VOLUME IV.

Historical Department, Biennial Report, 1916.
Historical Society, Biennial Report, 1916.
Oil Inspector, Biennial Report, 1916.
Land Office, Biennial Report, Secretary of State, 1916.
Adjutant General, Biennial Report, 1916.
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Railroad Commissioners, Annual Reports, 1915 and 1916.
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Pardons and Remissions by Governor, Biennial Report, 1916.

VOLUME V.

Insurance Department, Annual Report of Commissioner:
- Volume 1—Fire Insurance, 1916.
- Volume 2—Casualty and Miscellaneous, 1916.
- Volume 3—Life and Fraternal Insurance, 1916.

VOLUME VI.

Insurance Department, Annual Report of Commissioner:
- Volume 1—Fire Insurance, 1917.
- Volume 2—Casualty and Miscellaneous, 1917.
- Volume 3—Life and Fraternal Insurance, 1917.

Board of Health, Biennial Report, 1916.

STATE OF IOWA

1915

REPORT OF THE

STATE HIGHWAY COMMISSION

FOR THE

YEAR ENDED DECEMBER 1, 1915

ISSUED BY THE

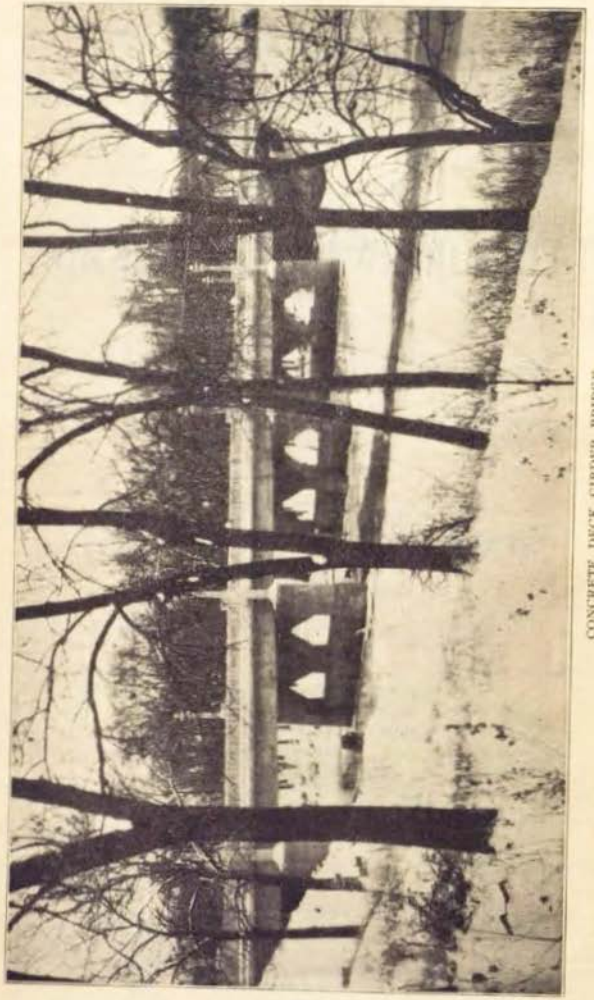
STATE HIGHWAY COMMISSION

AMES, IOWA

J. W. HOLDEN, Chairman
A. MARSTON
H. C. BEARD
State Highway Commission

THOS. H. Mac DONALD
Chief Engineer

DES MOINES
ROBERT HENDERSON, STATE PRINTER
J. M. JAMIESON, STATE BINDER
1916



CONCRETE DECK GIRDER BRIDGE.

Two hundred and nineteen foot concrete deck girder bridge over Des Moines River in Estherville. A very pleasing appearance has been obtained on this bridge by the use of deck girders and ornamental piers. This bridge was completed in 1915 at a cost of $12,000.00.

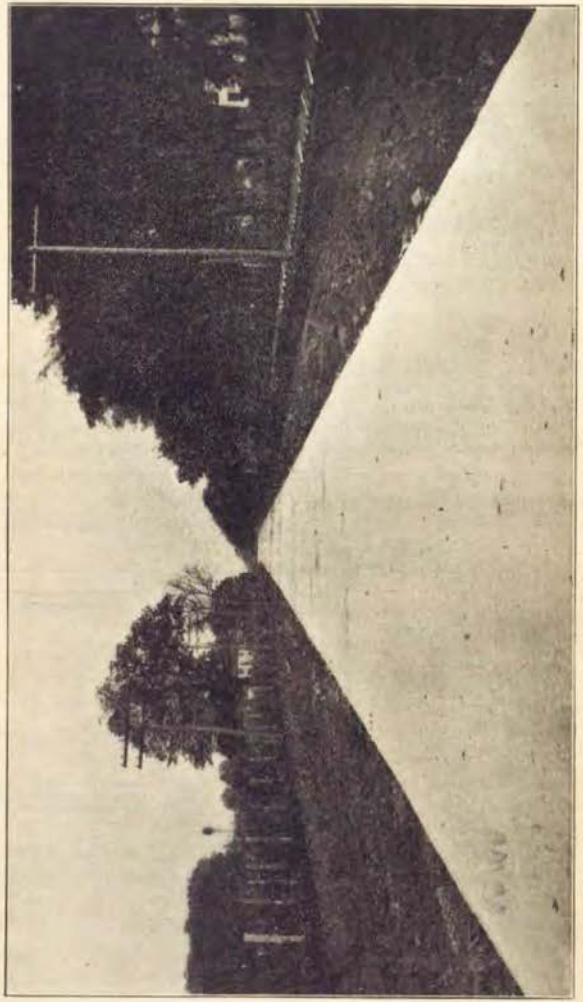
LETTER OF TRANSMITTAL.

To His Excellency, George W. Clarke, Governor:

Pursuant to the provisions of the Iowa Road Law, the State Highway Commission presents this its second annual report, for the year December 1, 1914, to December 1, 1915.

J. W. HOLDEN,
A. MARSTON,
H. C. BEARD,
Highway Commissioners.

Ames, Iowa, Dec. 1, 1915.



Concrete surfacing on the Agency road just west of Burlington. Cost of the concrete pavement after the grading was finished was $1.31 per square yard. The expansion joints are protected with metal plates.

STATE HIGHWAY COMMISSION

SECOND ANNUAL REPORT.

Ames, Iowa.
December 1, 1915.

To the Hon. George W. Clarke, Governor of the State of Iowa.

Pursuant to the provisions of the Iowa Road Law, the State Highway Commission presents this report for the year December 1, 1914, to December 1, 1915.

General Plan of Administration Under the Iowa Law.

The Commission believes it proper to outline the general plan of administration under the Iowa road law to correct some misinformation which exists, especially as to the handling of the road and bridge funds. Briefly, the units of state, county and township are concerned, each one having distinct functions of administration and control to perform. The state is represented by the State Highway Commission and a corps of engineers and assistants appointed by the Commission. The County is represented by the County Board of Supervisors, consisting of three to seven men elected to the position, and the county engineer appointed by the board of supervisors. The Township is represented by the Board of Trustees elected to the position, and the Township Superintendent or Superintendents of roads appointed by the Township Trustees.

Functions of State and Local Control.

In nearly all states where a state highway commission has been established, the principle of state control has been introduced simultaneously with the principle of state aid. In Iowa, the principle of state control was inaugurated without the principle of state aid, except insofar as the motor license funds which are returned to the counties may be termed state aid. This fund has not been applied to individual pieces of construction, and has not been termed a state aid fund, although in amount it is larger than the appropriations made by many states.

The functions of the State Highway Commission have consisted principally in the establishment of standards, both plans and

specifications, and general rules providing for uniformity of action for the local county and township road officers in the administration of road and bridge matters. It is the duty of the state to set standards and to enforce them. Only through the enforcement of a carefully prepared set of standards can uniformity of action and results be secured over a wide territory such as the State of Iowa.

The functions of local control, both county and township, lie in the expenditure of the funds raised from direct taxes or from other sources, and the expenditure of these funds under the standards developed by the State Highway Commission.

The State Highway Commission does not handle a single cent of road or bridge money belonging to the townships. The raising and expenditure of the funds through direct taxation has been made the function of the county and township boards, for which they, and they alone, are responsible. This point is emphasized here because of the generally misunderstood authority of the State Highway Commission in connection with the road funds. The commission does not have authority to raise or expend a single cent of the road and bridge taxes.

Standards for Construction, Maintenance and Procedure.

As stated above, the authority of the Commission lies in the development of standards and the enforcement of these throughout the counties and townships in reference to all road and bridge matters. Since its organization, standard specifications and plans have been developed for the major types of both road and bridge construction, and these have been placed in the hands of the proper officials. It is the policy of the Commission to publish these standards in such form that they will be conveniently available for use. It is also the policy of the Commission to develop the standard specifications after taking into consideration the possibilities and limitations of the producer, as well as the needs of the consumer.

Under the present plan a uniformity of construction, of materials, and of general method of procedure, exist throughout the state. The only differences that appear among the counties are due to different degrees of efficiency in administration, and in the amount of money available for expenditures. There is probably no other state that can show, among ninety-nine counties, the same uniformity that has existed in Iowa during the past three years in the bridges and culverts constructed, in the materials furnished, in the character of road grading, and in the prices paid for the various classes of work.

This cut illustrates the standard pony truss steel bridge. Approximately 250 of these structures were built in Iowa during 1915. This is a 90' span built in Chickasaw county.

Bridges and Culverts.

During the preceding year the bridge department of the Highway Commission designed 459 bridges for 76 counties estimated at $1,182,000.00, checked in detail 436 designs submitted for approval from 78 counties, made 40 inspection trips, developed new standards for both steel and concrete structures totalling 48 designs, passed upon and reported to the commission for approval 172 bridge contracts amounting to $1,337,069.00, passed upon and reported to the Commission for rejection bridge contracts amounting to $37,300.00 reported on 49 material contracts submitted from 22 counties, and investigated 92 complaints on bridge and culvert work from 62 counties. It will be noted that these figures are considerably increased over those reported for last year.

Railroad Crossings.

On railroad crossing improvement work the Commission has during the past year listed complaints on 112 projects from 45 counties, surveyed 45 crossing projects, prepared detailed plans on 46 projects estimated at $211,400.00, approved plans on 8 projects, held 37 conferences and adjusted a total of 41 projects, which improve 33 crossings and eliminate 21 crossings.

Roads.

The road department of the Commission passed upon plans for the permanent grading of 549 miles of road, undertook the settlement of 254 road complaints, passed upon road contracts totalling

$71,000.00, made detailed daily inspection of the construction of two miles of concrete road, prepared plans for and gave detailed supervision to the permanent grading of six and one-half miles of state road at state institutions, which required 369 days of work, and spent 148 days in the field on other classes of work.

Field Engineers.

The field engineers have attended eighty-four material lettings, twenty-seven road lettings, amounting to $230,562.00, one hundred and forty bridge lettings, amounting to $1,679,165.00, made field investigations of one hundred and ten complaints, taken up personally with each county engineer the preparation of his annual report, inspected bridge sites, approved grade lines, and given such general supervision to the highway work that 1,641 days have been spent in the field.

Experimental and Research.

In connection with the Good Roads experimental work of the Engineering Experiment Station of the Iowa State College, the Commission has assisted in carrying on tests of concrete and corrugated metal pipe culverts, road oiling, materials for road and street surfaces, bituminous carpet for concrete roads, and tests of road and bridge materials.

The Commission regards the experimental work on roads as highly important at this time, especially the use of oil on earth roads, and the building of reasonable cost gravel roads. We respectfully urge that the next general assembly give consideration to the necessity for building some object lesson roads of the lower cost type in order to prove their durability under Iowa conditions.

Educational.

The educational work of the Commission is done principally through the monthly service bulletin, the demand for which is constantly growing. Bulletins, including the pamphlet entitled, "Recent Road Legislation," have been published by the Commission during the past year in its educational work.

The Commission and members of the force have held forty-five road meetings in thirty-four counties, and the commissioners have spent a total of one hundred and thirty-one days in eighty-six counties on inspections and in consultation with the highway officers.

Lakebed Surveys.

In addition to the preliminary records gathered for all the meandered lakes of the state, the Commission has at this date completed the surveys on about twenty individual lakes.

State Institutional Roads.

In co-operation with the State Board of Control the Commission has prepared plans and supervised road work at the State Epileptic Colony at Woodward, at the State Hospital at Cherokee, and at the Iowa State College at Ames.

Growth of Use of and Demand for Improved Road Surfaces.

The Commission submits that the season of 1915 has demonstrated the limitation of the earth road surfaces on main traveled roadways, regardless of how well such roads have been constructed or how faithfully they are maintained. The State is now facing the problem of providing some weather and traffic resisting surface for the main traveled roads, a large mileage of which, as will be seen from the detailed report, has been placed in permanently graded form, needing the addition only of a surface to make them compare favorably with the best construction in other states.

The insistent demand for such roads is increasing, and does not come mainly from the pleasure seeker, but from the business man whose principle method of transportation is denied him when the roads are impassable for motor vehicles.

Needed Legislation.

Without at this time submitting a discussion in detail for needed legislation, the Commission submits the following as the most necessary additional legislation needed to give the State an adequate set of road laws.

Patrol System of Maintenance.

Practically all of the eastern states on their improved roads have found it necessary to develop a patrol system of maintenance. On Iowa roads which carry only a natural soil, sand-clay or gravel surface, the patrol system of maintenance is absolutely necessary to insure the proper up-keep of the roads.

Financing Road and Bridge Improvement.

A few of the counties are finding it possible to do some permanent road grading work, and practically all are doing at least

some permanent bridge and culvert work. There are a large number of counties, which, because of the large proportion of their road funds required for repair work, will not be able to do either permanent bridge or permanent road work out of their current funds for a considerable number of years, and some other method must be developed for financing these improvements.

The most expensive character of road work is the temporary patch work, such as many counties are finding it necessary to do out of their current tax levies.

The Commission is of the opinion that some form of bonding system must be provided if the permanent road work is to be carried on as rapidly as is desirable.

State Aid.

Every state that is making a decided advance in the building of permanent roads is accomplishing this object through the direct establishment of some form of state aid. Due to the form of taxation in this State, any state tax on property that might be levied would be the same as a direct county tax, but the Commission believes that the automobile license road fund should be set aside and used only for the permanent improvement of the roads. It is believed that this would encourage the building of permanent roads, and would also meet the approval of those who pay the license.

Federal Aid.

The State should make some provision looking forward to meeting its proportion of the cost of road improvements when an appropriation is made by the Federal government for the same purpose. The demand is becoming so insistent that it seems now only a question of a short time before some form of Federal aid is granted. In fact two stretches of road in this state have already been built, or are in progress of construction, under the first appropriation which was made for the improvement for Federal post roads.

Convict Labor.

At the state institutions convicts have been employed under the direction of the Commission for the past three years on various kinds of road and bridge work. The possibilities, as well as the limitations, of this form of labor are now reasonably well understood. Convict labor is economical on work which requires a considerable amount of hand work which cannot be done by some form of machinery. Convict labor is not economical on work which can be economically handled by machinery, such as dirt moving in ordinary soils. In rock excavation the use of convict labor would probably be economical.

Crew of convicts building a culvert at State Hospital for Insane at Cherokee. This culvert is on the new routing of the Hawkeye Highway through the State Farm of the institution.

The best use that could be made of convicts in this State is in quarries in the preparation of road materials. There is not a large amount of first class stone, but there is sufficient so that quarries could be developed, and the supply thus produced dis-

Convict road building crew at Woodward during 1915.

tributed all over the State. The Commission believes that the most economical use that can be made of convicts in road work is in the preparation of road materials at the quarries, or possibly in the manufacture of paving brick or some similar material.

This culvert was built by convict labor. It is on one of the new roads built during 1915 at the Iowa Colony for Epileptics at Woodward. It is of the circular type, concrete, with straight bulkheads and coping.

Motor Traffic in Regulation.

The Commission recommends that Iowa adopt a set of regulations for motor traffic similar to the rules adopted by the State of Ohio. The increased use of the highways by traffic of this character demands that reasonable regulations be enforced on the public highways, and it would be of immense value and service to the road user to have but one set of regulations in force throughout the State. The Commission will probably issue a set of suggested rules and regulations during the coming year.

Improper Uses of the Roads.

The Commission is of the opinion that cross state road races are not proper uses for the roads, and lead to a disregard of the state laws and municipal regulations by others who use the roads. The Iowa dirt roads are not, and probably never will be, proper surfaces on which to attempt to maintain high rates of speed over any considerable mileage. There are times, of course, when high speed is possible, but the publication of high rates of speed obtained and continued for some hours gives the wrong impression of safe uses that can be made of the ordinary dirt road. Reckless driving is immediately responsible for most of the accidents which have come under our observation and every road race prompts an utter disregard of all laws of safety in the use of the roads.

High Tension Transmission Lines Along the Public Highways.

Chapter 174, Acts of the Thirty-fifth General Assembly, gave the Board of Railroad Commissioners power to grant franchises to companies for the building and maintaining of transmission lines along public highways. The Highway Commission is of the opinion that high tension electrical currents should not be carried along the public highways of this State, but that companies wishing to transmit such high tension currents should acquire proper private right-of-ways. The high tension currents are dangerous to life and property alike, and may also render the telephone lines practically useless.

The Commission recommends the repeal of the part of the law allowing such high tension currents to be carried upon the public highways.

Work of Commission other than Road and Bridge Work Proper.

By the Acts of the Thirty-sixth General Assembly the Highway Commission, in addition to the road and bridge work proper required, was given the following additional duties:

The making of a survey and report on each of the meandered lakes of the State, still under the jurisdiction of the State.

The supplying of engineering and supervision for road work to be done around the state institutions under the administration of the Board of Control of State Institutions.

The assisting of the Department of Justice in the preparation of defense of patent infringement suits brought against Iowa municipalities or contractors under patents affecting materials or processes used in highway improvements, and the preparation of plans and estimates of cost for the elimination of dangers at railroad crossings.

Organization of the Commission.

The organization of the Commission by departments is as follows:

COMMISSIONERS.

J. W. Holden, Chairman.
A. Marston, Commissioner.
H. C. Beard, Commissioner.

ADMINISTRATION DEPARTMENT.

Thos. H. MacDonald, Chief Engineer.
J. E. Kirkham, Consulting Bridge Engineer.
C. B. McCullough, Assistant Chief Engineer.
L. A. Wilkinson, Sr., Accountant.
J. W. Eichinger, Bulletin Editor.
C. D. Curtiss, Assistant Engineer.
A. S. Miller, Assistant Engineer.
Janet Jacobsen, Secretary.
Annie Laurie Bowen, Clerk.
Thora Tallman, Stenographer.

BRIDGE DEPARTMENT.

J. H. Ames, Bridge Engineer.
E. F. Kelley, Assistant Bridge Engineer.
E. W. Blumenschein, Structural Engineer.
J. A. Paulsen, Chief Draftsman.
E. Williams, Assistant Engineer.
L. H. Doughty, Designer.
W. N. Adams, Draftsman.
W. A. Reeves, Draftsman.
Theodore Ohmann, Draftsman.
V. Enslow, Draftsman.
Hans Hanson, Clerk.
Ethel Seamands Paulsen, Stenographer.

ROAD DEPARTMENT.

F. R. White, Road Engineer.
J. S. Dodds, Assistant Road Engineer.
W. E. Jones, Assistant Road Engineer.
O. W. Crowley, Assistant Engineer.
W. M. MacGibbon, Assistant Engineer.
L. S. Gates, Assistant Engineer.
F. H. Mann, Assistant Engineer.
Anna Vanderlinden, Stenographer.

DISTRICT ENGINEERS.

(Joint Road and Bridge).

C. Coykendall, District Engineer No. 1.
W. H. Root, District Engineer No. 2.
W. F. Beard, District Engineer No. 3.
L. M. Martin, District Engineer No. 4.
J. S. Morrison, District Engineer No. 5.

DEPARTMENT OF DRAINAGE INVESTIGATIONS.

R. W. Clyde, Drainage Engineer.
S. A. Schackle, Assistant Engineer.
H. S. Leicht, Assistant Engineer.

Financial Report.

A full summary of the expenditures of the Commission for the fiscal year, 1914-15, is included in Part Four. The detailed and itemized expenditures will appear in the Expense Report of the Executive Council and the Board of Audit.

PART ONE—CHAPTER ONE

GENERAL REVIEW.

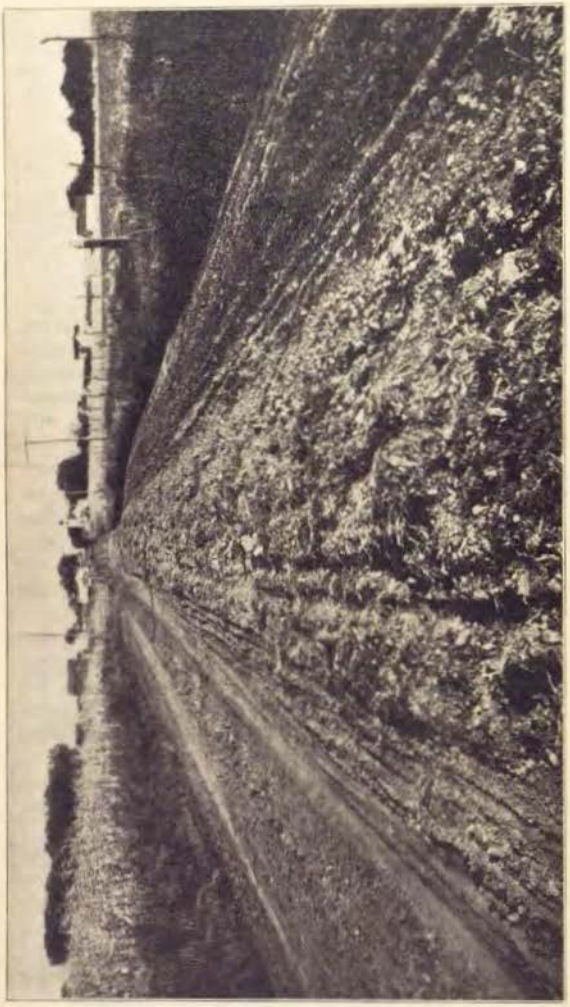
1915 Road Conditions.

The year 1915 will stand out in the experience of the highway officials, engineers and contractors of the State, in keen recollection because of the discouragements and the retarded progress of road and bridge improvements undertaken, suffered from unfavorable weather conditions. Through all the working season until late fall, one rain has followed another. Newly graded roads have been turned into quagmires, impossible to finish. Streams have again and again overflowed their banks, filling foundation excavations and effectively stopping bridge construction. The most consistent road dragging succeeded only in using up all available funds, and the dragging organization of county after county gave up in despair because of the little results accomplished on roads which never dried.

The year 1915 will be long remembered by the public who were forced to use the roads continuously to carry on the necessary traffic of the State.

The summer season of 1915 will be remembered by many transstate tourists who on their way to the great western expositions, had occasion to cross this state over roads that during a reasonably dry year would have been maintained in excellent shape, but which during this season have been the poorest possible advertisement for Iowa.

But the year of 1915 has demonstrated beyond question the limitations of the best earth roads that can be built during prolonged seasons of wet weather, and for this reason alone perhaps the losses will yet become a bankable asset if the State awakens with a determined effort to place some character of weather and wear resisting surfaces upon those roads which must be traveled every day of the year, regardless of the weather conditions.



This photograph is typical of many miles of township blade grader work done in Iowa during the 1915 season. The road builder threw the soil into the middle of the road, making no attempt to bury it under the new grade where it would do no harm. For many weeks a road like this is impassable for auto traffic except on the extreme edge of the road. There is no basis upon which the expenditure of road money for such work can be justified.

It is not likely that the State will next year experience the same conditions that prevailed during this season, but it is an assured fact that in any state with the soil conditions such as exist in Iowa, and with an annual rainfall of thirty-two inches, every year will bring its periods when the traffic demands on the main roads will cause an earth surface to give way, and to occasion all the disadvantages and losses resulting from a suspension or stagnation of the ordinary and extraordinary public traffic.

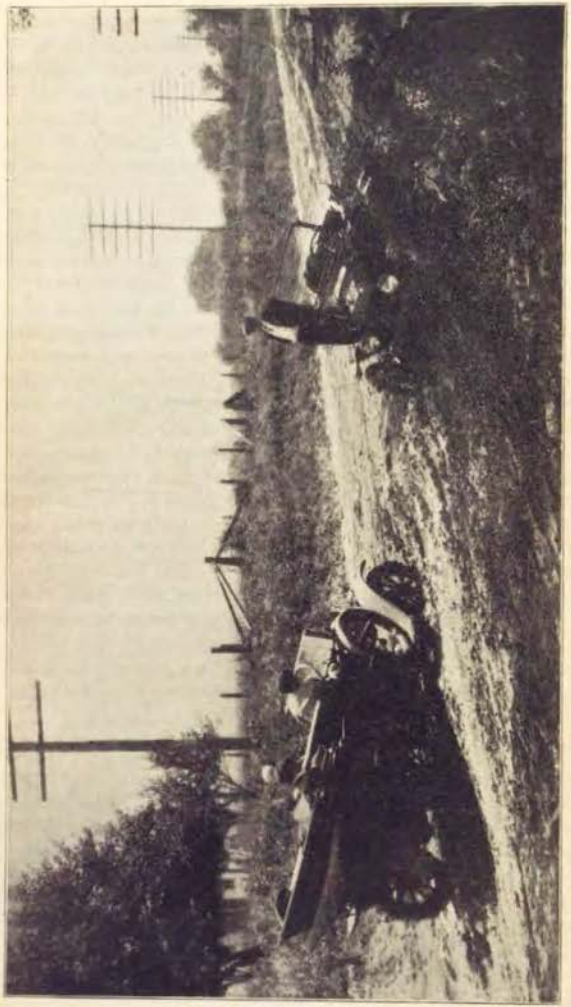
If the year 1915 has taught the lesson of the limitations of earth road surfaces on main traveled thoroughfares, then perhaps it has been worth the cost to Iowa. No matter how bad the year has been for the building and maintenance of roads it cannot be denied that public sentiment for better roads has increased more rapidly than in any other considerable number of years previous.

Some facts have existed which have contributed to a successful year's work along some lines. The prices of materials for bridge work, when the larger part of the contracts were let for the year, ruled relatively low. Prices for corrugated and other metal culverts, cement, structural steel and other materials of construction have never been lower in the history of the State. One manufacturer reported that after tabulating the prices bid in this State and in adjoining states on the same product, the Iowa prices were eighteen per cent lower on that particular material than those of the adjoining states.

The finished quality of much of the bridge work, particularly in reinforced concrete, is better than has ever before been secured in the State. The percentage of permanent bridge work has increased over 1914 in spite of the fact that in a number of counties practically every cent of the revenues were devoted to bridge repairs.

Outlook for 1916.

It is hardly conceivable that 1916 will bring the same weather conditions with it as have prevailed during the past twelve months. The highway work during the coming year will have the advantage of being conducted under an organization which has been rapidly gaining in experience and efficiency. A number of counties have already outlined their year's work, and have plans in progress of preparation providing for the expenditure of their 1916 funds. This means that work will be started early, and with more favorable weather conditions will be handled with less inconvenience to the public than in previous years.



Any dirt road during 1915.

As the efficiency of the engineering and administrative organization increases, greater care is being observed in the protection of the rights and necessities of the traveling public. Each year is showing a greater percentage of permanent work and less of repair work in bridge construction, but the counties are responding more slowly to the necessity for permanent road building, and too large a percentage is still being spent in temporary and repair work.

This view shows a finished section of the experimental mile of two course gravel road built on the Hawkeye Highway just east of Ft. Dodge during the season of 1915.

Constant inquiries are being received from private individuals and from public officials as to the possibility of issuing bonds against their current revenues in order to do permanent work rather than patch work. No adequate method now exists for anticipating funds. During 1916, bonds can not be issued for either road or bridge work except as these may be necessary to cover overdrafts created by unusual circumstances.

During 1916, if the present market conditions continue, prices will rule higher than during the past season. Take the single example of corrugated culverts. The price of the zinc used for galvanizing the metal, which has been stationary for years at five to six cents per pound is, at this date, quoted at about eighteen cents, making a difference in this item alone of not less than twelve to fifteen per cent. These market conditions may change at any time, but as long as the foreign demand for iron and steel

Typical mile of permanent grade constructed during the 1915 season in Crawford county. This mile is on the Soldier-Dunlap road.

articles continues as at present, the State must expect to pay prices that are considerably higher than those which have prevailed for the twelve months past. The fact, also, that many contractors have carried on work with practically no profit, or with actual losses, will have the effect of raising prices bid by them on bridge work.

View of the old Military road in Dubuque county running southwest from Dubuque to Cascade. This road was built of the native limestone and has been in use many years. During the season of 1916 it is proposed to improve this stretch of road which extends out for about eleven miles from Dubuque and to gravel the remaining distance to Cascade.

The fact of generally higher prices, however, will not be any considerable handicap to those counties which are following a definite policy of permanent improvement, as the value of such improvements, if high class, is so much greater to the community than the first cost of the materials entering into their construction, that the unit prices become a matter of secondary importance. The effect of higher prices will be more disastrous to those counties which will continue, as in the past, to use their funds for repairs and patch work and for temporary improvements only. This is the really expensive character of work, regardless of the cost of the materials or workmanship which are used.

Development of Road Systems in Neighboring States.

It is of interest to know the methods under which other states are developing a road system. There is considerable wrong information in this State relative to the progress that is being made. According to the latest available figures, Iowa's total road mileage is exceeded only by that of Kansas, Missouri and Texas, that is, Iowa stands fourth in the total road mileage. Iowa's total road and bridge expenditures are exceeded only by California, Indiana and New York, that is, Iowa stands fourth in the total expenditures.

It must be remembered that nearly one-half of Iowa's total expenditure, however, is for bridges and culverts, the greater percentage of which is for permanent work. Iowa has made faster progress than any other state in the number of permanent water way structures built during the past three years. The expenditures for roads are distributed over so large a mileage that while, as stated above, Iowa ranks fourth in the total expenditures, she ranks twenty-second in the average expenditure per mile. Iowa is an agricultural state of wonderful uniformity, and requires roads to be maintained continuously in a passable shape to every section of land. The road officers in an effort to meet the insistent and popular demand for roads reaching every section of land have distributed the current revenues over so many miles that the actual road work accomplished has in most of the counties been productive of only temporary results. This point is fully discussed under Chapter Four on road work, which very clearly shows the actual progress that is being made with road improvements.

It has not been difficult to secure rapid progress in permanent bridges and culverts, but it is extremely difficult to get the same character of road work proper, under the present methods of

financing such improvements from the direct taxes. The demand requires too wide a distribution to provide permanency in the work accomplished. In order to satisfy the demand for a longer yearly mileage of improved roads, surfaced with some other form of material than the natural soil, a different method of financing the cost of the construction must be provided. The cost of such construction cannot be met from an annual direct tax levy, unless the expenditure is limited to this one form of construction alone.

Every state which has made progress in road building, and which is held up as an example to be followed in Iowa, is financing the construction of such roads either from funds that are held for permanent construction only and cannot be dissipated by distribution over a long mileage in repair and maintenance work, or from the proceeds of bonds issued against the current tax levies.

To show the progress being made in other, and particularly in neighboring states in the building of surfaced roads, a summary has been made of the expenditures and progress made in the states.

In the ten years ended December 31, 1914, the expenditure for highway work in the United States increased from $60,000,000.00 in 1904 to $250,000,000.00 in 1914. In 1904 only ten states were participating in state aid or management. At the present time forty-four states have some form of highway department, and in thirty-one of these, financial aid is given by the state.

While the growth has been rapid indeed, the work of improving the total mileage has just been started. The following table shows the total mileage and the improved mileage of roads in Iowa and some of the other states.

ROADS IN IOWA AND OTHER STATES.

State	Total Mileage	Surfaced	Total State Appropriation Spent to Jan. 1, 1915	Total Funds Expended for 1914 Road Work	State Money for 1915 Road Work
Iowa	104,027	2,503[1]	$ 175,000[2]	$ 11,437,000	$ 75,000[3]
Illinois	94,141	9,000	867,989	7,957,668	2,100,000
California	48,069	9,368	8,269,942	14,670,414	7,000,000
Michigan	68,906	8,859	2,207,701	9,516,224	1,700,000
Missouri	120,000	8,000	1,421,983	8,277,253	350,000
Minnesota	91,890	6,206	2,708,174	8,225,821	1,770,741
Ohio	83,681	28,312	5,123,671	11,261,882	3,300,000
Wisconsin	61,050	11,500	2,829,486	9,118,708	1,215,000

[1]Does not include permanently graded roads.
[2]For period 1904 to 1913.
[3]Estimated five per cent of automobile license fund for maintenance of State Highway Commission.

When first instituted nearly all of the various state highway departments had very limited funds. Their functions were in most cases advisory and educational. From a small start the departments in many states have been built up into large, efficient organizations controlling the expenditures of large sums of public money.

Illinois.

The Illinois Highway Department was organized in 1905, but the work was restricted to educational and investigational work and the distribution of crushed stone prepared by state convicts. In 1913 the law was broadened and state aid for highway work made possible by appropriations of $400,000.00 for 1913-14 and $700,000.00 for 1914-15. In addition, $100,000.00 per annum for engineering and experimental work was appropriated.

State aid roads and bridges are built under state supervision, one-half of the expense being paid by the county and one-half by the state. Counties may raise money by special tax, or may issue bonds if there is not sufficient money in the treasury to meet their allotment. The counties must raise an amount equal to their allotment before it becomes available.

Ohio.

Ohio established a state highway department in 1904. A system of inter-county highways connecting all of the county seats in the state has been laid out, and is being improved under the supervision of the State Highway Department. The cost is apportioned on the following basis:

Fifty per cent to the state, twenty-five per cent to the county, fifteen per cent to the township and ten per cent to the abutting property owners. The state's share is payable from the unexpended balance remaining to the credit of a county from the special appropriation by the general assembly, or from the state highway improvement fund, provided by an annual levy of three-tenths mill on all taxable property of the state. The county's share is raised by the levy of a tax not exceeding one mill upon all taxable property of the county. The township trustees are authorized to levy a tax not exceeding three mills upon all taxable property of the township. Up to January 1, 1915, a total of 596 miles of road had been constructed under this system at a total contract price of $5,124,000.00, or an average of $9,000.00 per mile.

Michigan.

In 1905 the legislature in Michigan enacted a law providing for state aid in road construction and for a state highway department. The duties of the department were to compile records of road building material as to quality and location, and records of roads built under the state reward system, to superintend the inspection of state reward roads and prepare plans for roads and bridges. Instruction in road and bridge construction and expert advice was to be given to local authorities.

In 1913 the law was very much broadened. A system of state trunk line roads, about 3,000 miles in extent, was provided for. The original reward was for a nine-foot width of surfacing. This was increased by ten per cent for each additional foot in width up to sixteen feet. The state pays the entire cost of all bridges of over thirty foot span on the trunk line roads. A maintenance fund equal to two per cent of the original reward is allowed annually on all roads which are properly maintained. The rewards allowed are as follows.

Sand-clay	9 foot width	$ 250.00 per mi.
Gravel	9 foot width	500.00 per mi.
Stone-gravel	9 foot width	750.00 per mi.
Macadam	9 foot width	1,000.00 per mi.
Concrete	9 foot width	1,000.00 per mi.
Brick	9 foot width	1,000.00 per mi.

Ten per cent additional for each additional foot in width up to sixteen feet.

For trunk lines this reward is doubled, a reward of $3,400.00 per mile being granted for macadam, concrete or brick trunk line road. Counties working under the "county road system," organize good roads districts consisting of several townships, or townships may work independently in constructing state reward roads. Funds may be raised by the counties, districts or townships by special taxes or by bonding.

Up to July 1, 1914, approximately 2,400 miles of state aid roads had been built. At that time 500 miles were under construction. During the year ended July 1, 1914, $581,736.00 was expended by the state on reward roads, and $100,000.00 on state trunk line bridges.

Minnesota.

The Minnesota State Highway Commission was organized in 1905. The state engineer employed by the commission is required to make all surveys, prepare plans and specifications, and

WOOD PILE TRESTLE BRIDGE.

This type of construction is rapidly being replaced by permanent structures on the highways of this state. At the time this photograph was taken, three years ago, the county in which this bridge was located had 20,000 lin. ft. of this type of construction on its highways.

have supervision of all work on all state roads. The commission is authorized to investigate the location of road materials, methods of construction, and systems of administration, and to hold public meetings and apportion state aid.

The state road fund is created by an annual tax levy of one mill on each dollar of valuation, together with all money accruing from investments in the internal improvement land fund. This fund is apportioned among the various counties, but no county can receive more than three per cent, nor less than one per cent in any one year. The annual appropriation for the state highway department was in 1914, $150,000.00. In the state road system, as laid out, there are 11,401 miles. In 1914, a total of $3,126,106.00 was expended on road and bridge work under state supervision.

Missouri.

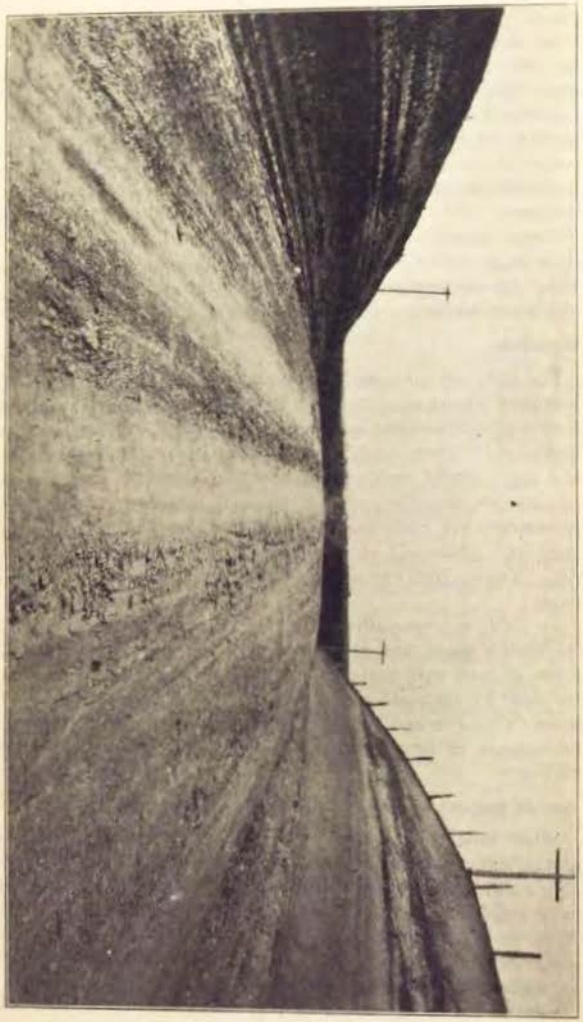
In 1907, a state highway department was organized in Missouri. Its work was educational and investigative.

In 1913 the law was changed and the work of the department increased. The first state appropriation was given in 1907 when a war debt fund of $475,000.00 was equally divided among the counties. The state highway department exercised no control whatsoever over the expenditure of this money. The state now has the proceeds from a special tax levy and from the automobile licenses. State aid is used in the maintenance of about 10,000 miles of roads. Counties or special good road districts may bond for the purpose of building roads and bridges. In ninety-two counties, the road work is in charge of the county court of three members. In twenty-two township counties, the roads in each township are under the control of a township board.

California.

The first state aid law was passed in California in 1895. Comparatively little work was done, however, until after the passage of the State Highways Act in 1910. This act, which was passed by a referendum vote of the people, provided for a bond issue of $18,000,000.00, and for a system of state highways distinct from the state roads built under legislative appropriations. This system of state highways comprises two trunk lines traversing the state from north to south, and a system of laterals connecting all the county seats with the trunk lines. Funds became available for work in 1912.

Up to January 1, 1915, a total of 1,008 miles of this system had been placed under contract, of which 632 miles were com-



Cut on Denison-Defiance road in Crawford county; 21,839 cubic yards of earth moved on this mile at a unit cost of 16.8c per cubic yard. Here is a permanent improvement.

pleted. In 1914, a total of 406 miles of state and state aid roads were built. The state aid roads are roads other than those in the state system, and have usually been constructed in sparsely settled sections. Special appropriations are made by the legislature for these roads. In 1914 a total of $14,670,614.00 was expended; $9,495,281.00 of this amount comprised local funds expended in road work by counties, townships and districts and $5,175,333.00 was for road work done solely at the expense of the state.

Under prescribed conditions any county can issue bonds for road improvement. The work is done under supervision of the state highway department. Road districts may also be organized and bonds issued for road improvements.

Wisconsin.

The state aid plan was inaugurated in Wisconsin in 1911. The boards of county commissioners are required to select a continuous system of roads known as "the county system of prospective state highways." These roads may be constructed by the town, county and state jointly, each paying one-third of the cost, or a county can assume two-thirds of the cost and the state one-third. Improvements are made under the general direction, and in accordance with plans and specifications of the state highway commission. County highway commissioners are in direct charge of the work.

In 1914, approximately $4,330,000.00 was expended, of which the state's share was $1,230,000.00. With this expenditure, 720 miles of road were surfaced, and 540 miles graded. This brings the total for state aid roads built up to January 1, 1915, to 2,632 miles. Counties and towns may issue bonds for the original improvements of any portion of the system of prospective state highways.

Present Demand in Iowa.

When road construction was first started under the direction of the state highway departments in the eastern states, the use of the roads was limited to horse-drawn vehicles, and the states were content to build a few miles of surfaced road each year. With the advent of the automobile and the enormously increased use of the roads the demand changed as suddenly, and the states are no longer content to build a few miles each year, but there is a popular increasing insistence that a long mileage of reasonable

cost roads be built each year so that a three-hundred-and-sixty-five-day traffic can be maintained without inconvenience over them.

It was probably not foreseen in 1891 when New Jersey made the first state appropriation that a great principle of legislation had been enacted, and which would within twenty-five years grow to a nation-wide movement.

In Iowa in 1913, 16,000 miles of the main roads of the state passed under the immediate jurisdiction of the counties from the townships, which had formerly held control. Practically none of this mileage had been improved in a way that would meet present day traffic needs, in fact some of the best roads existing have already been necessarily re-made to provide a sufficient width of roadway to carry the traffic without danger.

At the time this mileage was taken over by the counties, the demand was insistent that the whole mileage of the system be placed in a serviceable condition as early as possible. This accounts for the fact that in the 1914 road work, the road funds proper were devoted to the repair and grading of 2,176 miles of earth road, 75 miles of surfaced roads, the maintenance of 15,000 miles, and other work which can be classified only as repairs and temporary road work.

The year of 1915 will show a larger mileage of permanently graded roads, and due to weather conditions, a vastly increased cost of maintenance. It is obvious that the system to be developed in this state must provide a long mileage of low cost roads capable of being built rapidly without undue investment in expensive machinery, and of a type of construction that can be maintained continuously throughout the year to sustain the traffic demands.

These conditions are met by well constructed gravel roads. We also have some examples of sand clay roads which have carried the traffic successfully. It is true that both of these types of roads require continuous maintenance at a higher annual cost than the maintenance proper on some of the higher priced road surfaces. However, it must always be borne in mind that the cost of any road to a community, no matter how it is financed, is the cost of the annual maintenance, plus the interest on the original investment, plus a sinking fund sufficient to replace or renew the road when it can no longer be maintained with any reasonable expenditure. If these items are all taken into consid-

eration it will be found that for the greater per cent of the roads which now require surfacing to be continuously serviceable, the gravel or some similar surface is the lowest priced type of road that can be built. A demand exists for surfaced roads and a long mileage of such roads, but this demand is for a type of road that can be financed without an undue financial burden upon the community.

Experimental stretches of gravel roads have been built during the past year in Dickinson County near Spirit Lake and in Webster County near Fort Dodge. The Commission co-operated with the Board of Supervisors in a stretch of gravel road in Polk County, connecting with Southwest Ninth Street in the City of Des Moines. These roads are discussed elsewhere in this report.

During the past year there have been a number of miles of earth roads treated with oil. This treatment is discussed more fully elsewhere in this report. Such treatment must be regarded as temporary only, and cannot be classified as surface road construction in any sense.

Experimental road oiling has been carried on at Ames with equipment furnished by the Highway Commission and the Good Roads Experiment Station, and observations have been made of oiled roads in several other sections of the State.

PART ONE—CHAPTER TWO

ADMINISTRATION DEPARTMENT.

Organization.

During the first two years of operation under the present law there were so many blank forms, methods of accounting and cost keeping, and detailed matters of this same character to be developed and installed throughout the State, that it was thought advisable to maintain an office department. The educational work of the Commission was also carried on under a distinct department. After the preliminary work had been done, the office department, educational work, experimental and testing, and accounting were all grouped under the general head of administration. The organization is as outlined under the report of the commissioners.

REINFORCED CONCRETE SLAB BRIDGE.

One hundred and thirty-eight bridges of this type were constructed in the state during 1915 at an average cost of $1,300.00 each. This bridge is located in Cedar county.

Commissioners.

The personnel of the Commission has remained unchanged. Commissioner Beard, whose first term expired July 1, 1915, was reappointed by Governor Clarke. The organization since July 1, 1915, has consisted of J. W. Holden of Scranton, Chairman, Commissioners H. C. Beard and A. Marston. Commissioner Marston holds membership ex-officio as Dean of Engineering of the Iowa State College.

School of Instruction.

The second annual school of instruction for county engineers was conducted by the Commission at Ames on December 28, 1914, to January 2, 1915.

In addition to the staff of the Highway Commission, lectures and addresses were given by Dr. Pearson, President of the Iowa State College, Professor J. E. Brindley, Henry E. Sampson, Special Counsel for the Department of Justice, Professor T. R. Agg, A. R. Hirst, State Engineer of Wisconsin, Clifford Older, Bridge Engineer for the Illinois Highway Commission, Professor J. E. Kirkham, J. S. Coye, Chemist of the Engineering Experiment Station, P. C. McArdle, then Chief Engineer for the Illinois Highway Commission, Professor R. W. Crum, J. T. Donaghey, Chief Inspector for the Wisconsin Highway Commission, E. B. McCormick of the Office of Public Roads, Harvey Ingham, Editor of the Register & Leader, Des Moines, and Lafayette Young, Editor of the Des Moines Daily Capital.

One hundred and twenty-two engineers and road men were registered, and a number of county supervisors and other public officials were in attendance who did not register.

This view shows a typical rounded corner built according to the Iowa standard in Crawford county, during the season of 1915.

Crawford county has made it a rule to round all corners on all permanent work on county road system. This view shows a typical one of the rounded corners. Note that the traffic is almost entirely inside the original fence corner which is marked by the camera case. To round a corner like this it requires about 1-80 of an acre, fences being cut back thirty feet on each side from the corner.

Addresses and talks were made by a number of county engineers, and a generally successful meeting was held. These meetings will be held each year for the purpose of developing the best methods of road and bridge construction and maintenance, and for the inter-change of ideas amongst the body of engineers who are responsible for the results which are obtained in all the counties in the state.

County Engineers.

Due to unsatisfactory conditions in the engineering work the county engineer of Polk County was removed by the Highway Commission, and Mr. John W. Budd of Des Moines was appointed by the Board of Supervisors to fill the vacancy.

Due to resignations and other causes, new engineers have been appointed to county positions by the boards of supervisors in the following counties:

Adams, Allamakee, Appanoose, Boone, Cass, Delaware, Hamilton, Humboldt, Hardin, Harrison, Jackson, Johnson, Jasper, Kossuth, Lee, Lucas, Lousia, Montgomery, Muscatine, Polk, Pottawattamie, Pocahontas, Shelby, Tama, Taylor, Union and Wright.

Road Meetings.

During the year, the Commissioners and representatives of the Commission have held forty-five public meetings in thirty-four counties of the State. Practically all of these meetings were held for the purpose of explaining and instructing the county road officials in the requirements of the road laws.

Northwestern Road Congress.

The Northwestern Road Congress, an organization including the states of Illinois, Wisconsin, Indiana, Minnesota, North and South Dakota, Missouri and Iowa, held its annual convention at Cedar Rapids on October 4-5-6 and 7. Two hundred delegates were in attendance, and all sessions of this congress were well attended.

The condition of the roads undoubtedly prevented a large number of road enthusiasts in the state from attending the meeting, as only a few delegates attempted to make the trip in their cars. The Commercial Club of Cedar Rapids is to be congratulated on the efforts put forth by that organization to insure a successful meeting.

County Inspections by Commissioners.

In addition to the regular force of the Commission who make frequent visits to the various counties of the state, the Commissioners have spent one hundred and thirty-one days in the field inspecting the work of eighty-six counties, and conferring with the supervisors, engineers and township trustees.

Official Communications.

The following official communications have been issued during the year:

No. 26.—Relative to the purchasing of bridge and culvert material.

No. 27.—Blanks for information concerning salaries and expenses allowed county engineers.

No. 28.—Relative to second annual road school.

No. 29.—Relative to the employment of county engineers and their assistants.

No. 30.—Relative to the issuing of county warrants.

Purchase of Materials.

Under the requirements of the road law it is contemplated that all bridge and culvert material shall be purchased upon competitive bids submitted at a publicly advertised letting. The commission has enforced this requirement strictly, and the uniformly low prices paid for materials have shown the advantage of this policy. Part of this is due to the fact that low prices have prevailed generally throughout the country, but this has been true before when the price to the Iowa consumer did not reach the level of the prices obtained under the sharp competitive system of lettings which has prevailed during this year. All materials have been purchased on standard specifications furnished by the Commission, insuring a high grade quality throughout.

Conference with Bridge Builders Association.

It has been the policy of the Commission to take into consideration in writing specifications the views of the men who must furnish the material and do the work, as well as the requirements of the public in its use of the finished structures.

In pursuance of this policy a conference was held with a committee from the Iowa Bridge Builders Association at their request, at which time this committee submitted to the Commssion for its consideration various points in connection with the standard bridge specifications.

Conference with Culvert Manufacturers.

A conference was also held with the manufacturers of corrugated culvert pipe on June 9, 1915, to take up the points which they wish to present in the same manner as in the conference with the committee from the Bridge Builders Association.

At this conference it was agreed that the Commission would take up correspondence with the neighboring states in an effort to standardize corrugated culvert specifications for all of the states in this territory. It was believed by the manufacturers present that if the same gauges, length of sheets and other requirements were used generally that a higher class product could be obtained at lower prices.

At the meeting of the Northwestern Road Congress at Cedar Rapids a committee was appointed consisting of M. W. Torkelson, Bridge Engineer for the Wisconsin Highway Commission, J. H. Mullan, Deputy State Engineer of the Minnesota Highway Commission, Alex Anderson, County Superintendent of the Illinois Highway Commission and Thos. H. MacDonald, Chief Engineer for the Iowa Highway Commission, to report recommendations for standardizing culvert specifications.

OLD BURLINGTON STREET BRIDGE.

This two span low string truss bridge has been replaced by three 10'-0" concrete arch spans. The bridge spans the Iowa River on Burlington street, Iowa City, Johnson county.

A conference was held at Madison at which manufacturers and mill representatives were requested to present their views, and a set of recommendations has been prepared based on the results of these conferences, the recommendations of the manufacturers and requirements of the state highway departments.

Conference with Lumber Dealers.

On November 17th a similar conference was held with the lumber dealers of the state who are engaged in furnishing this material to the counties. The standard specifications under which this material is purchased from various points in the northwest and each were discussed, and principles for a new set of specifications governing lumber furnished to the counties of the state were agreed upon.

Standard Specifications and Plans.

The Commission has issued during the year standard specifications for highway bridge construction, earth road building, concrete road building, corrugated metal culverts and concrete pipe culverts.

Standard plans have been issued in booklet form for pony truss steel bridges, which will be followed by plans published in the same form of the different types of concrete bridges.

Constant inspection is being made of the structures and construction obtained under the standard specifications. Tests in the field and in the laboratory are being conducted, and such changes made in the specifications and plans as the information thus secured warrants.

During the ensuing year standard specifications and standard plans will be issued covering all materials and construction which have not yet been standardized.

Publications.

Since January 1, 1915, there have been published nine issues of the Service Bulletin, of approximately 12,000 copies each. The full mailing list for the Bulletin comprises about 20,000 names, and with an issue of about 12,000 copies it is necessary to alternate on portions of the list every month, about 8,000 of the people on the list receiving copies only on alternate months. Requests to be placed on the mailing list have been coming in at the rate of probably thirty-five to forty each week. Most of these requests are, of course, from residents of Iowa, but there have

BURLINGTON STREET BRIDGE.

This bridge of three 104' concrete arch spans is constructed on Burlington street in Iowa City, Johnson county, at a total cost of $50,000.00.

been a great many from engineers, engineering schools, construction companies, and engineering and automobile publications outside the state.

The material in the bulletin is prepared with the view of arousing interest in, and a desire for, improved road conditions. Each issue contains articles descriptive of good bridge, culvert or road work done in Iowa counties. The illustrations are chosen with a view to illustrating good construction or maintenance features. There is occasionally an article of a strictly technical or semi-technical nature. The majority of the material, however, is prepared with the idea of attracting the interest of the general reader by showing him what other communities are doing in the way of road and bridge improvement, and arousing in him a desire for such improved conditions in his own community. The same means that arouse his interest are planned to illustrate to him the best methods of accomplishing or securing the improvements desired. Engineers, road superintendents and crew foremen are shown methods and means used by others in similar positions in their road and bridge work.

The many commendatory notices received through the press and through personal correspondence, indicate that the Service Bulletin is filling the object for which it was designed. No effort is made to influence readers to paved roads, or to favor any special type of material for surfacing where paved roads are determinded upon. The aim has been to make available to all the results attained in every road improvement attempted by any community. Chief attention has been given to the construction of dirt roads and their maintenance. The general demand for information on the oiling and gravelling of dirt roads during the past year made it seem advisable to give much space to articles and illustrations on these subjects. These articles have been widely copied, and issues of the Bulletin containing such articles have been pretty generally exhausted.

Newspapers have copied freely from the bulletin and have made many requests for the use of the cuts used in the illustrations. Oil and gravel road sets of cuts have been going from paper to paper throughout the entire summer. The matter of supplying such material promises to become one of the important features of the bulletin work.

In addition to the Service Bulletin there have been issued a number of strictly technical and semi-technical publications. Some

of these have been in form similar to the Service Bulletin and as supplements to the bulletin, as for instance:

Standard Specifications for Highway Bridges.
Standard Specifications for Building Earth Roads.
Standard Specifications for Concrete Road Building.
Standard Plans for Low Riveted Steel Trusses.
Standard Specifications for Metal Culverts.

Other publications of strictly technical matter, not in the form of the Service Bulletin have been as follows:

Report on Test Specimen Concrete Tile.
Engine Loads on Timber Joists.
Accredited Paints for Shop and Field Coats.

In conjunction with the Department of Justice there were issued 10,000 copies of a booklet entitled, "Recent Road Legislation of Iowa." This was a compilation of the road, bridge and drainage laws of Iowa, the text of the law being accompanied by an interpretation of the law free from legal verbiage.

During May there was issued a 5,000 copy edition of "The Way to Good Roads." This was a thirty-six page, nine by twelve inch booklet prepared especially for use in good roads study courses for the Iowa Federation of Women's clubs.

Photographs.

There are now in the Commission's photograph files approximately 2,000 negatives. These are used for the making of prints, for cuts and illustrations, enlarged views and lantern slides. The pictures show road, bridge and culvert construction in nearly every county in the state. Both good and bad methods and results are illustrated. There are sets showing sand-clay, macadam, and gravel road construction, concrete road, bridge and culvert building, effect of oil and methods of oiling country roads, steel bridge construction, tile, beam and paint tests, elevating and blade grader work, convict labor on road, bridge and culvert construction, and many typical Iowa road scenes.

State Fair Exhibit.

The Commission recognizes as one of its most important functions, the development of the educational possibilities and opportunities presented to it. Road improvements will always remain a matter of local concern, and to a great extent, one of local selection. The more information of a substantial nature that can be placed before the public as regards types and materials

of construction, the more intelligent will be the selection made by the public to apply to local necessities.

For this reason at the June 14th meeting the Commission decided to develop an exhibit on the State Fair Grounds, constructed in a permanent way, that would serve as an exposition of the various types of standard road and bridge improvement as these types are now recognized. The bridge construction illustrated in this exhibit consists of a longitudinal section of a reinforced concrete deck girder bridge, which forms the entrance to the exhibit space set aside for the use of the Commission by the State Fair board, and a standard box culvert built under the roadway, with a portion of the concrete cut away at the end to disclose the method of using steel for reinforcing the structure.

The country road portion of the exhibit consists of sections ten feet long and sixteen feet wide of the following types of construction:

Oiled earth, gravel, penetration macadam, reinforced concrete and brick on concrete base.

The roadway sections are built sixteen feet wide, standard width for a double track roadway, which on the standard county road section allows for a four foot earth shoulder on either side of the surfacing material.

The pavement exhibit consists of wider sections of concrete, one and two-course, brick on concrete base, asphaltic concrete on concrete base, sheet asphalt on concrete base and creosoted wood block on concrete base, confined at the side by a concrete curb.

The country road surfaces are placed on a standard county road section earth road built to a true scale, with a standard woven wire fencing on either side of a sixty-six foot right of way.

The various materials used were selected to illustrate practically all of the standard forms of pavement available for use in this state. No attempt was made by the Commission to show preference, or to formulate recommendations for the use of any particular type of material. The exhibit was constructed in a convenient location, with the idea only of providing an opportunity for those interested to examine all the available types of road materials side by side. The exhibit was supplemented by a collection of photographs and printed material showing actual road and bridge construction, both good and bad, in the state.

During the week of the State Fair, many public officials and citizens interested in road improvement visited the exhibit and

gave much serious study to the different forms of construction displayed.

It is planned to add to the value of this exhibit by compiling the cost of roads constructed of the various types, and as opportunity presents itself, to obtain data upon the length of life and the amount of traffic that each can carry without serious deterioration.

Railroad Crossings.

In addition to the definite projects taken up and reported in detail herein, the railroads have of their own accord done a considerable amount of improvement work at crossings, such as the widening of grades, decreasing the grade of approaches to their track, and planking or otherwise improving grade crossings between the rails.

The new legislation of the Thirty-sixth General Assembly relative to the elimination of danger at railroad crossings has been of much assistance, as it allows the counties and townships to assist in making such improvements. On account of the heavy expense involved in each average grade separation, only a limited number of such projects can be secured in any one year. For this reason the Commission is endeavoring to select those crossings which carry the greatest amount of traffic for first consideration.

Roads Through and Adjacent to State Property.

Under the Acts of the Thirty-fifth General Assembly, amendatory to chapter 93, Acts of the Thirty-third General Assembly, roads in and adjacent to state institutions were placed under the supervision of the Board of Control of State Institutions. This matter was discussed in Part Seven of the 1914 Report. There are about fifty miles of such roads which have thus been placed under the direct control of the state, and for which the state is responsible, both for their maintenance and their construction.

Under the Acts of the Thirty-sixth General Assembly relative to the Highway Commission, it is the duty of the Commission to do the engineering work required on these roads upon request of the Board of Control.

During the year construction has been carried on at the State Hospital at Cherokee, the State Hospital at Woodward and the Iowa State College, under plans and specifications and supervision of the Highway Commission. Convict labor was employed on all this work, and a complete report is made under Part Five of this report.

This is typical of the old type wooden culvert built in Iowa under the old system of road and bridge building. This is a culvert on the state farm at Woodward which has since been replaced by a concrete box culvert.

State Road Work. Steam shovel making a 19-foot cut on the North Road at the Iowa State College at Ames. The steam shovel with an engineer, fireman, and water boy, was hired from a contractor. The rest of the work was done by convicts from Anamosa. The dirt was loaded into steel dump cars in trains of five cars each, which were allowed to run down hill under the guidance of a convict brakeman. The empty cars were then drawn back by horses.

Lakebed Surveys and Investigations.

Under an act of the Thirty-sixth General Assembly the Commission is required to make a survey and report on all the meandered lakes of the State. By this law the Commission was directed to detail such employees as were necessary to perform this work, and was empowered to call upon the engineering departments of the Iowa State College and the State University and upon other state departments, for assistants to carry on this work.

There are about eighty lakes and lakebeds which will require a survey and report. At this time about one-fourth of the surveys have been completed, and there are three parties in the field, two of these parties being made up of employees of the Commission and one party of employees of the State Fish and Game Warden, Mr. E. C. Hinshaw. It is planned to finish these surveys by July 1, 1916, if possible, and as soon as the surveys are completed, to classify the lakes as required in the law, so that the report can be completed by January 1, 1917.

A report of the work to date is included under Part One, Chapter Five.

Investigations.

A number of important investigations were carried on by the Commission during the past year. An investigation of certain bridge contracts and bills filed therefor, has been made in accordance with the request of the grand jury of Plymouth County. The Report on this contract is now ready for filing with the county attorney.

An investigation of reinforced concrete pipe under service conditions has been carried on in connection with the Experiment Station, and a partial report made to the Commission. As soon as completed the results of this investigation will be issued in printed form.

An investigation of the road and bridge work and the allowance of bills therefor was made in Taylor County, and the data obtained placed in the hands of the Attorney General.

Experimental and Research Work.

The experimental and research work carried on by the Commission in co-operation with the Good Roads section of the Engineering Experiment Station of the Iowa State College covers the general field of reinforced concrete pipe, metals for culvert pipe, materials for road and pavement building, paints for structural steel, use of oil on earth roads, use of bituminous carpets on concrete roads, and the distribution of floor loads on bridges. Progress reports are included in Part Three of this report.

General Correspondence.

A considerable amount of correspondence comes to the Commission and the commissioners on matters other than the routine details of road and bridge construction. The officials of towns and small cities request and receive a considerable amount of information relative to the improvement of the roads and streets under their jurisdiction. The Commission has followed the general policy of distributing the information which it has gathered, together with standard specifications and plans, to municipal officials as well as the county and township officers. The road problems of the small towns are frequently even more difficult to handle than those of the county road systems, on account of lack of sufficient funds or an adequate organization to deal with these problems.

Another branch of correspondence which results in much practical benefit to the State is with manufacturers in regard to the improvements and standardization of their products. This has been necessary in the development of standard specifications, and the Commission is pleased to report that in general, the manufacturers have responded with an improved product in a most satisfactory manner. This has been true of paints, corrugated and boiler metal pipe and reinforced concrete pipe.

Accounting.

Since July 1, 1915, all bills of the Commission have been passed upon by the State Board of Audit at Des Moines. The accounting work of the Commission now consists of three general lines:

The bills for the Highway Commission work proper.

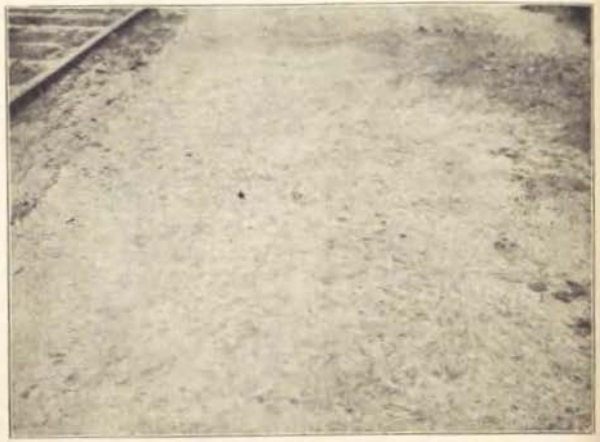
The bills incurred in the construction and maintenance of state roads around the state institutions, and

The expense bills of the lake survey work.

The expense bills of the lake survey work are audited by the State Board of Audit, the same as the bills of the Highway Commission work proper, and the bills for the state road work are audited by the Board of Control of State Institutions.

Federal Post Road.

In 1914 an appropriation was made by the U. S. Department of Agriculture to aid in the improvement of the Dubuque-Dyersville Post Road, amounting to $30,000.00. Plans and specifications



Faulty concrete pavement surface—improper consolidation of the concrete, the use of soft and friable aggregate, in many cases covered with a coat of finely divided clay or dirt, together with a mortar which was too lean to withstand abrasion, has resulted in a surface of this character. The mortar carpet has rapidly scaled away, and the stones are picked out piece by piece, due to faulty bonding of the material in the concrete.

Improvement of Hawkeye Highway in Dubuque county. Earth cut east of Farley. Note the care with which the side slopes have been shaped. The sub-grade has been rolled ready to receive the gravel surfacing. It cost 20c per cubic yard of earth to make this cut.

were prepared by the U. S. Office of Public Roads, and these plans and specifications submitted to the Highway Commission for approval. These plans, as first submitted, did not correspond with the standards adopted by the State Highway Commission in a number of important particulars, and in order to secure an adjustment, Road Engineer F. R. White, was sent to Washington, D. C., for a joint conference with the Office of Public Roads. This conference was held on February 5th and 6th, at which a satisfactory agreement was reached, and the work is now in progress under the plans and specifications as approved by the Commission.

A view on the Dubuque-Dyersville post road. This photograph shows one of the work trains on the industrial railroad installed for the purpose of hauling material from the gravel pit at Farley.

When completed this will be the most extensive single highway improvement ever undertaken in the state. The road will provide a gravel surface, and all railroad grade crossings will be eliminated either by overhead viaducts or by subways. The total length of the improvement is about nineteen miles, and the estimated cost about $160,000.00, including the cost of the viaducts and subways, a portion of the cost of which will be shared by the Illinois Central Railway. The plans prepared by the Commission have been adopted for all viaduct construction.

Pavement Through State Capitol Grounds.

On request of the State Executive Council the Commission examined the specifications for the bitulithic pavement, for which a contract has been awarded for the pavement of East Grand Avenue in the City of Des Moines through the State Capitol grounds. The Commission has also agreed to detail an inspector on this work for the Executive Council when actual construction is under way.

Changes in County Road Systems.

The county road systems for the several counties as shown by the official county maps filed with the county auditors on March 1, 1914, were approved and finally passed upon by the Thirty-sixth General Assembly, thus closing all questions as to the designation of the systems as outlined.

Certain definite principles were laid down under which it is possible to make slight changes in the systems as now provided. There seems to be little dissatisfaction, however, with the original systems, as all the changes which have been petitioned for are to correct minor defects which have appeared. The changes petitioned for are outlined in Chapter Four of Part One.

PART ONE—CHAPTER THREE

BRIDGE DEPARTMENT.

November 1, 1914 to December 1, 1915.

Classified Work of the Department.

The work of the Bridge Department for the period covered by this report is along much the same general lines as the Designing Department for the years 1913-14. The addition of the field and office work in connection with railroad crossing improvements constitutes the most important change in the activities of this department. A detailed report on this part of the work is taken up under Section Two. The approval of bridge contracts which in former reports has been taken up under other department headings are contained in the Bridge Department report for the first time. To properly emphasize the importance of the various activities of the department the following schedule has been prepared which shows the percentage of the total cost of maintaining the department chargeable to each of the various classes of work

STEEL TRUSS ON PEDESTAL ABUTMENTS.

This 60' low riveted truss span with concrete floor has been erected on pedestal abutments and provided with two 22' approach spans. The total length of the structure completed, including piling, was $5,908.00. Bridge located over Mud Creek between Sections 17 and 23, Lloyd township, Dickinson county.

handled by the department during the period covered by the report; preparation of bridge designs 30.5%; railroad crossing work 18.2%; preparation of standard plans 11.5%; administrative and clerical work 9.4%; blue printing 4.2%; special trips and reports on same 3.8%; compilation county engineers' reports 3.5%; approval of bridge plans submitted 3.6%; educational work and work incident to County Engineers' Short Course 2.9%; approval of shop drawings 2.4%; work on county maps and road profiles 2.2%; work incident to patent litigation 2.0%; miscellaneous 5.8%; total 100.0%.

No account is taken of the District Engineers in the above classification. The major portion of the field work is handled by the District Engineers and a more detailed schedule showing the distribution of their time and expense in connection with bridge work is contained in another part of this report.

Bridge Designs for Specific Locations.

One of the most important functions of the bridge department is the preparation of plans of structures for specific locations. Notes for the designs are secured by the county engineers or by the district engineers and forwarded to the Commission for design. During the past year the Bridge Department has prepared plans for 459 bridges and culverts situated in 76 counties in the state. The estimated cost of the work for which special designs were prepared totals $1,181,667, which is slightly above total amount reported for 1914. Under Schedule One is given a complete list of the bridge and culvert designs which have been prepared during the past year, but not including the 1916 designs.

SCHEDULE ONE.

BRIDGE DESIGNS FOR SPECIFIC LOCATIONS.

County	Number of Designs	Estimated Cost of Structures Designed	Cost of Engineering in Designing Department.
Adams	1	$ 1,202.00	$ 4.57
Allamakee	5	32,009.00	23.49
Appanoose	1	3,090.00	3.95
Benton	4	13,873.00	87.13
Black Hawk	1	1,989.00	25.47
Boone	4	6,527.00	16.56
Buchanan	3	8,464.00	40.41
Buena Vista	2	14,054.00	121.53
Butler	3	28,564.00	171.47
Calhoun	1	1,829.00	8.75
Carroll	4	6,685.00	45.22
Cass	4	9,700.00	30.45
Cedar	4	5,421.00	39.56

SCHEDULE ONE—Continued.

County	Number of Designs	Estimated Cost of Structures Designed	Cost of Engineering in Designing Department.
Cerro Gordo	2	10,502.00	121.20
Cherokee	8	19,609.00	175.91
Chickasaw	17	34,002.00	127.61
Clarke	30	7,590.00	46.80
Clay	19	38,937.00	233.67
Clayton	22	29,137.00	207.70
Clinton	1	4,332.00	109.93
Crawford	1	4,951.00	26.99
Dallas	3	17,196.00	16.54
Davis	2	6,310.00	7.29
Delaware	8	12,330.00	82.38
Dubuque	10	23,637.00	372.43
Emmet	2	9,947.00	57.06
Fayette	2	19,070.00	72.64
Franklin	1	9,169.00	26.32
Fremont	2	3,710.00	4.67
Greene	4	12,688.00	81.80
Grundy	9	27,396.00	92.10
Guthrie	1	4,325.00	33.24
Hamilton	5	16,266.00	76.78
Hancock	4	7,804.00	22.18
Hardin	2	7,757.00	25.65
Harrison	4	17,615.00	142.24
Howard	12	22,870.00	133.91
Humboldt	19	35,670.00	179.03
Ida	11	27,124.00	112.25
Jasper	5	21,036.00	64.06
Jefferson	2	8,343.00	43.47
Johnson	1	2,127.00	12.16
Kossuth	42	76,829.00	352.36
Lee	10	37,722.00	198.80
Linn	7	32,993.00	62.22
Louisa	6	13,437.00	53.86
Lucas	1	1,445.00	9.09
Lyon	2	1,116.00	42.13
Mahaska	1	3,127.00	10.37
Marion	3	22,088.00	53.71
Mitchell	3	14,580.00	22.05
Monona	7	15,516.00	135.94
Monroe	5	13,745.00	28.13
Montgomery	1	3,154.00	18.46
Osceola	2	7,174.00	16.13
Palo Alto	6	12,033.00	35.50
Plymouth	9	17,617.00	58.93
Pocahontas	5	23,649.00	56.63
Polk	..	39,950.00	133.08
Poweshiek	8	20,718.00	96.13
Ringgold	6	8,955.00	20.27
Shelby	13	23,900.00	48.96
Sioux	3	11,180.00	54.90
Story	2	13,930.00	77.86
Tama	19	41,133.00	131.81
Taylor	18	10,645.00	83.38
Van Buren	2	5,846.00	11.00
Wapello	2	9,855.00	85.83
Warren	6	16,833.00	107.93
Washington	1	640.00	51.28
Webster	4	12,353.00	145.75
Winnebago	7	12,308.00	54.93
Winneshiek	5	12,099.00	106.24
Woodbury	2	4,177.00	18.67
Worth	6	8,984.00	47.55
Wright	15	38,077.00	168.57
Total	459	$ 1,181,667.00	$ 5,904.90

Approval and Analysis of Designs Submitted.

The detailed work of checking and approving designs varies greatly in amount and ranges from a comparison with the stand-

ard plans to a detailed mathematical and graphical analysis. During the period covered by this report 288 bridges and culverts were submitted for approval by county engineers and contractors. The estimated cost of the bridges and culverts for which designs were approved is $366,000.

The Bridge Department also checked the detailed shop drawings for 180 steel bridges, which are estimated at $241,000.

The estimated total cost of the structures represented by the designs and shop drawings checked and approved is $607,000.

Standard Plans.

During the current year a number of new standard designs have been completed and several series of designs have been entirely revised. These which have been revised are the concrete box culverts, concrete slab and girder bridges and concrete bridge abutments.

The following is a complete list of the bridge standards as completed and revised up to the present date.

Series C—Concrete box culverts for spans from 2′ to 12′. Entirely revised. Twenty-two sheets of designs and one estimate sheet.

Series D—Circular concrete culverts from 18″ to 42″ diameter. Not revised. Four sheets of designs and four of estimates.

Series E—Metal culverts. Not revised. One sheet.

Series F—Concrete pipe culverts. Revised. One sheet.

Series I—Concrete through girder bridges. Not revised but incomplete. Nine sheets of designs.

Series G—Timber, and timber and steel construction. Three sheets of designs.

Sheet G-1—Pile trestle. Not revised.

Sheet G-2—Pile abutments for steel bridges. Entirely revised.

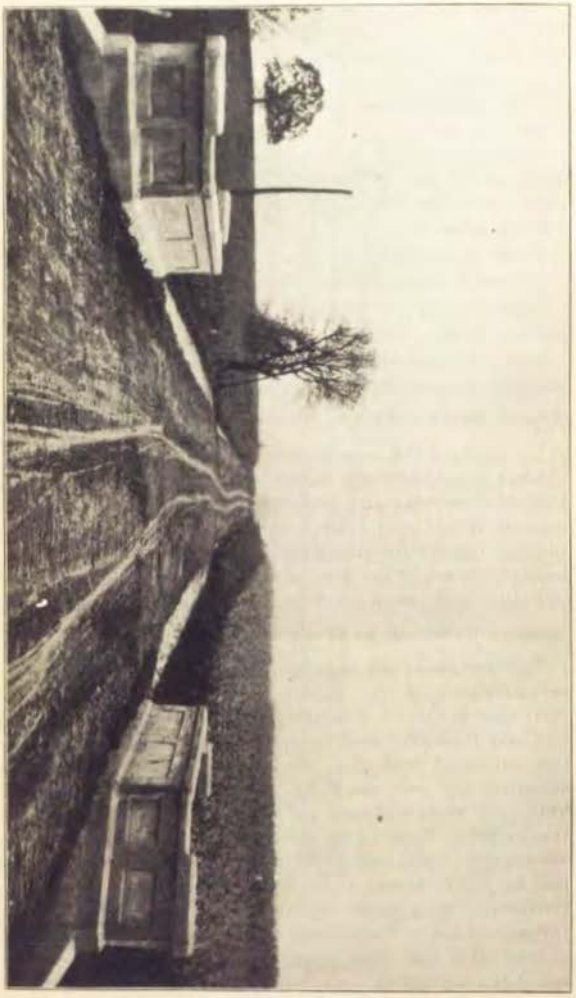
Sheet G-3—Creosoted pile trestle with steel joists. New design.

Series X—Steel pony truss spans without joists for spans from 35′ to 100′ with 16′ and 18′ roadways. Twenty-eight sheets of designs. Series is complete and not revised.

Series Y—Steel pony truss spans with joists for spans from 35′ to 85′ and 16′ and 18′ roadways. Twenty-two sheets of designs, not complete. Designs completed for 40′x16′, 50′x16′, 60′x16′, 60′x18′, 65′x16′, 70′x16′ and 80′x16′ spans.

Series V—I-Beam spans. Four sheets of designs.

Sheet V-1—Beam spans with concrete floor and angle railing. Revised January 1, 1915.



TYPICAL HANDRAIL DESIGN.

The Commission's standard design for handrails on concrete slab and girder bridges. This handrail is not only pleasing in appearance, but provides a safe approach to the bridge. Located in Cedar county.

Sheet V-2—Beam spans with wood floor and wood pile abutments.

Sheet V-3—Beam spans with concrete floor and gas-pipe railing.

Sheet V-4—Beam spans with concrete floor and gas-pipe railing.

Series T—Through riveted truss spans for spans from 90′ to 140′ with 16′ and 18′ roadways. Twelve sheets of designs. Designs completed for 90′x16′, 100′x16′, 100′x18′, 140′x16′, and 140′x18′ spans.

Series H—Concrete deck girder bridges for spans from 24′ to 40′. Two sheets of designs. Entirely revised.

Series J—Concrete slab bridges for spans from 14′ to 24′. One sheet of design. Entirely revised.

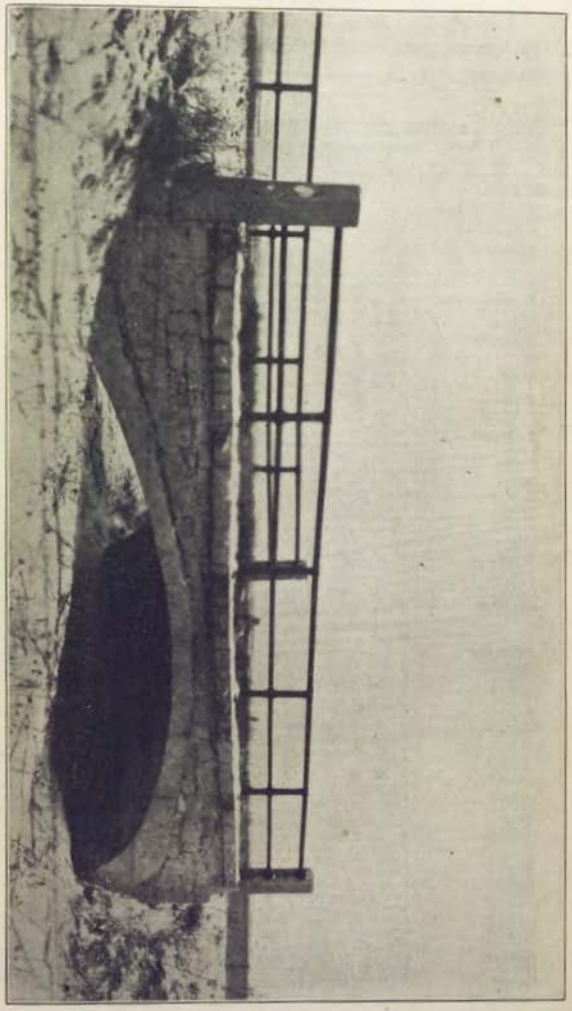
Series K—Concrete abutments for heights of 10′ to 26′. Four sheets of designs. Entirely revised.

Trips by Members of Bridge Department.

The work of this department has necessitated a number of inspection trips which are mostly of a special nature. The major portion of the trips were made for the purpose of reporting on the strength of old steel bridges now in service, the preparation of plans to provide for unusual conditions and attendance at bridge lettings. A few of the more important inspection trips relative to defective bridge work are discussed in another part of this report.

Approval of Contracts for Bridge Work.

The approval of contracts for bridge work is one of the most important duties of the department. During the period from November 1, 1914, to January 1, 1916, contracts totalling $1,337,000 have been submitted for approval. These 172 contracts have been submitted from 81 of the 99 counties. While the contracts submitted this year exceed by only 51 the number submitted in 1914, yet they represent an expenditure approximately twice that of 1914. Many of the contracts were not in the proper form for approval when sent in and a portion of the delay in approval may be justly charged to the delay caused in securing this information. No accurate records were kept on the contracts returned and held for additional information, but our records show at least 30 of the bridge contracts came in for approval with incomplete information.



This is a photograph of the first reinforced concrete bridge built in the United States. It is located in Lyon county, 4½ miles southeast of Rock Rapids, Iowa. It was built by Frederick Von Emberger, who was at that time the official representative of Joseph Melan, famous Austrian designer. The bridge was built in 1893. The span is thirty feet. The rise of the arch is three feet and the roadway sixteen feet. The thickness of the arch at the crown is six inches. The reinforcing is of the style known as the Melan system and in this case consisted of five 4" I-beams. The side walls are faced with Sioux Falls jasper. The hand rail is of gas pipe. The cement used was imported from Germany and cost $3.25 per barrel, at Rock Rapids. The mixture was one part cement to two parts sand to four parts broken jasper. The bridge cost $3000. Herr Von Emberger is at present a resident of Vienna, Austria.

Schedule Two shows the detailed information on account of the bridge contracts submitted during the period covered by the report.

SCHEDULE TWO.

BRIDGE CONTRACTS SUBMITTED FOR APPROVAL. NOVEMBER 1, 1914, TO JANUARY 1, 1916.

County	Contractor	Date Approved	Amount Approved
Allamakee	E. B. Fowler	August 17, 1915	$ 9,590.00
	Clinton Bridge Works	Oct. 25, 1915	11,806.60
	Clinton Bridge Works	Oct. 27, 1915	1,199.00
	Chambers and Dobson	Oct. 27, 1915	2,250.00
Appanoose	B. S. Staley	June 14, 1915	980.00
Audubon	Lana Construction Co	Not required	
Benton	Alfred Vinall	April 30, 1915	4,238.00
Black Hawk	Waterloo Construction Co	Not approved	
	H. S. Bouton	March 20, 1915	18,981.82
	Miller-Hey Const. Co	April 6, 1915	16,000.00
Boone	Koss Construction Co	Aug. 30, 1915	6,956.00
	Marsh Engineering Co	Nov. 6, 1914	5,338.00
Bremer	F. J. Miller	Jan. 8, 1915	6,215.00
	Chas. Russell	April 14, 1915	4,760.00
	J. H. & C. H. Russell	July 26, 1915	1,975.00
Buchanan	N. M. Stark & Company	June 5, 1915	1,987.65
	Waterloo Construction Co	July 27, 1915	7,185.00
Buena Vista	Illinois Steel Bridge Co	June 25, 1915	3,463.00
	Des Moines Bridge & Iron Co	Aug. 6, 1915	9,283.00
Butler	Miller-Hey Construction Co	June 3, 1915	18,688.00
Calhoun	Iowa Bridge Company	March 24, 1915	6,681.00
Calhoun	Iowa Bridge Company (a)	Aug. 13, 1915	11,690.00
	Omaha Struct. Steel Co	May 9, 1915	6,653.00
	Empire Construction Co	May 9, 1915	2,450.00
	Koss Construction Co. (a)	Aug. 13, 1915	13,300.00
Carroll	A. W. Merrick	May 27, 1915	6,481.88
	Pickus Eng. & Const. Co	Sept. 20, 1915	13,980.00
Cass	Standard Bridge Co	May 14, 1915	3,700.00
Cedar	N. M. Stark & Co	April 6, 1915	13,200.00
Cherokee	Ward and Weighton	April 6, 1915	11,163.00
	Pickus Eng. & Const. Co	April 6, 1915	4,835.00
	Pickus Eng. & Const. Co	July 15, 1915	15,889.00
	Ward & Weighton	Sept. 11, 1915	2,089.00
Chickasaw	Pan-American Bridge Co	May 29, 1915	13,200.00
Clark	Marsh Engineering Co	May 14, 1915	3,187.00
Clay	Thor Construction Co	Jan. 23, 1915	31,361.00
	Koss Const. Co. (b)	Jan. 23, 1915	
	Des Moines Bdg. & Iron Co. (c)	June 3, 1915	9,137.00
	Koss Const. Co	June 29, 1915	8,155.00
Clayton	A. F. Schweikert	May 26, 1915	3,460.00
	Worden-Allen Company	May 26, 1915	3,688.00
	A. C. Boyle	July 26, 1915	3,650.00
	Paul N. Kingsley	July 26, 1915	20,404.00
	N. M. Stark & Co	Aug. 6, 1915	4,177.00
	Worden-Allen Company	Aug. 6, 1915	2,720.00
Clinton	John R. Kane	April 16, 1915	17,597.00
	Thos. Carey & Sons	Aug. 9, 1915	17,972.00
	Iowa Bridge Company	March 27, 1915	7,895.00
Crawford	Marsh Engineering Co	July 14, 1915	7,340.00
	Ellsworth McNeal	July 15, 1915	2,440.00
	Lana Construction Co	Aug. 17, 1915	4,207.00
	Iowa Bridge Company	Not approved	
Dallas	Federal Bridge Company	May 7, 1915	4,387.00
	Des Moines Bridge & Iron Co	July 26, 1915	9,436.00
	Marsh Engineering Co	Aug. 6, 1915	6,995.00
Davis	Ottumwa Supply & Const. Co	June 19, 1915	2,400.00
Decatur	Clinton Bridge & Iron Wks (d)	April 30, 1915	2,537.00
	Wm. G. Morrison	Aug. 9, 1915	5,500.00
Delaware	Clinton Bridge Works (a)	Nov. 11, 1915	715.00
Dubuque	Paul N. Kingsley	Aug. 6, 1915	34,446.00
Emmet	N. M. Stark & Co	Aug. 17, 1915	4,530.00

SCHEDULE TWO—Continued.

County	Contractor	Date Approved	Amount Approved
Fayette	Koss Construction Co	June 5, 1915	10,000.00
	Chambers & Dobson	June 5, 1915	1,889.00
	G. L. Thompson	June 10, 1915	3,065.50
	N. M. Stark & Co	Sept. 21, 1915	5,675.00
	C. E. Walker	Sept. 21, 1915	4,850.00
	G. L. Thompson	Sept. 21, 1915	2,365.00
	Waterloo Const. Co	Sept. 21, 1915	12,980.00
Floyd	Miller-Hey Const. Co. (a)	April 19, 1915	1,748.00
Greene	Iowa Bridge Company	March 28, 1915	9,302.00
Grundy	Iowa Bridge Company	Aug. 30, 1915	19,427.00
	Miller-Hey Const. Co	Aug. 30, 1915	6,372.00
Guthrie	Des Moines Bdg. & Iron Co. (a)	Sept. 10, 1915	3,369.00
Hamilton	Clinton Bridge Works	Aug. 13, 1915	4,294.00
	A. W. Merrick	Sept. 21, 1915	11,423.00
	Albert Swanson	Sept. 23, 1915	6,671.00
Hardin	N. M. Stark & Co	July 15, 1915	11,777.00
Harrison	Standard Bridge Co	June 5, 1915	5,380.00
	Federal Bridge Co	June 5, 1915	4,260.00
	Lana Construction Co	June 5, 1915	7,790.78
	Standard Bridge Co. (a)	Sept. 18, 1915	4,040.00
Howard	Chambers & Dobson	Feb. 18, 1915	5,367.01
	Chambers & Dobson	Feb. 18, 1915	5,743.47
Humboldt	Humboldt Cement Prod. Mfg	Sept. 21, 1915	31,730.00
	Koss Construction Co	Sept. 21, 1915	4,990.00
Ida	Iowa Bridge Company	May 14, 1915	21,125.00
Iowa	M. O. Burnett	July 13, 1915	9,210.25
	M. O. Burnett	July 13, 1915	17,742.15
	M. O. Burnett	July 14, 1915	5,697.34
Jackson	John Anderson & Son (a)	Sept. 11, 1915	4,100.00
Jasper	Thor Construction Co. (a)	Aug. 30, 1915	5,967.00
	J. W. Turner Improvement Co	Aug. 30, 1915	6,661.00
	Iowa Bridge Company	Sept. 10, 1915	7,081.00
Jefferson	Spalding & Kerns	April 23, 1915	1,350.00
	Central States Bdg. Co	April 23, 1915	6,663.00
Johnson-Louisa	Iowa Bridge Company (e)		
Johnson	Iowa Bridge Company	April 26, 1915	5,000.00
	Clinton Bridge Works	April 26, 1915	1,758.95
Jones	Wm. Flaherty	March 12, 1915	2,139.00
	W. L. Hanssen	March 12, 1915	3,374.00
Kossuth	Des Moines Bdg. & Iron Co. (f)	Dec. 11, 1914	3,895.20
	Waterloo Const. Company (f)	Dec. 11, 1914	5,112.00
	Marsh Engineering Co	Not approved	
	Marsh Engineering Co. (g)	July 27, 1915	2,562.00
	Marsh Engineering Co	Aug. 6, 1915	21,219.00
	Marsh Engineering Co	Not approved	
	Marsh Engineering Co. (a)	Oct. 11, 1915	7,726.00
	Marsh Engineering Co. (a)	Oct. 11, 1915	2,345.00
	Marsh Engineering Co. (a)	Oct. 11, 1915	1,093.00
Lee	Koss Construction Co	April 26, 1915	10,640.92
	Clinton Bridge Works (a)	Aug. 18, 1915	1,525.43
Linn	A. P. Munsen	April 6, 1915	7,869.60
	Mo. Const. & Ballast Co	April 6, 1915	6,358.00
	Ill. Steel Bridge Co	April 6, 1915	8,140.00
	Perry Joyne	Aug. 30, 1915	6,492.00
	Marion Concrete Co. (a)	Aug. 30, 1915	1,775.00
Madison	Iowa Bridge Co. Co.	May 18, 1915	5,610.00
Mahaska	Whitlatch & Ort	May 31, 1915	20,500.00
Marion	L. B. Childs	March 12, 1915	31,978.00
	A. Phelps	July 15, 1915	10,300.00
Marshall	Cole Bros.	May 1, 1915	14,550.00
Mills	Monarch Engineering Co	June 25, 1915	2,100.00
	J. O. Evans	June 29, 1915	950.00
Mitchell	Minneapolis Bridge Co	June 1, 1915	7,415.00
	N. M. Stark & Co	June 1, 1915	1,657.00
	Worden-Allen Co.	June 1, 1915	1,734.00
Monona	Illinois Steel Bridge Co	Dec. 22, 1914	2,890.00
	Omaha Struct. Steel Works	May 28, 1915	15,431.00
	Ward & Weighton	Sept. 21, 1915	7,315.00
Monroe	Ottumwa Supply & Const. Co	July 13, 1915	10,750.00
Monroe-Wapello	Ottumwa Supply & Const. Co	Oct. 22, 1915	3,845.00
Montgomery	Lana Const. Co	Not required	
	Wilson Concrete Co. (h)	June 19, 1915	2,054.59
	Red Oak Bdg. & Iron Works (a)	Sept. 10, 1915	6,400.00

SCHEDULE TWO—Continued.

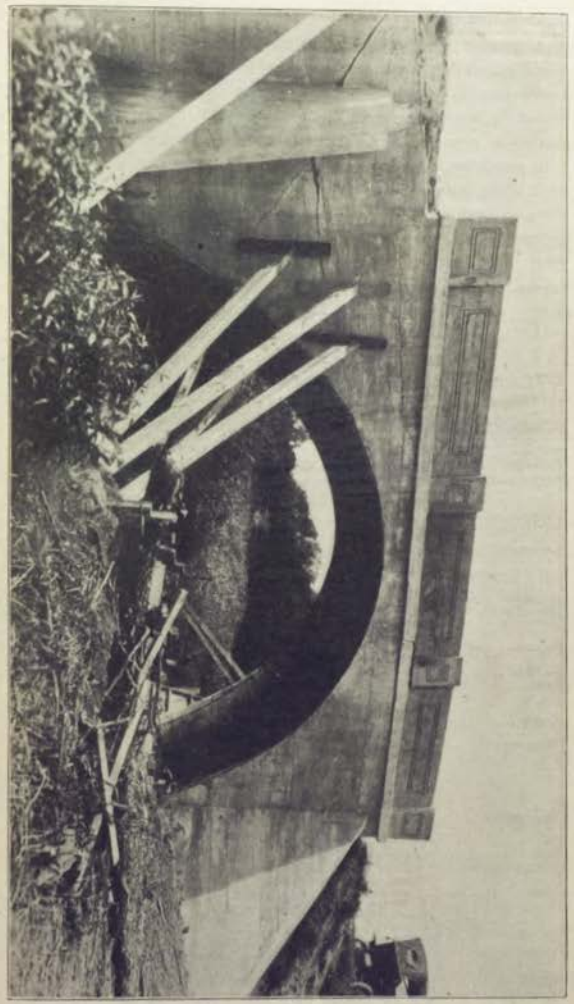
County	Contractor	Date Approved	Amount Approved
Muscatine	Chas. Winn	Jan. 11, 1915	2,329.50
O'Brien	Federal Bridge Co	March 22, 1915	13,119.00
	Pickus Eng. & Const. Co	July 19, 1915	2,050.00
Osceola	Western Bdg. & Const. Co	April 25, 1915	6,475.00
Page	Briggs & Corey	Dec. 22, 1914	4,200.00
	Wilson Concrete Co	Dec. 22, 1914	2,150.00
Palo Alto	Des Moines Bdg. & Iron Co	April 7, 1915	9,488.00
	Des Moines Bdg. & Iron Co	July 19, 1915	2,800.00
Plymouth	Marsh Engineering Co	May 14, 1915	9,000.00
Pocahontas	Iowa Bridge Co	Sept. 11, 1915	11,128.00
Polk	N. M. Stark & Co	Nov. 3, 1914	12,991.27
	N. M. Stark & Co	April 17, 1915	11,822.00
	N. M. Stark & Co	May 22, 1915	3,410.00
	N. M. Stark & Co	Aug. 3, 1915	5,150.00
	N. M. Stark & Co	Aug. 30, 1915	4,352.00
Pottawattamie	Lana Construction Co	Nov. 24, 1915	6,072.00
Poweshiek	Iowa Bridge Co	June 25, 1915	7,262.00
	N. M. Stark & Co	June 25, 1915	17,693.00
Sac	Clinton Bridge Works	Not required	.....
	Worden-Allen Co	July 19, 1915	1,792.00
	Clinton Bridge Works	Sept. 23, 1915	2,066.00
Shelby	Lana Construction Co	July 17, 1915	6,026.00
	Des Moines Bdg. & Iron Co	Sept. 30, 1915	18,196.00
Sioux	Des Moines Bdg. & Iron Co	Sept. 15, 1915	7,637.00
Story	Paul N. Kingsley	Feb. 17, 1915	34,822.00
	Cole Bros.	Aug. 13, 1915	15,334.00
Tama	Paul N. Kingsley	May 22, 1915	44,982.44
Van Buren	Illinois Steel Bridge Co. (a)	Oct. 16, 1915	2,090.00
Warren	Iowa Bridge Company	May 18, 1915	9,250.00
Washington	Iowa Bridge Company	July 15, 1915	7,320.00
Webster	N. M. Stark & Co	June 11, 1915	4,815.00
	Des Moines Bdg. & Iron Co	June 11, 1915	13,267.00
Winnebago	Iowa Bridge Co	June 3, 1915	4,375.00
Worth	Forest City Const. Co	June 29, 1915	3,370.00
Winneshiek	Federal Bridge Co	March 31, 1915	18,100.00
Wright	Iowa Bridge Co	Nov. 6, 1914	975.00
	Dobson Construction Co	June 3, 1915	9,821.00
	Iowa Bridge Co	Sept. 13, 1915	13,163.00
Total amount approved			$ 1,337,069.15

(a) Private contracts.
(b) Filling only.
(c) 32½ cents a cubic yard.
(d) Metal only.
(e) Repair work cost plus a percentage.
(f) Repair work.
(g) $13.90 per cubic yard estimated amount.
(h) Two culverts not approved.

SUMMARY STATEMENT BRIDGE CONTRACTS SUBMITTED FOR APPROVAL.

Date of Report	Number	Total Amount Approved
April 1, 1913 to December 1, 1913	53	$ 344,162.24
December 1, 1913 to November 1, 1914	121	731,205.58
November 1, 1914 to January 1, 1916	172	1,337,069.15
Total	346	$2,412,436.97

	Number	Total Amount
Contracts submitted but not approved November 1, 1914 to January 1, 1916	7	$ 37,330.25
Average amount of each contract approved November 1, 1914 to January 1, 1916	....	7,774.00



This picture shows a concrete arch bridge of patent type construction. It was built prior to the passage of the Iowa road law without any state supervision. The character of the work secured by this county under the old system speaks for itself.

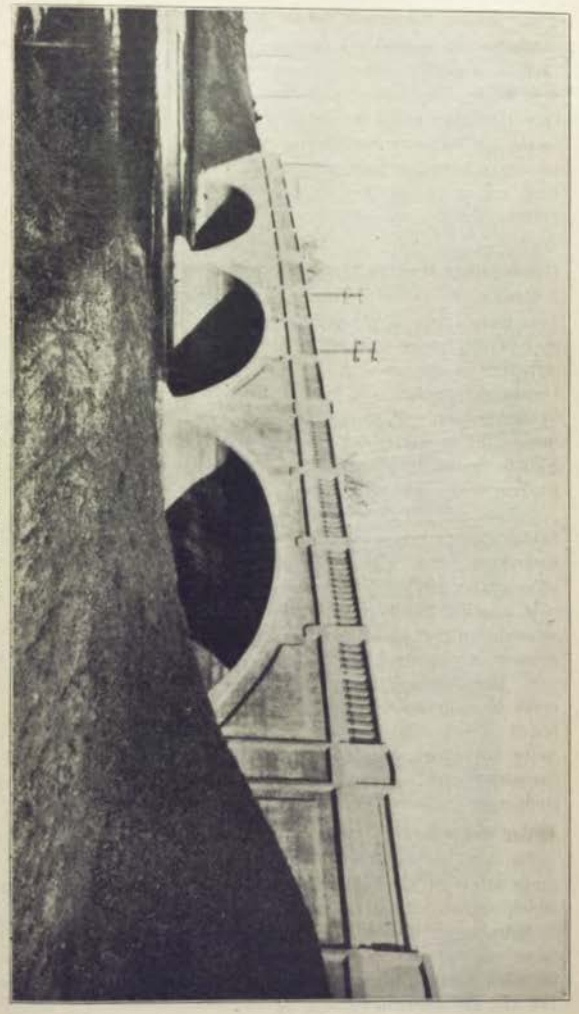
Approval of Contracts for Material.

A greater number of contracts for material were submitted to the Commission for approval this year than ever before. In nearly every case it was necessary to either hold the contract for additional information or to change the form of the contract as submitted in some respect. This can be accounted for when it is taken into consideration that a great many of the counties were for the first time making up contracts for their material requirements. It is to be hoped that the contracts received in 1916 will come in on standard forms and be much more uniform in character than those contained in this report. A complete list of the material contracts sent in is contained in Schedule Three.

SCHEDULE THREE.

MATERIAL CONTRACTS SUBMITTED FOR APPROVAL.
NOVEMBER 1, 1914, TO JANUARY 1, 1916.

County	Company	Date Approved	Material
Audubon	Midland Metal Mfg. Co.	April 14, 1915	Corr. pipe
	Lana Construction Co.	June 22, 1915	Corr. pipe
Bremer	Klauer Mfg. Co.	Retd. May 8, 1915	Corr. pipe
Calhoun	Farmers Lumber Co.	Not approved	Cement
Cass	S. G. Hunter	Not required	Corr. pipe
	Wheeler Lum. Br. & Sup. Co.	Not required	Lumber
	Lana Construction Co.	Not required	Boiler pipe
Dallas	Klauer Mfg. Co.	July 16, 1915	Corr. pipe
Davis	Sax Bros.	Retd. to county	Gravel
	Sax Bros.	Retd. to county	Cement
Decatur	Greenman Lumber Co.	Feb. 22, 1915	Lumber
	Western Boiler Pipe Co.	Not required	Corr. pipe
	Western Boiler Pipe Co.	Oct. 25, 1915	Corr. pipe
	O. C. Jordan	Oct. 25, 1915	Lumber
Delaware	Farmers Supply Co.	March 12, 1915	Cement
Des Moines	Western Boiler Pipe Co.	Not required	Boiler pipe
Jefferson	Iowa Pure Iron Culv. Co.	April 30, 1915	Corr. culvert
	Good Roads Machinery Co.	June 19, 1915	Corr. culvert
Johnson	Klauer Mfg. Co.	Not approved	Corr. culvert
	Clinton Bridge Works	April 26, 1915	Reinf. bars
Keokuk	Midland Metal Mfg. Co.	Feb. 22, 1915	Corr. pipe
Lee	Western Boiler Pipe Co.	Rejected	Boiler pipe
	Western Boiler Pipe Co.	Aug. 30, 1915	Boiler pipe
	Western Boiler Pipe Co.	Nov. 13, 1915	Boiler pipe
Lucas	Midland Metal Mfg. Co.	April 30, 1915	Corr. pipe
	American Casting Co.	April 30, 1915	Cast iron
Mahaska	K. Knudson	Feb. 23, 1915	Cement
	Greenman Lumber Co.	Feb. 23, 1915	Lumber
	Iowa Culv. & Sheet Met.	Feb. 23, 1915	Corr. pipe
	Ottumwa Sup. & Const. Co.	Feb. 23, 1915	Boiler pipe
	J. Shargo	March 31, 1915	Old boiler pipe
	J. Shargo	June 12, 1915	Old boiler pipe
Montgomery	Iowa Pure Iron Culv. Co.	Rejd. April 12, '15	Corr. pipe
	Marsh Engineering Co.	Not required	Reinf. bars
	Red Oak Sand Co.	March 31, 1915	Sand
Polk	Ft. Dodge Culvert Co.	July 8, 1915	Corr. pipe
Pottawattamie	American Casting Co.	Not approved	Cast iron
	Wilson Concrete Co.	July 21, 1915	Conc. pipe
Scott	Interstate Mat'l Co.	March 12, 1915	Cement
	Ft. Dodge Culv. Co.	March 12, 1915	Corr. pipe
	Wheeler Lum. Br. & Sup. Co.	March 12, 1915	Lumber
	Clinton Bridge Works	March 12, 1915	Boiler pipe
	Clinton Bridge Works	March 12, 1915	Reinf. rods
Taylor	Des Moines Br. & I. Wks.	Not required	Steel
	Neb. Br. Lum. & Sup. Co.	March 31, 1915	Lumber
	Omaha Str. Steel Co.		Boiler pipe
Winneshiek	Federal Bridge Co.	March 31, 1915	Struct. steel
Mahaska	Kalbock Lumber Co.	Retd. for cor.	Lumber
	Greenman Lumber Co.	Retd. for cor.	Lumber



CONCRETE ARCH BRIDGE.

A three sixty-foot span concrete arch bridge over Beaver River in Parkersburg, Butler county. Constructed at cost of $12,727.00.

Complaints on Bridge and Culvert Work.

During the period covered by this report, a total of 92 complaints were filed with the Commission concerning bridge and culvert work. The majority of these complaints were of such a nature that they could be adjusted without the necessity of a field inspection by some member of the Commission's force. It was necessary however, to investigate 27 of the complaints which were filed, and in making the field examination and report on these complaints, the various members of the Commission force spent 32 days.

General Field Work in Connection with Bridge Department.

During the period covered by this report, the Commission has been called upon to perform a number of general duties in reference to the bridge and culvert work contemplated and under construction in the counties. A total of 33 days was spent by the Commission's engineers in certifying to emergency conditions on bridge and culvert work. In each case, where the work was deemed of an emergency nature and the estimated cost above $1,000 the engineer issued an emergency certificate which was filed with the county auditor.

A total of 349 days was spent in a general inspection of the bridge and culvert work under construction by the counties. This inspection was of a general nature and reports are on file in this office giving in detail the conditions observed.

In securing the necessary information to prepare the plans and estimates of cost on bridge and culvert work designed by the Commission, it was necessary to spend a total of 126 days in this manner. Most of these bridge surveys were made by the district engineers in company with the county engineers and members of the board of supervisors in the various counties. On a few of the more important structures, it was necessary to make special arrangements for securing the necessary data for designing and in such cases engineers were sent out from this office.

Bridge and Material Lettings.

The total estimated amount of bridges and culverts in the lettings attended, totals $1,679,146.11. This does not include work which was advertised and upon which the bids were rejected, but includes only the work actually let by contract, or upon which bids were received and the work constructed by day labor. The work included 2,140 bridges. The bridge lettings attended, numbered 140 and the material lettings 84.

LOW RIVETED TRUSS SPAN.

This is a typical (X series) low riveted steel truss span with concrete floor and abutments. Protection railings are provided on the abutments to insure additional safety. Located in Crawford county.

A larger number of material lettings were held last year than ever before. Nearly all of the counties in the State held at least one letting, and in some instances all of the material purchased was under contract secured by competitive bidding.

Special Assignments.

A total of 78 days was spent by members of the Commission on special assignment work which is distributed among the following list of counties as indicated.

Cedar County	31 days
Clay County	11 days
Emmet County	34 days
Webster County	2 days

In Cedar County the special assignment work consisted of the inspection of some rejected culverts. One of the Commission's engineers, Mr. Fahey, spent sometime in Cedar County inspecting the removal and reconstruction of some rejected culverts.

The special assignment work in Clay County consisted of time spent by various members of the Commission force on the Spencer bridge. This was a large five span concrete arch bridge over Little Sioux River and the Commission assisted the County Engineer's force to some extent in the inspection work on this structure. Engineers were assigned to Clay County to be present at times when important parts of the structure were under construction.

Thirty-four days were spent on special assignment work in Emmet County by Engineer Crowley on the inspection of Lincoln Street bridge in Estherville. The Commission's inspector was on this work during the entire period of construction.

Two days were spent in Webster County in measuring up some old steel spans in determining their present ability to carry heavier loadings.

PART ONE—CHAPTER FOUR

ROAD REPARTMENT.

Development of Road Work.

When the new road law was passed the bridge work was fairly well developed. The Highway Commission, which has been operating for nine years under Section 2674-F, Supplement to the Code, 1907 and Chapter 98, Acts of the Thirty-third General Assembly, had devoted its time almost exclusively to the development, and, in so far as possible, the standardization of bridge work. Little or nothing had been done toward the standardization of road construction or the securing of proper engineering supervision for such work.

Until the passage of the new law there had been little or no engineering applied to road construction, as it was the popular idea that it was useless to spend money for surveying and preparing plans for permanent road grading. It was generally assumed that anyone knew enough to cut off the hills and deposit the dirt in the low places.

Under these conditions it was natural that during the first year under the law there should be slow development in the road work. Our records show that during 1913 there were only twenty-nine miles of road profiles officially approved, and only three hundred eighty-one miles of grade line approved by the district engineers. After having worked with the new system for a year, local road officials began to see that there was real merit in the requirement that surveys should be made in advance, and there began to be a demand for engineering on road work.

The new law provides that the county drainage fund can be spent for road work on the county road system, and that the two-mill road building fund must be levied. These provisions have increased the amount of money available, and the road work increased accordingly. During 1914 the Commission officially approved 445 miles of road profiles while the district engineers approved 961 miles of grade line.

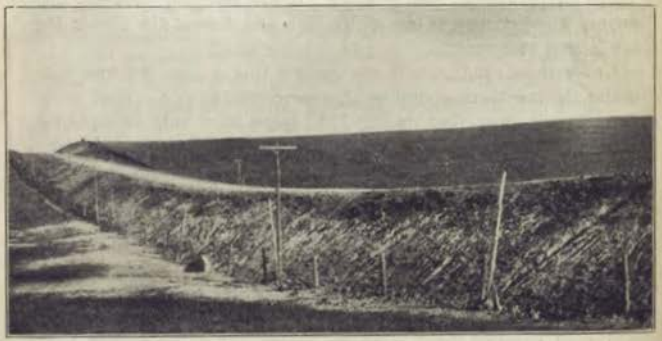
The plans for all road work must be approved by the Commission. Since there were only twenty-nine miles of profiles submitted for our official approval in 1913, this work did not require

a great deal of time or attention, and the organization was not developed with special reference to this work.

Organization of Road Department.

Early in 1915 the Commission's force was re-organized so as to form a Road Department, giving exclusive attention to this work.

The first work of the department consisted in perfecting an organization to handle the road profile approval in an efficient and systematic manner. The detailed steps necessary in the approval of profiles were carefully mapped out so that there could be no cause for delay, or misunderstanding on the part of anyone. An engineer familiar with this work was detailed to devote his entire time to the inspection and checking of the profiles submitted to the Commission. Delays have thus been eliminated. The standard of the work secured has been steadily improving until at present the profiles are coming in in better shape and with more detailed information than formerly. There have been approved by this office during the past year plans from forty-four counties for the improvment of 549 miles of road. Refer to Schedule Number Six.



This Crawford county fill contains 17,735 cubic yards of dirt. Fences were moved out ten feet on each side and there is still no room to spare.

This mileage should be much larger next year, as none of the county road cash fund can now be spent for building culverts, and, due to unusual rainfall, a large portion of the road funds were used this year for repairs and maintenance. Further, many miles of road have been graded this year upon the district engineer's approval of the grade line and plans have not been sent

in for official approval. The new ruling that the profiles must be officially approved before construction is started should cause the profiles to be sent in from nearly every county in the state. A brief summary of the information for the profiles approved in 1915 follows:

The average amount of earthwork was 5280.4 cubic yards per mile, or one cubic yard per lineal foot of road.

The average rise and fall per mile of road was reduced 11.5 feet by permanent grading, or from 52.9 feet before improvement to 41.4 feet after improvement.

The average maximum grade percentages were reduced 2.2, or from 5.92% before improvement to 3.73% after improvement.

Plans, Specifications, and Classification of Road Work.

In endeavoring to improve the quality of road construction through a standardization of the work, the following plans and specifications have been prepared:

Specifications for earth road construction. The amendments to the road law, passed by the Thirty-sixth General Assembly, require that grading where the estimated cost is in excess of $1,000.00 shall be advertised. In order to be able to advertise and contract this work satisfactorily, standard specifications for earth road construction were prepared. In preparing these specifications, the specifications of other state highway departments were carefully examined, and none were as comprehensive as are the specifications which we have prepared.

It is often said that Iowa is behind in road building, but here is one type of road construction in which Iowa excels.

Specifications for concrete roads. In a few communities there was a demand for the construction of small stretches of concrete road this season, and a set of standard specifications were prepared in pamphlet form, for both one and two-course work. In preparing these specifications it was not our idea to provide for the construction of cheap concrete roads, but rather to provide for quality first. Accordingly, in place of using the ordinary soft native limestone for aggregate, the requirement is made that the coarse aggregate in the wearing surface must be trap, quartzite, or granite. Also the requirement is made that all sand must be screened and washed.

Much can be done to improve the quality of concrete road construction by using only strictly high-class materials and the most approved construction methods on the work.

Standard cross section for gravel roads. Since gravel is the most widely distributed road surfacing material in the state, it is natural that the first efforts towards hard-surfacing the highways will be the use of gravel. With this idea in view, the Commission has adopted standard

cross sections for "Class A" or two-course gravel surfacing, which, it is believed, will produce satisfactory results with the present and anticipated future traffic. These cross sections require for a surfacing 10 feet wide, 1670 cubic yards, and for a surfacing 16 feet wide, 2,385 cubic yards of gravel per mile. Such a road is more expensive than the gravel surfacing formerly placed, and since there is a strong popular demand for a large mileage of gravel surfacing which cannot be secured with the funds available by using the "Class A" surfacing, a cross section has been prepared for "Class B" or single-course gravel roads. This cross section requires for a surfacing 10 feet wide, 880 cubic yards. It is not recommended except where the volume of traffic and funds available are small, but is approved with the understanding that systematic and constant maintenance will be adopted. A top course can be added later.

Guard rail. The construction of roads to permanent grade lines necessitates the construction of numerous fills of such height as to be dangerous for traffic. In order to make these points safe, the Commission recommends that guard rails be constructed along the shoulders of fills six feet or more in height. Standard plans for such guard rails have been adopted, using both wood and concrete posts, although it is found that the concrete posts can be secured for practically the same price as the wood.

Classification for road work. In order to meet the requirements of the amendments passed by the Thirty-sixth General Assembly, and the experiences of the past three years, the classification for road work on the county and township system has been revised to become effective January 1, 1916.

Convict road building crew at Cherokee during 1915.

Road Lettings Attended. (Refer to Schedule No. 7.)

An amendment passed by the Thirty-sixth General Assembly provides that road grading estimated to cost over $1,000.00 must be advertised. In conformance with this requirement, many of the counties have held advertised lettings during the past season, and in all cases where the Commission was advised in advance of such lettings, we have endeavored to notify contractors, and to have a district engineer present. Twenty-seven such road lettings were attended at which contracts were let for the improvement of 116.35 miles of road at an approximate cost of $230,562.00. This work included the permanent grading of 88.35 miles without placing any hard surfacing, grading and graveling twenty-six miles, and grading and paving with concrete, two miles.

Road Contract Approval.

The law does not require that the contracts for road work shall be approved by the Commission. Nevertheless, seven counties, Cerro Gordo, Calhoun, Des Moines, Keokuk, Lee, Scott, and Winnebago, have voluntarily sent in road contracts, amounting to $71,000.00, for approval. These contracts include two miles of concrete road; one at Mason City, and the other at Burlington.

Inspection and Supervision of Road Work.

Since the major portion of the road work being done in the state is grading work, the amount of time required by the district engineers in inspecting and giving general supervision to such work is not as great as for the bridge work. Nevertheless, two hundred fifty-six days have been spent on inspection and supervision of road work.

Road Complaints. (Refer to Schedule No. 6.)

Statistics compiled by the Office of Public Roads show that while Iowa ranks fourth among the states of the Union from the standpoint of total funds expended annually on the highways, yet the mileage of roads in this state is so great that the average annual expenditure is only $110.00 per mile, and in this respect, Iowa ranks twenty-second.

This being an agricultural state, it is necessary to maintain a road reaching practically every quarter section of land, and there is a constant demand that each mile be kept in good condition. Under such conditions and because of the unusual rainfall of the past year, many complaints were filed with the Commission regarding the condition of certain roads upon which the local au-

Convict culvert building crew at Woodward.

thorities had not made satisfactory repairs. Two hundred fifty-four of such complaints were answered and taken up with the local officials. Eighty-three complaints which seemed to demand a field examination have been investigated by the district engineers. The remainder have been taken up by correspondence with the local officials. It is impossible to state the results secured in each case, although the following are typical examples of complaints satisfactorily adjusted:

On September 23, 1915, we received a complaint from the Post Office Department at Washington, D. C., regarding a road on the south side of Section 18, Allison Township, Lyon County. The complaint stated that this road was flat and low so that the water was standing in the side ditches and the ground had become so thoroughly saturated that it was almost impossible to travel the road. On September 24th we took the matter up with the county engineer, and on October 2d we received a letter from him to the effect that the township trustees in charge of the road had agreed to open a ditch through the adjoining field so as to allow the water to drain away from the road, and that it was further contemplated that as soon as the soil should dry sufficiently, the grade would be raised so as to further improve the road.

On August 6, 1915, we received a complaint concerning the condition of the roads on three sides of section 25-78-25, Bloomfield Township, Polk County, the complainant stating that these roads were in an impassable condition. On August 9th this complaint was taken up by letter with the township trustees and township superintendent. On August 11th a reply was received from the township superintendent that the township would grade the roads so as to place the same in good condition and would make the necessary fills to the bridge approaches provided the county would fix the culverts on these three miles of road. On August 14th the question of repairing or replacing the culverts was taken up with the county engineer by correspondence, and on August 17th we received a reply from the county engineer that he had investigated the condition of the culverts, that one crew was already working on these structures, that another crew would be started on the work within three or four days, and that the work would be completed within three weeks.

On August 4th we received a complaint concerning the condition of the county road between Guss and New Market in Taylor County. On August 9th this complaint was referred to the district engineer, and on August 11th an examination of the road was made with the county supervisor. He agreed that certain repair work should be done and stated that as soon as he could secure teams, he would proceed with this work. On August 14th we received another complaint from a different source concerning the condition of this road, and on August 20th still another complaint was received. We advised each of these latter complainants that an examination of the road had been made and arrangements made for its repair, and recommended that they wait two or three weeks to allow sufficient time for making these repairs. On September 8th we received another letter from one of the complainants stating that no work had been done on the road and calling our attention to the fact that the three weeks which we had requested them to wait had elapsed. On September 12th the supervisor in charge of the road was requested to meet with the Commission on September 21st and advise why the repairs agreed upon had not been made. In the meantime the road was repaired and on September 21st the supervisor met with the Commission and advised that the work was done.

Proposed Changes in County Road System.

The Thirty-sixth General Assembly provided for changes in, and additions to the county road system when such changes would (a) eliminate dangerous crossings or curves; (b) decrease the cost of improving and maintaining the road; (c) materially shorten the direct lines of travel between two market towns, and (d) where such additions are extensions of existing county roads along the boundaries of incorporated cities or towns. Under this provision of the law the following counties have requested changes in their county road systems:—Appanoose, Buena Vista, Butler, Clarke, Crawford, Delaware, Grundy, Henry, Hancock, Humboldt, Keokuk, Mitchell, Pocahontas, Polk, Sac, Winnebago, Wapello.

Special Assignments.

In the development of county and township road work and in supervising road work at the different state institutions, it has become necessary to assign engineers from the Road Department on special duty. The special assignments during 1915 are as follows:

Inspection of concrete road at Mason City.
Inspection of concrete road at Burlington.
Special work on Hawkeye Highway at Dubuque.
Special work at State Hospital at Cherokee.
Road work at State Colony for Epileptics at Woodward.
Road work at State College at Ames.

Four hundred sixty-one days have been spent by engineers of the Road Department on such special assignments. A discussion of the State Road work at Cherokee, Woodward and Ames will be found in Part Two of this report.

The special work on the mile of concrete road at Mason City consisted of having an engineer constantly on the job to see that the specifications were rigidly enforced. A careful system of reports was adopted, showing the maximum and minimum temperature each twenty-four hours, the weather conditions, the condition of the sub-grade, the amount of cement used in each square of pavement between two expansion joints, and the quantity and quality of concrete aggregate used.

Convict road building camp at Cherokee during 1915.

The work on the mile of concrete road at Burlington was the same as at Mason City, although our engineer was unable to reach this work until approximately 2,100 lineal feet of road had been constructed. That there is real need for such special engineers is evidenced by the fact that until our engineer arrived on this work, little or no inspection was being given. One of the farmers in the neighborhood had been employed to stay on the job, but, as he frankly admitted, he was not familiar with such work and naturally construction methods were permitted which should not have been allowed. The sub grade was not excavated uniformly to the required depth; the surfacing of the concrete was being done with floats on the ends of long sticks; the concrete was not mixed uniformly and thoroughly as required by the specifications, and the concrete proportions were not carefully maintained. The effect on the progress of the work due to the enforcement of rigid requirements is illustrated by the fact that in the seven days spent in laying concrete prior to the time when the special engineer arrived on the work, approximately 2,100 lineal feet of road were placed, or an average of approximately 300 lineal feet per day. While after the engineer arrived on the work, the daily average progress was approximately 260 lineal feet. Eighteen days were spent on this work.

The special work being done on the Dubuque Post Road consists of inspecting the construction of a long concrete culvert at the site of a high fill just east of the Julien Crossing, and in assisting the county engineer in the preparation of accurate plats for the new right-of-way which is being bought in the improvement of the Hawkeye Highway. It was contemplated at the time this engineer was sent to Dubuque County that the work on the fills for the Center Grove and Julien Crossings would be pushed during the winter, and that this would require the services of an engineer practically all winter. However, it is now definitely settled that this work will be shut down during the winter, and accordingly, the special engineer will leave the county as soon as the right-of-way plats are completed. Twenty-eight days were spent on this work.

Annual Report Blanks.

Blanks have been prepared for the county engineers, township trustees, township clerks, and township road superintendents reports for road work done on the county and township road systems. About two thousand sets of such blanks have been sent out.

Dubuque Post Road.

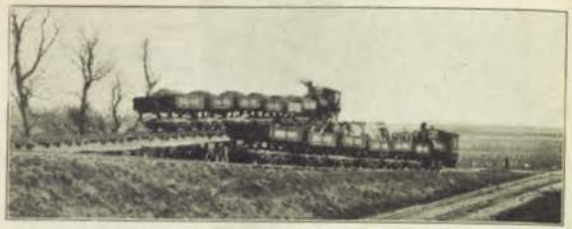
The report of this department would not be complete without reference to the construction of the Hawkeye Highway in Dubuque County. While the detailed construction and supervision of this work has been carried on under the direction of the Office of Public Roads, yet the State Highway Commission has spent a great deal of time in checking plans, estimates, and specifications

Improvement of Hawkeye Highway in Dubuque county. Showing a 12' rock cut one mile east of Dyersville. The sub-grade has been prepared and rolled ready for the gravel surfacing. It cost 95c per cubic yard to make this cut.

submitted for approval, and in conference with representatives from the Office of Public Roads, the Board of Supervisors, the Dubuque Industrial Corporation, the Dubuque Automobile Club, and the Illinois Central Railroad Company, for the purpose of bringing the conflicting interests of these various organizations together on such a working basis that the financing and completion of this extensive improvement may be secured in spite of the fact that we have no adequate laws to provide for such highway construction.

The road under discussion extends from Dubuque to Dyersville, a distance of about twenty miles, and the improvement contemplated consists of permanently grading the road to a maximum grade of 6%, building all bridges and culverts of concrete, constructing a two-course gravel wearing surface using the trench method, and eliminating three dangerous railroad crossings. The total cost of the work will be approximately $166,000.00. The funds which have been raised are as follows:

Improvement of Hawkeye Highway in Dubuque county. The finished road. The gravel surfacing is 15 feet wide, 8 inches thick at the crown and 6 inches thick at the edge, requiring about 2,000 cubic yards of gravel per mile of road. The gravel is spread evenly in a trench prepared for that purpose and is then thoroughly compacted by rolling. The surfacing thus prepared costs about $1,300.00 per mile exclusive of grading or drainage.



Improvement of Hawkeye Highway in Dubuque county. Transporting the gravel for surfacing. This gravel for use east of Farley is secured from a pit about one mile north of that town, and is loaded by a steam shovel into small cars and then transported to the road where it is distributed by dump wagons. West of Farley the gravel is transported with large dump wagons drawn by steam tractors.

Federal Government	$ 30,000
Dubuque County	80,000
Illinois Central Railroad, approximately	21,000
Dubuque Industrial Corporation, up to	10,000
	$ 141,000
Additional funds necessary to complete this work, which it is expected will be raised by popular subscription	$ 25,000

The construction work is nearly half done at this time.

SCHEDULE NUMBER FOUR.

ROAD PROFILES APPROVED—ROAD COMPLAINTS.

County	Profiles Approved	Complaints Filed with Commission	County	Profiles Approved	Complaints Filed with Commission
Adair	1	5	Clayton	....	1
Adams	....	5	Clinton	....	1
Allamakee	2	....	Crawford	23	2
Appanoose	....	6	Dallas	19	9
Audubon	....	4	Davis	....	9
Benton	21	4	Decatur	....	6
Black Hawk	....	....	Delaware	....	....
Boone	....	2	Des Moines	1	2
Bremer	6	....	Dickinson	2	4
Buchanan	....	....	Dubuque	21	2
Buena Vista	....	6	Emmet	....	1
Butler	....	1	Fayette	....	3
Calhoun	37	1	Floyd	....	2
Carroll	3	3	Franklin	....	3
Cass	....	6	Fremont	....	1
Cedar	7	3	Greene	30	....
Cerro Gordo	25	1	Grundy	....	2
Cherokee	24	1	Guthrie	....	2
Chickasaw	....	2	Hamilton	9	2
Clark	....	3	Hancock	1	1
Clay	....	1	Hardin	2	....

SCHEDULE FOUR—Continued.

County	Profiles Approved	Complaints Filed with Commission	County	Profiles Approved	Complaints Filed with Commission
Harrison	4	5	Osceola	....	....
Henry	....	....	Page	....	3
Howard	4	1	Palo Alto	51	2
Humboldt	27	....	Plymouth	....	3
Ida	....	....	Pocahontas	....	....
Iowa	....	1	Polk	....	10
Jackson	....	1	Pottawattamie	....	5
Jasper	2	7	Poweshiek	....	2
Jefferson	4	....	Ringgold	....	3
Johnson	1	5	Sac	57	....
Jones	3	1	Scott	12	....
Keokuk	9	....	Shelby	....	1
Kossuth	1	1	Sioux	....	1
Lee	3	1	Story	37	3
Linn	....	8	Tama	6	1
Louisa	5	1	Taylor	....	6
Lucas	....	2	Union	....	6
Lyon	....	1	Van Buren	....	3
Madison	....	5	Wapello	7	3
Mahaska	1	4	Warren	5	11
Marion	5	13	Washington	....	2
Marshall	1	3	Wayne	....	4
Mills	3	1	Webster	34	1
Mitchell	....	1	Winnebago	8	....
Monona	....	2	Winneshiek	....	1
Monroe	....	4	Woodbury	....	1
Montgomery	....	2	Worth	....	....
Muscatine	5	2	Wright	18	1
O'Brien	....	1			
			Total	549	254

SCHEDULE NUMBER FIVE.

ROAD LETTINGS ATTENDED.

County	No. of Lettings	Miles of Road	Kind of Work and Unit Prices	Approx. Total Price
Allamakee	1	1	Earthwork—Earth 25c per cu. yd. Loose rock, 45c per cu. yd. Solid rock, 99c per cu. yd.	$3,800.00
Boone	1	6	Earthwork—21c per cu. yd. All bids rejected.	
Calhoun	1	13	Earthwork—19c per cu. yd.	11,500.00
Carroll	1	2	Earthwork—20½ per cu. yd.	3,500.00
Cass	2		Earthwork—Bids rejected.	2,100.00
			Earthwork—25c per cu. yd.	
Cedar	1	6	Earthwork—20c per cu. yd.	6,600.00
Cerro Gordo	2	6	Earthwork—24c per cu. yd.	4,300.00
		1	Concrete—$1.35 per sq. yd.	13,500.00
Cherokee	1	17	Earthwork—17.9-21c Oper. per cu. yd.	19,600.00
Crawford	1	6	Earthwork—16.8-21c per cu. yd.	9,000.00
Des Moines	1	1	Concrete—$1.31 per sq. yd.	17,000.00
Dubuque	1	20	Earthwork—20c per cu. yd.	
			Gravel—90c per cu. yd on road.	88,000.00
Greene	2	5	Gravel—44c-75c per cu. yd.	2,000.00
Hamilton	1	2	Earthwork—24½c per cu. yd.	5,880.00
Hardin	2	15	Earthwork—16.5-16.9c per cu. yd.	11,800.00
Jones	1	1	Earthwork—25½c per cu. yd.	1,000.00
Keokuk	2	3.6	Earthwork—24½c per cu. yd.	8,700.00
Page	1	....	Earthwork—26c per cu. yd.	1,040.00
Scott	2	2	Earthwork—23½-25c per cu. yd.	7,667.00
			Graveling—$2.05 per cu. yd.	
			Crushed stone—$1.75 per cu. yd.	
Shelby	1	1	Earthwork—18½-25½c per cu. yd.	3,135.00
Tama	1	.75	Earthwork	2,640.00
Winnebago	1	7	Earthwork—17¾c per cu. yd.	7,800.00
Totals	27	116.35		$230,562.00

PART ONE—CHAPTER FIVE

DRAINAGE INVESTIGATION DEPARTMENT.

The department of lakebed and drainage investigation was established in July, 1915, after careful consideration by the Commission for the purpose, of

Making a study of the streams and waterways of the State to determine scientifically the proper sizes of bridges and culverts needed, as the temporary structures are replaced with permanent construction.

The Commission has also assigned to this department the duty of carrying on and completing the investigation of the lakes and lakebeds of the State, as required by an act of the Thirty-sixth General Assembly.

CONCRETE HEADWALL CONSTRUCTION.

A satisfactory scheme devised to prevent the excessive wash on culverts, having considerable difference in end elevation. The construction of the concrete box at the up stream end enables the stream to deposit material rather than cut at this point. Constructed in Crawford county.

The State has passed into an era of permanent bridge building, which will continue until all the present temporary or semi-temporary structures have given way to those of permanent construction, such as concrete and the heavy steel bridges which are now being built.

It has been the experience that during the succession of comparatively dry years there is a considerable tendency to constrict the areas of waterways provided, and when a dry period is succeeded by a period of more than normal rainfall and stream discharge, the structures which have been built during the previous dry year are not sufficient in many instances for the increased demand upon them. We have already experienced several costly failures on this account.

In other instances the sizes of structures have been too large, or larger than necessary for the service demanded of them.

The replacing of the present temporary structures with permanent construction generally over the state, means the expenditure of millions of dollars. The Commission has made an estimate of the cost to complete the bridge system of one county where not less than one-half million dollars has already been spent for permanent construction. The estimate to complete the system of bridges and culverts is over one million dollars. This gives some idea of the total amount that will be spent in the ninety-nine counties of the State for this purpose alone.

In Iowa we have only a few rock foundations; also we have a large area in which the streams, geologically speaking, are young. This means that there will continue to be errosion and deepening of the stream beds with disastrous results if the waterways are restricted.

For the above reasons the Commission deems it imperative that a careful study be made of the streams of the State and the sizes of waterways needed. Before this work can be undertaken, except on a limited scale, this department must survey and report upon the meandered lakes of the State which are under jurisdiction of the State.

Lakebed Surveys and Investigations.

In the last report made by the State Land Department in 1899, the total number of meandered lakes and lakebeds is listed at about 103 separate areas. Of this number the records show that about twenty-one lakes have been drained and patents issued for all or part of the land included; that five lakes have been surveyed, and

more than five hundred dollars has been expended on the drainage of these lakes; and that surveys have been made, or are in progress, but less than five hundred dollars expended on sixteen lakes. This leaves a total of about 62 lakes to be surveyed.

Assistance from Other State Departments.

Under the terms of the act, the Commission was given authority to request assistance from other state departments, including the engineering schools of the State University and the State College. Up to the time of this report the following individuals and departments have co-operated in the work:

State Fish and Game Warden, E. C. Hinshaw is maintaining one party on the field surveys under the general supervision of Mr. L. A. Wilson, who was formerly employed by the State Executive Council on the lake surveys.

From the State University, Professor B. Shimek is making observations of the effect of the presence of lakes on the meteorological conditions surrounding them.

From the engineering department of the Iowa State College during the summer, Professors H. C. Ford, M. F. P. Costelloe, and F. A. Dragoun, were assigned to the lake surveys. Professor Ford acted as chief of party on the surveys from June 15th until school opened in September. During this time about ten students volunteered to assist in the work without compensation other than their actual field expenses.

From the Agricultural Experiment Station of the Iowa State College, Messrs. F. S. Wilkins, D. H. Zentmire and J. A. Krall, acting under the general direction of Professor H. D. Hughes, have been keeping records on a number of the lakes of the farm crops surrounding these lakes and the effect on the crops of the bird life which exists in proximity to the lake.

From the Forestry Department of the Iowa State College, Professor G. B. MacDonald is making a study of the trees and such growths now surrounding the lakes to determine the proper future development of the groves or other planting.

From the Botanical Section, Professor Pammel and Mr. Seal have been making a study of the plant life now existing inside the lakes for the purpose of determining to what extent the growth of reeds and such water plants can be prevented from filling the lakes.

All the above state employees serve without extra pay.

Reports will be made on these various subjects, all of which will have a bearing on the report made by the Commission as to its recommendations for the final disposition of the lakes and lake-beds.

The State Fish and Game Warden, Mr. E. C. Hinshaw, will submit a report along the line of the relation of fish and game life to the preservation of the lakes.

Status of Meandered Lakes Prior to 1904.

The status of the meandered lakes of State, according to the opinion of Milton Remley, Attorney General, rendered June 22, 1895, is as follows:

"The State, as a sovereign, is the owner of the shores of navigable waters below high water mark, and the soil under them."

This opinion was referred to by Justice Deemer in an opinion filed May 26, 1899, in the Supreme Court of Iowa, as follows:

"We are quite ready to assume as a general proposition that the title to all the lake beds in the State, especially those of navigable lakes, is in the State, and that the general government never had any control or ownership thereof. Indeed this seems to be the only almost unbroken voice of authority."

The above opinions were written in an appeal made by the State from the decision of the Humboldt County district court relative to the ownership of Owl Lake in that county, which was originally designated as a meandered lake, but which was later changed by the land commissioner of the United States Land Office as swamp land under the act of September 28, 1850, commonly known as the Swamp Land Grant.

The general policy, however, of the Department of the Interior seems to have been of non-interference with the meandered lakes, although the classification of a number of those in the original list was changed from meandered lakes to swamp lands, and as such patented to the counties in which each existed.

Status of Meandered Lakes Between 1904 and 1913.

The acts of the Thirtieth and Thirty-second General Assembly placed with the Executive Council of the State the authority to survey the meandered lakes and lake beds within the State, and to determine which lakes should remain the property of the State, and which might be drained, improved, demised or sold. Further authority was granted to construct canals between any of the lakes maintained where public convenience would require.

The initiative to bring the question of draining any lakebed lay with the property owners, fifty of whom were required to sign a petition for draining, and of this number twenty must be actual residents of the township.

Under the provisions of the above act (Chapter 2-B, Title 14, Supplement to the Code, 1913), if the Executive Council authorized the draining of any lake or lakebed, the drainage was carried out under the provisions of the drainage laws of the State by the Board of Supervisors of the county in which the lake was situated. The net proceeds derived from the sale of said lands, after all the expenses connected with the survey, appraisement, drainage and sale of said lands had been deducted, were returned to the county and credited to the road funds to be used in road improvement.

Under the provisions of these acts a number of the lakes were surveyed and drained, a few were sold without being drained and a number were surveyed and drainage denied.

An exact statement as to the number in each of the above classes will be included in a later report after the records are carefully verified.

Present Status of Meandered Lakes.

In the report of the land department of Iowa for 1899, Mr. G. L. Dobson, then Secretary of State, reported that a total of about 61,000 acres of land were covered by lakes in Iowa, as shown by the plats of survey. This estimate did not include a few meandered lagoons and bayous along the Mississippi and Missouri rivers. The list of lakes which he reported at that time included all of the areas originally classified by the United States government as meandered lakes and lakebeds. This list contained about one hundred and nine such areas. This original number has been reduced by the re-classification of certain lakes as swamp lands and the drainage and sale of others, until at the present time there are about eighty-five lakes in which the title still rests with the State. Of these about fifteen have been surveyed, leaving about seventy areas for which a survey and report will be required, and of the fifteen for which surveys have been made some further investigation will be necessary.

The Thirty-sixth General Assembly, in order to obtain the information necessary on which to formulate a permanent policy relative to the lakes and lakebeds of the State, passed an act, S. F. No. 2, which provides for the repeal of Chapter 2-B, Title 14 of the Supplement to the Code, 1913, in the application of such chapter to all lakes and lakebeds, except those which, under authority of the Executive Council, have already been drained, or in the drainage of which the sum of $500.00 has been in good faith expended, or to those lakes which were prior to January 1, 1915, sold under the provisions of said chapter. No such excepted lakebed, however, shall be sold by the State, or leased for more than one year. This act provides that the Highway Commission shall inspect and investigate the various lakes of the State affected by the act, and classify them into the following classes:

First—Lakes which should be preserved.

Second—Lakes which should be drained, the State retaining ownership of the lakebed.

Third—Lakes which should be ordered drained and the lakebeds sold.

The report of the Commission is required to contain the following information relative to each of the above classes:

First—As to the lakes to be preserved,—a general statement as to the lake, improvements required and estimated cost thereof.

Second—As to lakes to be drained, the state reserving title,—a general statement as to acreage of lakebed, cost of drainage and estimated value when drained, and reasons for drainage rather than preservation.

Third—As to the lakes to be drained and beds sold,—a general statement as to acreage, cost of drainage, value when drained, estimated price at which same should be sold, and recommendations for drainage and sale, rather than preservation or drainage, the State retaining title.

The above report is to be filed not later than January 15, 1917, for the consideration of the Thirty-seventh General Assembly.

General Principles Involved.

There is without a doubt, a popular demand generally existing in the State for the preservation and improvement of the natural bodies of water owned by the State. This sentiment has been growing rapidly since the advent of the motor car, which makes even the more isolated lakes easily reached by a large number of people. This sentiment has also been greatly increased by the work done to re-stock the lakes with fish, and the work of improvement which has been carried on under authority of law by the State Fish and Game Warden. There has accumulated a con-

siderable fund which can be used for the above purpose from the hunters' licenses.

In the opinion filed by Attorney General Remley, referred to above, he used the following statement:

"I would say that in my judgment, the policy of the State should be to maintain all the lakes of Iowa in their original extent and beauty as far as it is possible to do so. To convert the many beautiful lakes of Iowa into fields for cultivation appears to me to be utilitarianism run mad."

The acts which authorized heretofore the drainage of these lakes required that the petition for drainage contain a statement signed by the fifty free-holders, that the lake or lakebed sought to be drained was detrimental to the public health or the general welfare of the citizens of the county, and that it was unwise to maintain such lake or lakebed as a permanent body of water.

Progress Report.

At this time the State Highway Commission has two parties in the field on the surveys, and the State Fish and Game Warden has one party, all acting under the direction of Mr. R. W. Clyde, and surveys have been completed for about twenty lakes. It is planned to finish the surveys proper by July 1, 1916.

The present season has been so wet that surveys have been carried on with difficulty around the lakes as naturally the wettest lands and muddiest roads are to be found in the vicinity of the lakes.

It is planned to complete the classification and report on all the lakes by January 1, 1917.

PART TWO—CHAPTER ONE

RAILROAD CROSSING IMPROVEMENT.

Nov. 1, 1914—Jan. 1, 1916.

The work on railroad crossing improvements is handled by the regular organization of the bridge department, but on account of the special nature of this part of the work it has appeared desirable to confine the details of the work to a comparatively few members of the department. Few, if any, of the states in the Union have given greater attention than Iowa to the elimination and improvement of the most dangerous crossings on our main traveled highways. With the very apparent yearly increase in

PERMANENT UNDERGRADE HIGHWAY CROSSING.

This undergrade highway crossing is located one and one-half miles north of Grinnell in Poweshiek county. A clearance of 24 feet horizontal and 15 feet vertical is provided in this structure. Erected at a total cost of $9,000.00 for the improvement.

traffic on the highways of the State and the urgent demand for greater safety of travel, this phase of the work continually assumes graver importance.

A routine method of procedure has been adopted for all crossing complaints. As soon as a complaint is filed with the Commission, a number is assigned to the project and it is listed for inspection or survey. A field inspection is made as soon as possible after the complaint is filed. Field surveys are prepared for the projects requiring plans. After detailed plans are prepared, a conference is arranged between the interested parties and if possible an agreement reached as to the distribution of cost of the improvment. Many of the smaller propositions can be satisfactorily adjusted by correspondence alone and whenever possible this method of adjustment is used.

UNDERGRADE CROSSING IMPROVEMENT.

A view showing the old and new undergrade crossings on the county highway one and one-half miles north of Grinnell in Poweshiek county. A very dangerous turn in the highway was eliminated by this improvement.

The following is a summary statement of the work done and results accomplished on railroad crossing work during the period covered by this report, November 1, 1914, to January 1, 1916. Counties from which crossings were listed 45, railroad crossings involved 121, projects listed 112, projects listed for surveys 41, projects surveyed 45, projects surveyed and plans being prepared 22, projects for which plans and estimates have been prepared 46, projects upon which plans were submitted and approved 8, conferences held on projects 37, projects ready for conference 17, projects under adjustment at this time 44, projects temporarily abandoned 20, projects satisfactorily adjusted 41, work of construction completed 27. Total estimated cost of all crossing work designed $211,400.

The present status of each crossing project listed may be obtained by reference to schedule eight. Each project listed is taken up briefly and a synopsis of the work done on it up to the present time is given.

SCHEDULE SIX.

DETAILED STATEMENT OF WORK ACCOMPLISHED AND PROGRESS REPORT ON EACH CROSSING PROJECT LISTED.

NOTE: For crossing numbers not listed see Report of State Highway Commission for 1913-1914.

NO. 3—UNION COUNTY.

1½ miles S. W. Shepard, Sec. 34-35, Union Twp.; Chicago Great Western.

On September 24, 1915, a conference was held at which time an agreement was signed by the railroad company, board of supervisors and township trustees contemplating the construction of the approach fill to the overhead bridge and the payment of a portion of the cost by each party. A copy of this agreement is on file in this office. This proposition is satisfactorily adjusted.

NO. 4—PAGE COUNTY.

Between Sections 29-32, Nodaway Twp.; Chicago, Burlington & Quincy.

At a second conference held at Clarinda, May 6, 1915, it was agreed that the county should procure the necessary right of way and do the grading work contemplated by the plans. The railroad company is to reimburse the county for two-thirds of the entire cost of grading at a price not to exceed 30c per cubic yard for earth moved. Satisfactorily adjusted.

NO. 8—BENTON COUNTY.

Between Sections 13-14, Monroe Twp., 9 miles W. of Vinton; Chicago, Rock Island & Pacific.

Hearing before Railroad Commission held at the site of the crossing on May 18, 1915. The application for a railroad crossing at this location was denied by the Railroad Commission in an opinion given July 30, 1915. Proposition closed.

NO. 9—LINN COUNTY.

Section 33, Monroe Twp., on Cedar Rapids-Center Grove Hwy; Illinois Central & Waterloo, Cedar Falls & Northern.

At a second conference held in Cedar Rapids on January 14, 1915, the two railroad companies each agreed to bear the remainder of the cost of the improvement carried out in accordance with the plans if the county would appropriate $1,000 towards the cost of the improvement. The estimated cost of the project was $5,000. The county objected to the construction of an overhead crossing at this point and on November 6, 1915, filed with the Commission a petition signed by eighty-six citizens requesting that negotiations be taken up with the railroad companies for the improvement of the crossing at grade. (See 1914 Report.)

NO. 10—POLK COUNTY.

¾ mile N. of Des Moines, Hyperion Club Road, Sec. 18, Webster Twp.; Des Moines Interurban.

See 1914 Report. Further negotiations for the improvement of this project has been withheld at the request of the board of supervisors.

NO. 11—GUTHRIE COUNTY.

2½ miles E. of Stuart, S. line Sec. 36, Penn Twp.; Chicago, Rock Island & Pacific.

See 1914 Report. Project abandoned until question of changing county road is settled.

NO. 12—PAGE COUNTY.

Between Secs. 35-36, Grant Twp.; Wabash.

At a conference held on May 20, 1915, it was agreed that plans should be prepared for the suggested changes in the improvement of this crossing and negotiations taken up to insure the completion of the project. No settlement has been reached to date.

NO. 13—RINGGOLD COUNTY.

West corporation limits of town of Diagonal; Chicago, Burlington & Quincy.

On September 15, 1915, an agreement was reached whereby one-third of the cost of the improvement to be carried out in accordance with the plans is to be borne by each of the three interested parties, the town of Diagonal, Chicago, Burlington & Quincy and Ringgold County. The construction work will be done in 1916. Proposition now satisfactorily adjusted.

NO. 14—PAGE COUNTY.

Between Secs. 29-32, Tarkio Twp. In town of Norwich. Chicago, Burlington & Quincy.

At a conference held on May 6, 1915, the board of supervisors requested some changes in the plans as prepared and it was agreed that the county engineer and engineer of the railroad company should prepare plans embodying the suggested changes and submit same for consideration. No plans have been submitted to date.

NO. 15—RINGGOLD COUNTY.

Between Secs. 25-26, Jefferson Twp., 4 miles S. of Shannon City; Chicago, Burlington & Quincy.

Preparation of plans withheld awaiting further request from board of supervisors.

NO. 16—PAGE COUNTY.

In Sec. 33, Nodaway Twp., 2½ miles S. E. of Clarinda; Chicago, Burlington & Quincy.

Proposition satisfactorily adjusted. (See 1914 Report.)

NO. 17—PAGE COUNTY.

Between Secs. 23-26, Colfax Twp., near Blanchard; Iowa & Southwestern.

Plans and estimates of this improvement have been prepared and submitted to the railroad company and board of supervisors. Proposition has not been adjusted.

NO. 18—PAGE COUNTY.

Between Secs. 29-30, Lincoln Twp., near Coin; Wabash.

Plans and estimates of cost have been prepared and the project is now ready for conference.

NO. 19—UNION COUNTY.

In Sec. 20, Jones Twp., near Afton Junction; Chicago, Burlington & Quincy.

At a conference held September 22, 1914, the township trustees were notified that further negotiations for the improvement of this project would be withheld until the township road leading to the crossing was put in good condition.

NO. 20—TAMA COUNTY.

Between Secs. 17-18, Clarke Twp., 4 miles E. of Traer; Chicago, Rock Island & Pacific.

Proposition satisfactorily adjusted. (See 1914 Report.)

NO. 21—TAMA COUNTY.

In Section 27, Otter Creek Twp., near Gladstone; Chicago, Milwaukee & St. Paul.

Proposition satisfactorily adjusted. Bridge completed and road relocated. (See 1914 Report.)

NO. 22—CLARKE COUNTY.

On South Main Street in Osceola; Chicago, Burlington & Quincy.

City unable to appropriate its share of expense of improvement and proposition temporarily abandoned. (See 1914 Report.)

NO. 23—CLARKE COUNTY.

On South line Sec. 31, Green Bay Twp., 3 miles S. of Osceola; Chicago, Burlington & Quincy.

Plans and estimates of cost have been prepared and the proposition is now ready for conference.

NO. 24—CLARKE COUNTY.

Located in town of Woodburn, Singlers Addition; Chicago, Burlington & Quincy.

This proposition has been appealed to the Railroad Commission, December 20, 1915.

NO. 25—POLK COUNTY.

Between Secs. 2-11, Beaver Twp., ¼ mile W. of Mitchellville; Chicago, Rock Island & Pacific & Des Moines Interurban.

Crossings have been temporarily improved by grading. (See 1914 Report.)

NO. 26—POLK COUNTY.

Between Secs. 28-29, Allen Twp., near Avon; Chicago, Rock Island & Pacific.

Surveys for this improvement have been made and the plans and estimates of cost are now in the course of preparation.

CONCRETE ARCH BRIDGE.

Five 70' arch spans over the Little Sioux River in city of Spencer, Clay county. Completed in 1915 at a cost of $31,800.00.

NO. 27—LOUISA COUNTY.

Between Secs. 2-11, Grand View Twp.; Chicago, Rock Island & Pacific and Minneapolis & St. Louis.

This proposition in hands of Railroad Commission. Conference to be held soon at site of crossing.

NO. 28—IDA COUNTY.

Between Secs. 25-26, Greggs Twp.; Chicago & Northwestern.

Proposition satisfactorily adjusted and project completed. (See 1914 Report.)

NO. 29—SAC COUNTY.

Between Secs. 28-29, Eden Twp., 2½ miles E. of Schaller; Chicago & Northwestern.

Satisfactorily adjusted. (See 1914 Report.)

NO. 30—DECATUR COUNTY.

1½ miles W. of Grand River on township line; Chicago, Burlington & Quincy.

At a conference held on May 6, 1915, it was agreed that Commissioner Beard should take up the matter of settlement with the township trustees at once. Project has been abandoned and improved as grade crossing. (See 1914 Report.)

NO. 31—DECATUR COUNTY.

In Section 10, Center Twp., 4 miles N. of Leon; Chicago, Burlington & Quincy.

Right-of-way condemned and project completed according to plan, except that township road was not vacated for the present, but board expects to vacate it when a settlement of claims for damage is made. (See 1914 Report.)

NO. 32—DAVIS COUNTY.

Between Secs. 25-30, Cleveland Twp., in city of Bloomfield; Chicago, Burlington & Quincy.

This proposition was satisfactorily adjusted by railroad company and county.

NO. 33—BENTON COUNTY.

Between Secs. 27-34, Polk Twp., in town of Urbana; Waterloo, Cedar Falls & Northern.

Proposition temporarily abandoned.

NO. 34—POWESHIEK COUNTY.

Between Secs. 32-33, Chester Twp., 1½ miles N. of Grinnell; Minneapolis & St. Louis.

This permanent undergrade crossing has been constructed and the project now complete. (See 1914 Report.)

NO. 35—POWESHIEK COUNTY.

In town of Brooklyn, Sec. 23, Bear Creek Twp.; Chicago, Rock Island & Pacific.

Proposition temporarily abandoned on account of lack of funds on part of city. (See 1914 Report.)

NO. 36—SAC COUNTY.

Between Secs. 7-8, Sac Twp., in town of Ulmer; Illinois Central.

Proposition settled by correspondence, the railroad company agreeing to construct a culvert under the approach grade and pay $215 towards cost of grading. Now completed.

NO. 37—WOODBURY COUNTY.

Between Secs. 4-9, Woodbury Twp., ¼ mile S. E. Sioux City; Chicago, Milwaukee & St. Paul.

No agreement was reached at the conference held in Sioux City, April 8, 1915, and the matter was appealed to the Railroad Commission at that time. The proposition remains unsettled awaiting a decision by the Railroad Commission.

NO. 38—LINN COUNTY.

In Sec. 2, College Twp.; Chicago, Rock Island & Pacific.

Proposition temporarily abandoned awaiting further data.

NO. 39—HANCOCK COUNTY.

½ mile S. of Forest City, Sec. 2, Madison Twp.; Chicago, Rock Island & Pacific.

Proposition satisfactorily adjusted by correspondence.

NO. 40—KOSSUTH COUNTY.

In Section 12, Livingston Twp., 1 mile S. of Algona; Chicago & Northwestern.

Proposition satisfactorily adjusted. (See 1914 Report.)

NO. 41—ADAMS-TAYLOR COUNTIES.

In Sec. 33, Grant Twp., Adams County; Chicago, Burlington & Quincy.

Survey to be made and plans prepared.

NO. 42—MONTGOMERY COUNTY.

In Sec. 20, Jackson Twp., W. of Villisca; Chicago, Burlington & Quincy.

Proposition settled. (See 1914 Report.)

NO. 43—MILLS COUNTY.

Between Secs. 24-25, Indian Creek Twp., E. of Emerson; Chicago, Burlington & Quincy.

Advised county Highway Commission does not have jurisdiction in this matter and suggested an appeal to Railroad Commission.

NO. 44—HAMILTON COUNTY.

In Sec. 17, Cass Twp., 4 miles No. of Webster City; Chicago & Northwestern.

Surveys will be made for the plans for this improvement at an early date.

NO. 45—HAMILTON COUNTY.

Located in Sec. 8, Cass Twp., 5 miles N. of Webster City; Chicago & Northwestern.

Surveys for the plans for the improvement of this crossing will be made soon.

NO. 46—WOODBURY COUNTY.

In Sec. 6, Rock Twp., E. of Correctionville; Chicago & Northwestern.

Proposition satisfactorily adjusted. (See 1914 Report.)

NO. 47—DICKINSON COUNTY.

In Secs. 28-33, Diamond Lake Twp., 1 mile W. of Montgomery; Chicago, Rock Island & Pacific.

Plans for this improvement are now completed and a conference to arrange for a distribution of cost will be scheduled soon.

NO. 48—RINGGOLD COUNTY.

Between Secs. 10-15, Rice Twp., 2 miles S. W. of Mt. Ayr; Chicago, Burlington & Quincy.

Proposition satisfactorily adjusted. (See 1914 Report.)

NO. 49—STORY COUNTY.

Between Sec. 1, Grant Twp., and Sec. 6, Nevada Twp., on W. corporation line of Nevada; Chicago & Northwestern.

At a conference held June 17, 1915, it was agreed that the railroad company should provide material for widening the approaches to the present crossing and furnish a certain amount of gravel for gravelling a route to divert traffic from this crossing. This has been done and the proposition is now completed.

NO. 50—CLARKE COUNTY.

Between Secs. 15-22, Osceola Twp., 2 miles E. of Osceola; Chicago, Burlington & Quincy.

Plans and estimates have been prepared for some time but no conference held. Arrangements now under way for conference.

NO. 51—WASHINGTON COUNTY.

In Section 10, Iowa Twp., in Iowa Junction; Chicago, Rock Island & Pacific.

Plans and estimates prepared and proposition ready for conference.

NO. 52—MARSHALL COUNTY.

In Sec. 2, Jefferson Twp., 2½ miles E. of Haverhill; Chicago, Milwaukee & St. Paul.

Proposition satisfactorily adjusted. (See 1914 Report.)

NO. 53—CRAWFORD COUNTY.

Between Secs. 24-25, Boyer Creek Twp., 5 miles S. W. of Dow City; Chicago & Northwestern.

The surveys for this project have not been made. Some temporary work has been done on the crossing.

NO. 54—GUTHRIE COUNTY.

Between Secs. 29-30, Menlo Twp., 2 miles W. of Menlo; Chicago, Rock Island & Pacific.

Proposition temporarily abandoned on account of small amount of traffic on road.

NO. 55—LOUISA COUNTY.

In Sec. 25, Wapello Twp., 1½ miles W. of Elrick Station; Minneapolis & St. Louis.

Plans and estimates for this project are prepared and the proposition is ready to go to conference.

NO. 56—LOUISA COUNTY.

In Sec. 31, Morning Sun Twp., 2 miles S. E. Morning Sun; Chicago, Rock Island & Pacific.

Plans and estimates of cost for this project have not been completed.

NO. 57—MONROE COUNTY.

Between Secs. 6-7, Mantua Twp., 1½ miles W. of Avery; Chicago, Burlington & Quincy.

Agreement has been reached between railroad company and county but final settlement is being held up awaiting the purchase of right of way. Efforts to secure right of way now under way.

NO. 58—MARION COUNTY.

In Sec. 2, Knoxville Twp., 1½ miles W. of Knoxville; Chicago, Burlington & Quincy.

At a conference held on March 16, 1915, at Knoxville, a tentative agreement was reached on this project. Acceptance was secured from the railroad company and township trustees, but the county refused to participate in the cost. Proposition temporarily abandoned.

NO. 59—MARION COUNTY.

In Sec. 35, Liberty Twp., near Hamilton; Chicago, Burlington & Quincy and Wabash.

This grade crossing listed for survey during 1916.

NO. 60—DECATUR COUNTY.

In Sec. 30, Center Twp., 2 miles W. of Leon; Chicago, Burlington & Quincy.

Proposition temporarily abandoned awaiting advice from county engineer.

NO. 61—DALLAS COUNTY.

Between Secs. 32-33, Union Twp., near Dexter; Chicago, Rock Island & Pacific.

This grade crossing improved in accordance with the plans and an equal cost of the improvement borne by the railroad company and county. Estimated cost of improvement $620.00.

NO. 62—MONROE COUNTY.

In Sec. 6, Mantua Twp., 2 miles W. of Avery; Chicago, Burlington & Quincy.

Railroad company agrees to carry out improvement in accordance with the plans at their own expense. Estimated cost $756. Proposition satisfactorily adjusted at conference held March 3, 1915.

VIEW OF THE OLD SPENCER BRIDGE.

This is a roadway view of the old bridge in Spencer, Clay county, which has recently been replaced with a five-span concrete arch bridge. (See photograph of completed structure.)

NO. 63—MONROE COUNTY.

Between Sec. 31, Bluff Twp., and Sec. 36, Union Twp.; Chicago, Burlington & Quincy and Wabash.

Agreement reached at conference held March 3, 1915, between railroad company and county whereby each interested party pays one-third cost of improvement. Proposition not settled, awaiting the securing of a portion of the right of way necessary.

NO. 64—MONROE COUNTY.

In Sec. 23, Monroe Twp., near Lovilla; Chicago, Burlington & Quincy and Wabash.

Agreement reached at conference held March 3, 1915, whereby each interested party pays one-third cost of improvement. Proposition being held up awaiting purchase of necessary right of way.

NO. 65—MONROE COUNTY.

In Sec. 1, Troy Twp., 3¼ miles E. of Avery; Minneapolis & St. Louis.

The plans for this proposition are not complete, but a conference on this project will be held soon.

NO. 66—MARION COUNTY.

In Sec. 2, Knoxville Twp., 2 miles W. of Knoxville; Chicago, Burlington & Quincy.

See report on crossing No. 58. Agreement reached, but county refuses to participate in cost of improvement in accordance with this agreement. Proposition temporarily abandoned.

NO. 67—MARION COUNTY.

In Sec. 10, Knoxville Twp., 2 miles E. of Knoxville; Chicago, Burlington & Quincy.

At a conference held on March 16, 1915, the railroad company agreed to repair their present bridge at this undercrossing and provide the necessary clearance as requested. The entire expense to be borne by the railroad company. Work will be done in 1916.

THE OLD SITE OF THE SPENCER BRIDGE.

This 625' combination wood and steel structure has been replaced by an earth fill and a five-span concrete arch bridge. (See photograph of the completed structure.)

NO. 68—MARION COUNTY.

Between Secs. 17-20, Swan Twp., in town of Swan; Chicago, Burlington & Quincy.

At a conference held at the site of the crossing on September 25, 1915, the railroad company agreed to repair the crossing in accordance with the suggestions made by the city and county authorities. Proposition satisfactorily adjusted and completed.

NO. 69—WOODBURY COUNTY.

Between Secs. 28-33, Banner Twp., near Lowton; Chicago & Northwestern.

Plans completed recently and arrangement now being made for conference to be held to determine distribution of cost.

NO. 70—WOODBURY COUNTY.

In Sec. 32, Union Twp., in Correctionville; Illinois Central.

Proposition adjusted by correspondence and railroad company agreed to furnish gravel at crossing for improvement. Proposition now satisfactorily adjusted.

NO. 71—WOODBURY COUNTY.

Between Sec. 34, Union Twp., and Sec. 6, Rock Twp., in Correctionville; Chicago & Northwestern.

At the request of the city authorities further action on this proposition has been withheld until 1916.

NO. 72—WOODBURY COUNTY.

Between Sec. 36, Little Sioux Twp., and Sec. 31, Oto Twp.; Chicago, Milwaukee & St. Paul.

At a conference held in Sioux City on April 8, 1915, this project was under discussion and at that time the railroad company through its representatives present refused to participate in the cost of the improvement and the board of supervisors appealed the case to the Railroad Commission. No formal hearing has been held to date.

NO. 73—JEFFERSON COUNTY.

In Sec. 36, Lockridge Twp., E. of Lockridge; Chicago, Burlington & Quincy.

At the conference held at the site of the crossing on June 2, 1915, it was agreed between the railroad company's representative and board of supervisors that temporary repairs should be made to the existing undergrade crossing. Revised plans and estimates of cost were prepared and furnished each interested party. An equal distribution of cost was agreed upon. Articles of agreement have been sent each party for signature.

NO. 74—LEE COUNTY.

Between Secs. 3-4, West Point Twp., near West Point; Chicago, Burlington & Quincy.

This project involves the elimination of two grade crossings and the improvement of a portion of the county road system. Plans and estimates of cost have been prepared and the proposition is ready for conference.

NO. 75—MILLS COUNTY.

In Sec. 29, Silver Creek Twp., in town of Malvern; Chicago, Burlington & Quincy.

See 1914 report on conference held. A final decision was given by the Railroad Commission on July 30, 1915, ordering the crossing improved in accordance with the plans as prepared by the Highway Commission. An equal portion of the expense was borne by the railroad company and Mills County.

NO. 76—WOODBURY COUNTY.

Between Secs. 23-26, Liston Twp., 1 mile E. of Danbury; Chicago & Northwestern.

Project listed for survey at an early date.

NO. 77—CERRO GORDO COUNTY.

In Sec. 21, Falls Twp., S. W. limits town of Rock Falls; Chicago, Rock Island & Pacific.

A conference was held on this project on June 7, 1915, at which time an agreement was reached between the railroad company and the board of supervisors as to the method of improvement and distribution of cost. The present grade crossing is to be abandoned upon completion of an undergrade crossing by the railroad company. The railroad company is to construct and maintain the undergrade crossing and the county is to construct the road leading to the crossing and to pay $250 towards the cost of excavation on the railroad company's right of way. This project is under construction and the project satisfactorily adjusted.

NO. 78—CERRO GORDO COUNTY.

In Sec. 3, Lime Creek Twp.; Minneapolis & St. Louis and Chicago Great Western.

The project was satisfactorily adjusted by correspondence between the railroads interested and the county. Only a small amount of filling was necessary to the approaches in this instance. Crossing improvement now completed.

NO. 79—CERRO GORDO COUNTY.

Between Secs. 15-16, Pleasant Valley Twp., 1 mile S. of Swaledale; Chicago Great Western.

Plans for this improvement are now in the course of preparation.

NO. 80—LUCAS COUNTY.

Between Secs. 1-2, Benton Twp., 1 mile W. of Russell; Chicago, Burlington & Quincy.

Surveys have been made for this improvement and plans are being prepared.

NO. 81—LUCAS COUNTY.

In Sec. 19, Union Twp.; Chicago, Burlington & Quincy.

Surveys have been made for this improvement and plans and estimates are being prepared.

NO. 82—PALO ALTO COUNTY.

Between Secs. 13-14, Highland Twp., 7 miles W. of Emmetsburg; Chicago, Milwaukee & St. Paul.

At the conference held at the site of the crossing on September 24, 1915, the board of supervisors and township trustees agreed to appropriate $1,000 towards the cost of the improvement in accordance with the plans. This proposition was submitted to the railroad company but no notice of acceptance has been received to date. The project will probably be improved in substantial accordance with this proposition.

NO. 83—EMMET COUNTY.

Between Secs. 4-5, Estherville Twp., 2½ miles W. of Estherville; Chicago, Rock Island & Pacific.

This project has been taken up by County Attorney of Emmet County and the proposition temporarily abandoned by the Commission.

NO. 84—SIOUX COUNTY.

At intersection Secs. 8-9-16-17, Sherman Twp., in town of Maurice; Chicago & North Western.

A conference was held in Orange City on December 15, 1915, on this project and an agreement reached for the improvement of the present grade crossing. The railroad company and county each agree to pay one-half the cost of the improvement estimated at $700. Proposition now satisfactorily adjusted. Construction will be made in 1916.

NO. 85—SIOUX COUNTY.

Between Secs. 31-32, Holland Twp.; Chicago & Northwestern.

The plans and estimates of cost for this project are in the course of preparation at this time.

NO. 86—SIOUX COUNTY.

Between Secs. 6-7 and 7-8, Lincoln Twp., 5 miles N. W. of Perkins; Great Northern.

At the conference held at Orange City on April 7, 1915, no agreement was reached as to distribution of cost of this project. Objections were raised by the railroad company to the plans as prepared and a re-survey was made and revised plans submitted for consideration. On October 20, 1915, the railroad company submitted a proposition to the county agreeing to pay $1,400 towards the total cost of the improvement estimated at $4,900. No notice of acceptance received from the county on this offer.

NO. 87—SIOUX COUNTY.

Between Secs. 20-21, West Branch Twp., 3 miles S. of Sioux Center; Great Northern.

This crossing listed for survey during 1916.

NO. 88—LYON COUNTY.

Between Sec. 30, Larchwood Twp., and Sec. 25, Sioux Twp.; Chicago, Rock Island & Pacific.

Surveys for this project have been made and the plans are in the course of preparation at this time.

NO. 89—LYON COUNTY.

Between Secs. 35-36, Doon Twp., 1 mile S. of Doon; Great Northern.
This grade crossing listed for survey at an early date.

NO. 90—LYON COUNTY.

Between Secs. 15-22, Doon Twp., 1½ miles N. W. of Doon; Great Northern.

An inspection was made by the Commission's engineer on December 4, 1914, and a profile submitted to the railroad company of the improvement desired. The railroad company agreed to improve the crossing in 1915 as per suggestions. Project satisfactorily adjusted.

NO. 91—DAVIS COUNTY.

Sections 2-35, West Grove Twp., in town of West Grove; Wabash.
A survey for the improvement of this grade crossing is listed for 1916.

NO. 92—WAYNE COUNTY.

Between Promise City and Corydon; Chicago, Burlington & Quincy.

At a conference held on August 24, 1915, the railroad company through its superintendent agreed to do the necessary grading work to improve these crossings satisfactorily. The work has been done at the expense of the railroad company and the proposition satisfactorily adjusted.

NO. 93—MONROE COUNTY.

Between Secs. 21-22, Urbana Twp.; Chicago, Milwaukee & St. Paul
This crossing listed for survey at an early date. Plans will be prepared early in 1916 and a conference held on this project.

NO. 94—WRIGHT COUNTY.

In N. W. corner Sec. 27, Blaine Twp.; Chicago, Rock Island & Pacific.
This project listed for survey during 1916.

NO. 95—TAYLOR COUNTY.

Near Lenox; Chicago, Burlington & Quincy.
This project to be surveyed soon and plans for the improvement prepared.

NO. 96—MUSCATINE COUNTY.

In Sec. 24, Bloomington Twp.; Davenport & Muscatine Interurban.
This project listed for survey at an early date.

NO. 97—DALLAS COUNTY.

On S. corporation line, town of Woodward; Des Moines-Perry Interurban.

At a conference held at the site of the crossing on August 20, 1915, it was agreed that the Commission should prepare plans and estimates of cost on the improvement of this crossing at grade. These were prepared and negotiations taken up with the interurban company and county on a distribution. No agreement has been reached to date.

NO. 98—BUTLER COUNTY.

Between Secs. 28-33, Albion Twp., 2½ miles S. of Parkersburg; Chicago & Northwestern.

Plans are now in the course of preparation for this improvement and a conference will be arranged at an early date on this project.

NO. 99—FLOYD COUNTY.

In Sec. 14, Rockford Twp.; Chicago, Rock Island & Pacific.

Plans and estimates of cost on this project have been prepared and the project is now ready for conference. A meeting will be held soon on this proposition.

NO. 100—MARION COUNTY.

Between Secs. 20-29, Swan Twp., 1 mile S. of Swan; Chicago, Burlington & Quincy.

A survey will be made of this project during 1916 and plans prepared for its improvement.

NO. 101—HUMBOLDT COUNTY.

Between Secs. 28-29, Beaver Twp.; Minneapolis & St. Louis.

Plans for a permanent undergrade crossing were submitted by the railroad company for approval. These plans were approved and the undergrade crossing constructed in accordance with them. This project now satisfactorily adjusted.

NO. 102—TAMA COUNTY.

Between Secs. 27-34, Spring Creek Twp., 3.6 miles N. of Garwin; Chicago & Northwestern.

Plans for the permanent improvement of this undergrade crossing were submitted for approval by the railroad company. These plans were approved by the Commission and the work constructed in accordance with them. This project now satisfactorily adjusted.

NO. 103—MUSCATINE COUNTY.

In Sec. 16, Goshen Twp., 2½ miles E. of West Liberty; Chicago, Rock Island & Pacific.

A conference was held at West Liberty on this project on May 21, 1915, at which time an agreement was reached whereby the county and railroad company each pay one-half the cost of the improvement. The right of way for this project is now purchased and the work of construction will go forward in the spring of 1916.

NO. 104—DUBUQUE COUNTY.

In Sec. 27, Dubuque Twp., in town of Center Grove; Illinois Central.

Two conferences were held on this project which contemplates the construction of approach fills and a permanent steel viaduct over the tracks of the Illinois Central railroad. At the second conference held at Dubuque on August 3, 1915, acceptance was made of the plans as prepared by the Commission and an agreement reached whereby the county constructs the approach fills to the viaduct and pays $700 towards the cost of the viaduct. The railroad company pays $10,700 towards the cost of the viaduct and assumes maintenance. The total estimated cost of the completed project

is $20,482. This proposition is satisfactorily adjusted and a contract will be let soon for the construction work.

NO. 105—DUBUQUE COUNTY.

In Sec. 36, Center Twp., in town of Julien; Illinois Central.

Two conferences were held on this project which contemplates the construction of a viaduct and approach fills. At the conference held in Dubuque on August 3, 1915, an agreement was reached whereby the railroad company constructs and maintains a wooden viaduct over their tracks and the county constructs and maintains the approach fills. The wood viaduct is to be replaced with permanent construction in the future. The estimated cost of the entire project is $11,900. A contract will be let soon for this work.

NO. 106—DUBUQUE COUNTY.

In Sec. 10, Taylor Twp., 1 mile W. of Epworth; Illinois Central.

Two conferences were held on this project which eliminates a present grade crossing and contemplates the construction of a permanent subway crossing to replace it. At the second conference held in Dubuque on August 3, 1915, an agreement was reached whereby the railroad company constructs and maintains the permanent undergrade crossing and the county purchases the right of way necessary and constructs the highway approaching the crossing. The estimated cost of the improvement is $8,300 and a contract for its construction will be let at an early date.

NO. 107—FAYETTE COUNTY.

On South Frederick Street in City of Oelwein; Chicago Great Western.

This project temporarily abandoned on account of expense. The crossing at present is at grade and crosses six railroad tracks. Negotiations are under way to secure the installation of additional protection to the traveling public at this crossing.

NO. 108—WAYNE COUNTY.

Between Secs. 15-16, Jackson Twp., E. of depot, in town of Harvard; Chicago, Rock Island & Pacific.

The present wooden overhead bridge is in poor condition and the matter of repair or reconstruction is being taken up with the county and railroad company. Proposition not settled.

NO. 109—MAHASKA COUNTY.

In Sec. 10, White Oak Twp., near Rose Hill; Chicago, Rock Island & Pacific.

This proposition settled by correspondence, the railroad company and county agreeing on the improvement to be made and distribution of cost. Proposition consists of widening the approach grade and plank. Satisfactorily adjusted.

NO. 110—OSCEOLA COUNTY.

Between Secs. 13-24, West Holman Twp., 1 mile S. of Sibley; Chicago, St. Paul, Minneapolis & Omaha.

Project satisfactorily adjusted by an agreement from the railroad company to remove obstruction to the view at the site of the present grade crossing.

NO. 111—FAYETTE COUNTY.

Between Secs. 6-7 and 7-8, Jefferson Twp., 2 miles N. W. of Oelwein; Chicago Great Western.

Two grade crossings were improved by grading up the approaches and the matter satisfactorily adjusted by correspondence. Proposition closed.

NO. 112—IOWA COUNTY.

Near the town of North English; Chicago, Milwaukee & St. Paul.

This project is listed for early attention. The complaint as filed is indefinite and further information will need to be secured.

NO. 113—LINN COUNTY.

In Sec. 29, Otter Creek Twp.; Waterloo, Cedar Falls & Northern.

Plans for the improvement of a grade crossing by the construction of an overhead crossing at this location were submitted for approval. The plans were approved with suggestions. Proposition adjusted satisfactorily.

NO. 114—LUCAS COUNTY.

In Sec. 18, White Breast Twp., 1 mile E. of Lucas; Chicago, Burlington & Quincy.

Correspondence has been taken up with the county and railroad company for the adjustment of this proposition. No satisfactory agreement reached to date.

NO. 115—BOONE COUNTY.

1 mile E. of Madrid, Sec. 29-32, Garden Twp.; Chicago, Milwaukee & St. Paul.

This project will be surveyed at an early date and plans prepared for its improvement.

NO. 116—DALLAS COUNTY.

Between Secs. 4-9, Spring Valley Twp., in Perry; Minneapolis & St. Louis.

Plans and estimates of cost have been prepared for the improvement of this project at a conference held at the site of the crossing on August 20, 1915. No agreement was reached and the proposition is still in the hands of the Railroad Commission.

NO. 117—DALLAS COUNTY.

In Sec. 20, Van Meter Twp.; Chicago, Rock Island & Pacific.

The necessary surveys for this improvement will be made early in 1916.

NO. 118—LUCAS COUNTY.

On Court Street in Chariton; Chicago, Burlington & Quincy.

At a conference held at the site of this crossing on April 30, 1915, the plans and estimates of cost were taken up and discussed with the interested parties. No agreement as to the distribution of cost was reached and the matter was appealed to the Railroad Commission in May, 1915. No decision announced up to the present time. Proposition unsettled.

NO. 119—LUCAS COUNTY.

On Sixteenth St. in Chariton; Chicago, Burlington & Quincy.

The plans and estimates of cost were taken up and discussed for the construction of a subway crossing under the tracks of the Chicago, Burlington & Quincy at Sixteenth Street at a conference held in Chariton on April 30, 1915. No agreement was reached at that time and the matter was appealed to the Railroad Commission. Proposition is still unsettled as no decision has been given in the case by the Railroad Commission.

NO. 120—LUCAS COUNTY.

On Eighth Street in Chariton; Chicago, Burlington & Quincy.

This proposition satisfactorily adjusted when railroad company granted the city the right to go upon their right of way and remove the bank obstructing the view of approaching trains.

NO. 121—RINGGOLD COUNTY.

At intersection Secs. 17-18-19-20, Tingley Twp.; Chicago, Burlington & Quincy.

At a conference held at the site of the crossing on August 23, 1915, an agreement was reached whereby this undergrade crossing is to be improved in accordance with the plans as prepared by the Commission. County to construct 24" concrete culvert and railroad company to construct pile trestle and bear all additional expense.

NO. 122—RINGGOLD COUNTY.

Between Secs. 33-34, Union Twp.; Chicago, Burlington & Quincy.

An agreement was reached at the conference held at the site of the crossing on August 23, 1915, whereby the railroad company agrees to make temporary repairs satisfactory to the county. Proposition satisfactorily adjusted.

NO. 123—LINN COUNTY.

In Sec. 34, Bertram Twp.; Iowa Railway & Light Company.

Plans for the improvement of a grade crossing by the construction of a permanent overhead structure were submitted to the Commission for approval. A new design was prepared by the Commission and returned to the railroad company, August 25, 1915. This proposition is satisfactorily adjusted and the new structure will be erected at an early date.

NO. 124—GREENE COUNTY.

In Sec. 31, Kendrick Twp., in town of Ralston; Chicago & Northwestern.

Plans for the improvement of this project are practically complete and a conference will be arranged at an early date for the consideration of the distribution of expense.

NO. 125—STORY COUNTY.

Between Secs. 3-10, Navada Twp.; Chicago & Northwestern.

Plans and estimates for the improvement for this project are now practically complete and a conference will be arranged at an early date to take up the distribution of cost. This is an important crossing on the Lincoln Highway between Nevada and Colo and will receive early attention.

NO. 126—SCOTT COUNTY.

In S. E. ¼ Sec. 35, Princeton Twp.; Davenport, Rock Island & Northwestern.

A preliminary conference was held at the site of the crossing on September 17, 1915, and the alternate plans and estimates were taken up and discussed. A conference for arranging for the final distribution of cost will be held soon. Estimated cost of improvement of this crossing with a permanent subway, $11,700.

NO. 127—GREENE COUNTY.

Between Secs. 9-10, Jackson Twp.; Chicago & Northwestern.

Plans and estimates of cost have been prepared and a conference to determine the distribution of cost is now being arranged.

NO. 128—GREENE COUNTY.

Between Secs. 3-4, Scranton Twp., 1 mile W. of Scranton; Chicago & Northwestern.

Plans and estimates of cost are complete and this project is ready for conference at this time.

NO. 129—CARROLL COUNTY.

Between Secs. 19-20, Jasper Twp.; Chicago Great Western.

Surveys for this project to be made later at request of board of supervisors.

NO. 130—CARROLL COUNTY.

Between Secs. 21-28, Maple River Twp.; Chicago Great Western.

The improvement of this project taken up with the railroad company by correspondence and a report received showing the installation of a crossing bell. Proposition satisfactorily adjusted.

NO. 131—CARROLL COUNTY.

Between Secs. 29-30, Maple River Twp.; Chicago Great Western.

This project listed for a survey early in 1916.

NO. 132—CARROLL COUNTY.

Between Secs. 29-30, Maple River Twp.; Chicago Great Western.

Surveys for this project will be made at an early date and plans and estimates prepared.

NO. 133—CARROLL COUNTY.

On north side, Sec. 5, Roselle Twp.; Chicago Great Western.

Correspondence in reference to the improvement of this project has been taken up with the railroad company and township and county officials.

NO. 134—CARROLL COUNTY.

Between Secs. 6-7, Roselle Twp.; Chicago Great Western.

Temporarily abandoned awaiting further request from board of supervisors. Surveys for this project have not been made.

NO. 135—CARROLL COUNTY.

On W. line Sec. 18, Roselle Twp., in Halbur; Chicago Great Western.
Surveys for this project to be made in 1916, and plans prepared for the improvement.

NO. 136—CARROLL COUNTY.

Between Secs. 3-4, Warren Twp.; Chicago Great Western and Chicago & Northwestern.
This project listed for survey at an early date.

NO. 137—CARROLL COUNTY.

Between Secs. 22-27, Maple River Twp.; Chicago & Northwestern.
An inspection of this crossing was made on May 14, 1915, and correspondence taken up to secure its improvement. The final completion of the improvement is delayed in securing the necessary right of way.

NO. 138—CARROLL COUNTY.

Between Secs. 7-8, Maple River Twp.; Chicago & Northwestern.
This project to be surveyed at an early date and plans and estimates of cost prepared.

NO. 139—CARROLL COUNTY.

Between Secs. 27-28, Maple River Twp.; Chicago & Northwestern.
Surveys for the improvement of this project will be made at an early date.

NO. 140—CARROLL COUNTY.

Between Secs. 12-13, Warren Twp., 1 mile W. of Templeton; Chicago Milwaukee & St. Paul.
The necessary surveys for this project will be made at an early date.

NO. 141—KEOKUK COUNTY.

In Sec. 28, Richland Twp., 1½ miles W. of Richland; Chicago, Milwaukee & St. Paul.
Plans and estimates of cost for this project have been prepared and the conference date postponed at the request of the board of supervisors. It is probable this crossing project will be under consideration during 1916.

NO. 142—ADAIR COUNTY.

Between Secs. 8-9, Summit Twp.; Chicago, Rock Island & Pacific.
Surveys for the improvement of this crossing project are to be made soon.

NO. 143—MAHASKA COUNTY.

On S. line Sec. 36, Prairie Twp.; Minneapolis & St. Louis.
Plans and estimates of cost will be prepared as soon as the surveys can be completed on this project. Listed for survey in 1916.

NO. 144—ADAIR COUNTY.

Near N. ¼ Cor. Sec. 14, Somerset Twp.; Chicago, Burlington & Quincy.
Surveys will be made as soon as possible for this crossing project.

NO. 145—SHELBY COUNTY.

In Sec. 31, Lincoln Twp., 1 mile N. of Tennant; Chicago Great Western.
This project which contemplates the improvement of one and the elimination of two grade crossings is ready for conference. Plans and estimates of cost have been furnished the county and railroad company.

NO. 146—PLYMOUTH COUNTY.

In Sec. 6, Fredonia Twp.; Chicago, St. Paul, Minneapolis & Omaha.
Surveys have been made and plans and estimates of cost are in the course of preparation on this project. It will be possible to arrange an early conference on this proposition.

NO. 147—SIOUX COUNTY.

Between Secs. 31-32, Nassau Twp.; Chicago, St. Paul, Minneapolis & Omaha.
Surveys have been made and plans are practically completed for this project. A conference can be arranged at an early date.

NO. 148—KEOKUK COUNTY.

On Jackson Street in N. W. part of Sigourney; Chicago, Rock Island & Pacific.
Satisfactory temporary repairs have been made on the present wooden overhead bridge at this location. After several inspection trips and some correspondence, the matter has been satisfactorily adjusted.

NO. 149—DUBUQUE COUNTY.

Between Sec. 31, Washington and Sec. 36, Prairie Creek Twp.; Chicago, Milwaukee & St. Paul.
This project to be surveyed at an early date. Plans and estimates of cost will be prepared as soon as possible.

NO. 150—HARDIN COUNTY.

In Sec. 24, Hardin Twp., S. corporation line Iowa Falls; Illinois Central and Chicago, Rock Island & Pacific.
This crossing project listed for survey. Plans will be prepared in 1916 for the improvement of these two grade crossings.

NO. 151—FAYETTE COUNTY.

On Second Street, E. in City of Oelwein; Chicago, Rock Island & Pacific.
Plans and estimates of cost have been prepared and furnished the city engineer of Oelwein for the improvement of the crossing contemplated at this location. A conference on this project will be arranged at an early date.

NO. 152—FAYETTE COUNTY.

In Center Sec. 22, Union Twp.; Chicago, Rock Island & Pacific.
This crossing was inspected on June 23, 1915, and correspondence taken up at once to secure its improvement. The proposition is still unsettled and a conference will probably be arranged at an early date to consider further plans for the improvements.

NO. 153—FAYETTE COUNTY.

In Corner Sec. 3-4, Westfield Twp.; Chicago, Milwaukee & St. Paul.

Plans and estimates of cost for the elimination of a grade crossing by the construction of an undergrade crossing on a relocated road have been prepared and this project is now ready for conference.

NO. 154—WARREN COUNTY.

In Sec. 7, Richland Twp.; Chicago, Burlington & Quincy.

Plans were prepared for this improvement and a conference held on September 13, 1915. The board of supervisors refused to accept the recommendations of the appraisal board on the land which was condemned on account of excessive award of damage and the proposition is temporarily abandoned awaiting further action on the part of the interested parties.

NO. 155—WARREN COUNTY.

Sec. 16-17, Jefferson Twp., 1½ miles S. of Churchville; Chicago Great Western.

This project will be secured during 1916 and plans prepared for its improvement.

NO. 156—FRANKLIN COUNTY.

Between Sec. 31, Mott Twp., and Sec. 36, Marion Twp.; Chicago Great Western.

This project is listed to be surveyed in 1916. Plans and estimates will be prepared as soon as surveys are completed.

NO. 157—CLAYTON COUNTY.

In N. W. ¼ Sec. 13, Boardman Twp.; Chicago, Milwaukee & St. Paul.

Project involving the widening of planks on a grade crossing satisfactorily adjusted by correspondence. This project is now closed.

NO. 158—APPANOOSE COUNTY.

Three and three-fourths miles N. of Centerville and 2 miles E. of Mystic; Chicago, Milwaukee & St. Paul.

This project to be surveyed at an early date and plans prepared for its improvement.

NO. 159—KEOKUK COUNTY.

In N. W. ¼ Sec. 28, Twp. 74 N., R. 10 W.; Chicago, Milwaukee & St. Paul.

Plans and estimates of cost are available and this proposition is ready for a conference between the interested parties to determine the proportion of cost each should bear.

NO. 160—LYON COUNTY.

On Main Street in Rock Rapids; Chicago, Rock Island & Pacific.

At a conference held in Rock Rapids on August 17, 1915, an agreement was reached whereby the county buys the right of way outside the city limits and does the grading work necessary not within the city. The railroad company purchased creosote material for two pile bridges on the highway and does the grading on the right of way. Project satisfactorily adjusted.

NO. 161—BOONE COUNTY.

In S. E. corner Sec. 23, Des Moines Twp.; Ft. Dodge, Des Moines & Southern.

An inspection and if necessary a survey will be made of this project at an early date.

NO. 162—SAC COUNTY.

Between Secs. 19-30, Twp. 89, R. 38 W., W. of Schaller; Chicago & Northwestern.

At the request of the county a proposition for the improvement of this crossing was submitted to the railroad company and accepted by them; $125 was paid to the county by the railroad company towards this improvement. Proposition completed and satisfactorily adjusted.

NO. 163—POLK COUNTY.

Between Secs. 31-32, Jefferson Twp., ½ mile N. of Grimes; Chicago, Milwaukee & St. Paul.

This project is to be surveyed as soon as possible and plans prepared for its improvement.

NO. 164—KEOKUK COUNTY.

In Sec. 23, Richland Twp., 1½ miles N. E. of Richland; Chicago, Milwaukee & St. Paul.

A survey has been made for this improvement and plans and estimates are now being prepared.

NO. 165—KEOKUK COUNTY.

In Sec. 32, West Lancaster Twp., 1 mile S. W. of Haysville; Chicago, Milwaukee & St. Paul.

A survey for this improvement will be made at an early date. Plans and estimates of cost will then be prepared.

NO. 166—ADAIR COUNTY.

In town of Adair; Chicago, Rock Island & Pacific.

An examination and report on the present overhead bridge at the location was made and recommendations made for repairing the bridge. Proposition not settled.

NO. 167—MAHASKA COUNTY.

In Sec. 9, Scott Twp., in town of Olivet; Chicago, Rock Island & Pacific.

The complaint regarding the condition of a grade crossing on an abandoned track was satisfactorily adjusted by correspondence.

NO. 168—APPANOOSE COUNTY.

On W. city limits city of Centerville; Centerville, Albia & Southern.

A survey of this improvement has been made and plans and estimates of cost are now in course of preparation.

NO. 169—LINN COUNTY.

On the Main Street in Coggon; Illinois Central.

Correspondence in reference to this proposition has been taken up with the railroad company. Proposition now in course of adjustment.

RIVETED STEEL DECK TRUSS.

Only a few locations in the state will permit the use of this type of construction. This type of construction requires considerable head room above high water in order to allow its use. This bridge is located in Webster county, near Fort Dodge, over Lizard Creek.

NO. 170—STORY COUNTY.

Between Sections 20-29, Washington Twp.; Ft. Dodge, Des Moines & Southern.

The improvement of the condition of this grade crossing was accomplished by correspondence. The complaint is now satisfactorily adjusted.

NO. 171—PAGE COUNTY.

Between Secs. 29-32, Lincoln Twp., 1 mile N. E. of Coin; Chicago, Burlington & Quincy.

This project satisfactorily adjusted by township and railroad officials and complaint withdrawn.

NO. 172—CLAYTON COUNTY.

Between Sec. 25 Cass and 30 Lodomillo, 2 miles E of Strawberry Point; Chicago, Milwaukee & St. Paul.

This project surveyed recently and the plans now in course of preparation.

NO. 173—HENRY COUNTY.

In Sec. 10, Center Twp., on E. corporation line Mt. Pleasant; Chicago, Burlington & Quincy.

Plans for the overhead crossing at this location are now being prepared and will be available within a short time.

NO. 174—STORY COUNTY.

Between Secs. 22-27, Union Twp., 1 mile E. of Cambridge; Chicago, Milwaukee & St. Paul.

The complaint regarding this proposition was satisfactorily adjusted by correspondence and the project is completed at this time.

NO. 175—CALHOUN COUNTY.

Between Secs. 27-28, Greenfield Twp.; Chicago, Rock Island & Pacific.

Surveys have been completed for this project and the plans are in the course of preparation at this time.

NO. 176—CALHOUN COUNTY.

Between Secs. 23-24, Center Twp; Illinois Central.

Surveys have been competed for this project and the plans are in the course of preparation at this time.

NO. 177—CALHOUN COUNTY.

Between Secs. 17-20, Butler Twp.; Chicago, Milwaukee & St. Paul.

The surveys for this project are complete and the plans will be prepared at an early date.

NO. 178—MONROE COUNTY.

Section 15, Monroe Twp., First crossing south of Selection; Wabash.

The complaint on the conditions at this crossing satisfactorily adjusted by correspondence. Project completed at this time.

NO. 179—HARDIN COUNTY.

On W. line Sec. 7, Hardin Twp., near N. corporation line Iowa Falls. Chicago, Rock Island & Pacific.

Estimates of cost only have been prepared for this proposition which contemplates the substitution of an undergrade for a grade crossing at this location.

NO. 180—WEBSTER COUNTY.

Between Secs. 11-14, Dayton Twp.; Minneapolis & St. Louis.

Surveys for this project have been made and the plans are now being prepared.

NO. 181—WEBSTER COUNTY.

On N. line Sec. 1, Fulton Twp.; Minneapolis & St. Louis.

The surveys for this project have been made and the plans are being prepared.

NO. 182—WEBSTER COUNTY.

In Sec. 33, Cooper Twp., S. E. Cor. of Ft. Dodge; Ft. Dodge, Des Moines & Southern.

Surveys are completed for this project and plans are being prepared.

NO. 183—BOONE COUNTY.

Between Secs., 35-36, Jackson Twp.; Chicago & North Western.

A complaint regarding the condition of this crossing is being adjusted by correspondence with the railroad company. Project not settled.

NO. 184—DALLAS-POLK COUNTIES.

Between Sec. 31, Webster Twp., Polk County and Sec. 36, Walnut Twp., Dallas County; Chicago, Milwaukee & St. Paul.

Complaint regarding view at crossing being adjusted by correspondence. Proposition not settled at this time.

NO. 185—DALLAS COUNTY.

On center line Sec. 13, Des Moines Twp.; Chicago, Milwaukee & St. Paul.

The complaint regarding the conditions at this crossing are being adjusted by correspondence. Proposition not settled at this time.

NO. 186—JONES COUNTY.

Between Sec. 13, Greenfield and Sec. 18, Rome Twp., in town of Morley; Chicago, Milwaukee & St. Paul.

The complaint in reference to this project is being adjusted by correspondence. Not adjusted at this date.

NO. 187—JONES COUNTY.

Between Secs. 11-12, Greenfield Twp., 1 mile W. of Morley; Chicago, Milwaukee & St. Paul.

This project being adjusted by correspondence at this time. No satisfactory adjustment at this date.

NO. 188—JONES COUNTY.

Between Secs. 5-8, Greenfield Twp., 1 mile E. of Martelle; Chicago, Milwaukee & St. Paul.

This crossing project is listed for survey at an early date. Plans and estimates of cost will be prepared upon completion of the surveys.

NO. 189—JONES COUNTY.

In Sec. 8, Greenfield Twp., 2 miles S. E. of Martelle; Chicago, Milwaukee & St. Paul.

Surveys will be made at an early date for the improvement of this crossing.

NO. 190—DECATUR COUNTY.

Between Secs. 14-23, Long Creek Twp.; Chicago, Burlington & Quincy.

This crossing project to be surveyed as soon as possible and plans prepared for its improvement.

NO. 191—WAPELLO COUNTY.

In Sec. 25, Greene Twp; Wabash.

This crossing is listed for consideration at the earliest possible date and surveys for its improvement will be made in 1916.

NO. 192—RINGGOLD COUNTY.

Between Secs. 34-35, Lincoln Twp., 3 miles W. of Diagonal; Chicago, Burlington & Quincy.

This crossing project listed for survey at an early date. Plans and estimates of cost will be prepared as soon as the surveys can be completed.

NO. 193—POLK COUNTY.

Between Secs. 13-14, Saylor Twp.; Chicago Great Western.

This project will be adjusted by correspondence with the railroad company and county and township officials. Not settled at this date.

NO. 194—POLK COUNTY.

Between Secs., 13-14, Saylor Twp.; Ft. Dodge, Des Moines & Southern.

The improvement of this crossing has been taken up with the railroad company and county and township officials. The adjustment can be secured by correspondence.

NO. 195—POLK COUNTY.

Between Secs. 13-24, Saylor Twp.; Chicago & North Western.

The adjustment of this project will be taken up with the railway company in an effort to secure a satisfactory adjustment.

General Data Regarding Railroad Crossing Improvements.

In the 1913 and 1914 annual report a detailed statement is given concerning the distribution of railroad crossings in reference to the county and township road system and the railroads in this state. The following shows the type of the 195 crossings as originally listed.

Grade	140
Undergrade	23
Overhead	11
Unreported	16
No present crossing	5
Total	195

No attempt has been made to distribute the crossing improvements according to the mileage of track owned by each railroad in this state. Each crossing complaint as filed has been listed and it is interesting to note that the distribution of the 195 crossings listed is practically in a direct ratio to the total number of crossings on the principal railroad systems in the state. This can be better understood by referring to schedule forty on page 163 of the 1913 and 1914 report and the following table.

Chicago, Burlington & Quincy	49
Chicago, Rock Island & Pacific	31
Chicago & Northwestern	29
Chicago, Milwaukee & St. Paul	27
Chicago Great Western	15
Minneapolis & St. Louis	9
Illinois Central	8
Wabash	6
Miscellaneous	21
Total	195

Railroad Crossing Plans Submitted for Approval.

In addition to the work of preparing plans for crossing improvements, the Commission has been called upon to approve plans prepared by the railroad companies for the improvement of eight crossings. Schedule nine shows the detailed statement concerning the plans which have been submitted and approved by the Commission during the time covered by this report.

SCHEDULE SEVEN.

Project No.	County	R. R. Co.	Description	Date Approved
101	Humboldt	M. & St. L.	Undergrade—Permanent work	March 16, 1915
28	Ida	C. & N. W.	Overhead—Wood	Aug. —, 1915
106	Dubuque	I. C.	Undergrade—Permanent	Oct. 19, 1915
113	Linn	W. C. F. & N.	Overhead—Steel	May 11, 1915
133	Carroll	C. G. W.	Overhead—Wood	Nov. 23, 1915
123	Linn	I. R. & L. Co.	Overhead—Concrete	April 27, 1915
34	Poweshiek	M. & St. L.	Undergrade—Concrete	May —, 1915

Important Crossing Projects Adjusted.

Special attention should be called to a number of adjustments which have been secured in reference to crossing improvements during the past year and which are of greater importance than the average crossing improvement undertaken.

At two conferences held on June 22d and August 3, 1915, an agreement was reached between the Illinois Central Railroad and Dubuque County concerning the elimination of three grade crossings on the Dubuque Post Road, which is being improved by Dubuque County this year. The total estimated cost to the county and railroad company for the elimination of these three grade crossings is $40,690.00. Two of the crossings are eliminated by the construction of approach fills to the viaduct over the Illinois Central tracks and the third one is improved by the construction of a natural grade crossing. Contracts for the construction of these three structures will be let at an early date.

A dangerous grade crossing on the Chicago, Rock Island and Pacific Railroad near Rock Falls in Cerro Gordo County is to be improved in accordance with an agreement reached at a conference held last June. Two deaths was the result of an accident on this crossing last year and the danger has been eliminated at a joint expense to the railroad company and county by the construction of an undergrade crossing on a portion of re-located road. By the elimination of this grade crossing, one of the most dangerous crossings in Cerro Gordo County is improved.

A narrow and dangerous undergrade crossing is to be eliminated at the joint expense of Jefferson County and the Chicago, Burlington & Quincy Railroad. At a conference held at the site of the crossing on June 2d, an agreement was reached concerning the improvement to be made and the equal distribution of cost. The estimated cost of this improvement is $2,500.

PART TWO—CHAPTER TWO

THE WORK OF THE DISTRICT AND FIELD ENGINEERS.

Exclusive of the field work on railway crossings and three hundred sixty-nine days spent on surveys and construction work on state institutional roads under the Board of Control, engineers of the Commission have, during the past year, spent 1,641 days in the various counties assisting in the county and township highway work. Nine hundred forty-four days were spent on bridges and six hundred ninety-seven days on roads. This work is classified as follows:

	1914	1915
Examination of bridge sites	96	146
Attending bridge lettings	132	155
Attending material lettings	...	67
Inspection and supervision of bridge work	206	341
Examination of emergency work	28	33
Special assignments	345	226
Attending road lettings	...	23
Approval of grade lines	166	130
Inspection and supervision of road work	156	256
Inspecting proposed changes in county roads	...	15
Investigation of complaints	63	120
Investigation of county road systems	69	...
Explanation of yearly report	49	43
Unclassified	176	86
Total	1,594	1,641

Refer to Schedule Number Ten.

Some of this work is carried on by engineers sent direct from the office at Ames, but far the greater portion is handled by the five district engineers. These men spend their entire time on the road, conferring with the boards of supervisors, township trustees, and county engineers, assisting in the preparation of plans, the holding of lettings, and the inspection and supervision of highway work; and keeping the Commission advised of the progress being made in each county.

During the past year the field engineers have attended twenty-seven lettings for the improvement of 116.35 miles of road costing $230,562.00; one hundred forty lettings for the construction of 2,140 bridges, costing $1,679,165.00; and eighty-four lettings for bridge and road materials. 998.63 miles of road profile have been

examined in the field and grade lines approved. One hundred and ten complaints regarding the condition of the highways have been investigated, and the blanks for the annual reports have been taken up personally with every county engineer in the state.

SCHEDULE NUMBER EIGHT.

SHOWING DAYS SPENT IN EACH COUNTY BY FIELD ENGINEERS.

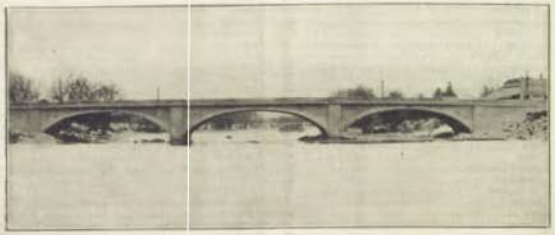
County	Days	County	Days
Adair	8	Jefferson	13
Adams	19	Johnson	9
Allamakee	16	Jones	6
Appanoose	17	Keokuk	11
Audubon	14	Kossuth	18
Benton	8	Lee	14
Black Hawk	15	Linn	20
Boone	18	Louisa	12
Bremer	11	Lucas	9
Buchanan	11	Lyon	14
Buena Vista	18	Madison	8
Butler	20	Mahaska	23
Calhoun	20	Marion	12
Carroll	18	Marshall	12
Cass	42	Mills	14
Cedar	43	Mitchell	6
Cerro Gordo	56	Monona	11
Cherokee	13	Monroe	22
Chickasaw	18	Montgomery	16
Clarke	8	Muscatine	15
Clay	25	O'Brien	9
Clayton	9	Osceola	4
Clinton	11	Page	7
Crawford	15	Palo Alto	13
Dallas	10	Plymouth	11
Davis	13	Pocahontas	18
Decatur	8	Polk	43
Delaware	14	Pottawattamie	35
Des Moines	36	Poweshiek	11
Dickinson	14	Ringgold	9
Dubuque	64	Sac	13
Emmet	47	Scott	19
Fayette	16	Shelby	15
Floyd	10	Sioux	17
Franklin	11	Story	7
Fremont	19	Tama	19
Greene	18	Taylor	17
Grundy	9	Union	10
Guthrie	8	Van Buren	9
Hamilton	20	Wapello	8
Hancock	8	Warren	14
Hardin	18	Washington	8
Harrison	15	Wayne	11
Henry	7	Webster	18
Howard	17	Winnebago	14
Humboldt	17	Winneshiek	13
Ida	13	Woodbury	11
Iowa	15	Worth	26
Jackson	7	Wright	
Jasper	28	Total	1641

SUMMARY OF FIELD WORK OF EACH ENGINEER.

Road Department.

F. R. White, Road Engineer, has attended three bridge lettings for 202 structures costing $77,400.00, two road lettings for twenty-one miles of road costing $130,000.00, two railway crossing conferences at which agreements were reached for the improvement

of three crossings estimated at $40,700.00. Seventeen days were spent on state road work, and twenty days on work relative to the plans, contract, and construction work on the Hawkeye Highway in Dubuque County. A trip was made to Washington, D. C., for consultation with the Office of Public Roads regarding the plans for this road. A total of eighty days was spent in the field, which required railroad travel amounting to 15,500 miles.



Concrete Arch Bridge in Shell Rock.

W. E. Jones, Assistant Road Engineer, has attended four bridge lettings for seventy-four structures costing $65,035.00, two road lettings for fifteen miles of road costing $12,400.00, has spent eleven days on field approval of road profiles, five days on emergency bridge work, nine days on explanation of annual report blanks, sixteen days on general inspection and supervision of road and bridge work, and thirteen days on surveys of state roads at state institutions. A total of eighty-two days have been spent in the field, which required railroad travel amounting to 9,617 miles.

J. S. Dodds, Assistant Road Engineer, has attended eighteen road meetings, spending a total of twenty-one days, prepared highway exhibits at the State Fair and Northwestern Road Congress spending eighty-three days, superintended gravel road construction in Polk County for twenty days, and given instruction in road building to six classes of Agricultural students at Iowa State College. A total of 130 days has been spent in the field on this work which required railroad travel amounting to 10,898 miles.

O. W. Crowley, Assistant Engineer, spent thirty-four days inspecting the construction of the Lincoln Street bridge in Esther-

BRIDGE APPROACH.

A view showing the approach to the Shell Rock bridge. Provision has been made for accommodating the roadway and sidewalk to this bridge.

ville, forty-two days making surveys and supervising construction work on state roads at Woodward and at Ames, forty-six days inspecting concrete road work at Mason City, eighteen days inspecting concrete road work at Burlington, twenty-eight days on the Hawkeye Highway in Dubuque County, twelve days inspecting on the Sioux River bridge at Spencer, and twenty-nine days on the Des Moines Paving Investigation. The total number of days spent in the field is 222, which required railroad travel amounting to 3,407 miles.

F. H. Mann, Assistant Engineer, has spent all his time since August 18th on state road work at Ames. One hundred days were spent in this work. The railroad travel amounted to 551 miles.

L. S. Gates, Assistant Engineer, has spent all of his time since August 23d on state road work at the State Farm at Woodward. Eighty-eight days have been spent thus. The railway travel has amounted to 1,474 miles.

W. M. MacGibbon has been engaged continuously since August 14th on state road work at the State Hospital at Cherokee. One hundred and four days were spent on this work. The railroad travel amounted to 1,288 miles.

District Engineers.

First District. Engineer C. Coykendall has attended fifteen material lettings and thirty-two bridge lettings for 642 structures costing $432,459.00; ten road lettings for forty and three-fourths miles of road costing $49,642.00; investigated forty-four complaints; spent thirty-one days in taking field measurements for bridges; twenty-two days approving grade lines; and 141 days in the supervision and inspection of bridge and road work. A total of 278 days has been spent in the field, requiring traveling amounting to 25,825 miles.

Second District. Engineer W. H. Root has attended twenty-one material lettings and thirty-eight bridge lettings for 398 structures costing $361.729.00; four road lettings for fourteen miles of road costing $15,900.00; investigated fifteen road complaints; spent sixty-two days taking field measurements for bridges; twenty-two days approving grade lines; and 116 days in the supervision and inspection of bridge and road work. A total of 268 days has been spent in the field requiring travel amounting to 23,874 miles.

Third District. Engineer W. F. Beard has attended six material lettings and twenty-nine bridge lettings for 440 structures costing $386,303; one road letting for seventeen miles of road costing $19,600; investigated thirteen complaints; spent thirty-six days taking field measurements for bridges; forty-six days approving grade lines; and 103 days in the supervision and inspection of bridge and road work. A total of 232 days has been spent in the field, requiring travel amounting to 18,655 miles.

Fourth District. Engineer L. M. Martin has attended nineteen material lettings, and twenty-eight bridge lettings for 193 structures costing $146,615; three road lettings for 27,400 cu. yds. of earthwork costing $6,275.00; investigated forty-four complaints; spent twelve days taking field measurements for bridges; four days approving grade lines; and 180 days in the supervision and inspection of bridge and road work. A total of 279 days has been spent in the field requiring travel amounting to 22,162 miles.

Fifth District. Engineer J. S. Morrison has attended nine material lettings, and thirty-one bridge lettings for 239 structures costing $211,948; four road lettings for 5.6 miles of road costing $16,367.00; investigated thirty-nine complaints; spent thirty-five days in taking field measurements for bridges; thirty-two days in approving grade lines; and 148 days in the supervision and inspection of bridge and road work. A total of 280 days has been spent in the field, requiring travel amounting to 17,828 miles.

PART TWO—CHAPTER THREE

HIGHWAY LEGISLATION.

Changes Made in the Road Laws by the Thirty-sixth General Assembly.

The full text of the principal road measures passed by the Thirty-sixth General Assembly has been printed in bulletin form under the title of, "Recent Road Legislation," which bulletin was issued by the Commission in co-operation with the Department of Justice. The Thirty-sixth General Assembly made some important changes in existing road laws, and passed some new measures to supplement existing laws. The important changes are summarized briefly as follows:

The Highway Commission: The members of the Commission are now required to give bonds, which were given voluntarily

before, and the duties of the Commission have been increased to include surveys and plans for the Board of Control of State Institutions, assist the Attorney General in patent suits, make surveys, plans and estimates for the elimination of dangers at railroad crossings.

County Road Systems: Roads on corporation lines may now be added to the county road system, and there are five reasons for which roads may be added or changed as they now exist in the county system.

Bridges: Plans for bridges over drainage ditches must be so designed, if it is thought necessary, that the superstructure may be removed to allow the dredges to pass through in cleaning such drainage ditches. No culverts may be paid for out of the county road fund. Permanent culverts may be built from the motor vehicle road fund.

Roads: The most important change is the provision requiring the advertisement for bids on all road work costing more than one thousand dollars.

Township Culverts: The township trustees may now make application to the board of supervisors for temporary culverts to be furnished them, and these culverts are to be placed by the township road superintendent.

The principal new laws passed by the Thirty-sixth General Assembly are as follows:

An Act Providing for the Condemnation of Land for Road Purposes: This act provides that ten freeholders of any county may, by petition, or the county engineer, by report, recommend the change of the course of any road or stream within the county. The Board of Supervisors has authority to order a survey and a report of the estimated cost of the recommended improvement, and if the cost is not considered excessive, the Board has authority to acquire the land through which the change is to be made or required for making the change, either by private treaty or by condemnation proceedings. This is an important measure, and provides a method for eliminating many sources of dangers from the public highways, such as bad corners, sharp turns, rough locations and dangerous railroad crossings. In fact, this act provides a way for acquiring the necessary land wherever the road can be improved by a change in the present location.

An Act Providing for the Drainage of Highways: This act provides for the drainage of the public highways through the establishment of a drainage district, which may or may not include private lands abutting upon the roadways. In case private lands are included, then a portion of the cost is to be assessed against these lands. The county board has authority to order the engineer to bring in a report, and after such report is received the board has authority to establish a district.

This act will provide an adequate remedy for those cases in which water is taken from farm land onto the roads to their detriment and the inconvenience of the public. In the southern part of the State there are many places where the practice exists of diking along fences to hold the surface water in the roadways, in place of allowing it to take its natural course.

Under the provisions of this act the board of supervisors of each county can establish an adequate drainage system, and assess an equitable portion of the cost of this system to the abutting property which is benefited by the establishment of such a system of drainage.

An Act Providing for the Improvement of City Streets: This act provides that any city having a population of two thousand or more may establish a district for paving to include a portion or the whole city, and may levy a tax over this district to assist in paying the cost of any pavement in the district. This act will make it possible to pave the outlying streets between the business sections and built up residential sections of cities, and the corporation lines.

One of the most serious street problems cities and towns have to meet is the construction and maintenance of the main traveled roads leading into the business sections of the town. Nearly all incorporations of two thousand or more are rapidly paving the business centers, and extending the paving as far into the residential districts as the cost can be financed by assessment against the property abutting or benefited. Probably the worst roads in the State have existed within the corporation lines of some of the larger cities and towns, and this act will relieve this condition by providing a method of financing the cost of such improvement. Up to fifty per cent of the cost of such street improvements may be paid by the whole district included and benefited thereby.

An Act to Provide a Drag Fund for Cities: This act provides that in cities and towns having a population of less than eight thousand, the council may levy a tax of not more than one mill to be used as a drag fund, which fund can be used for no other purpose than that specified.

An Act Requiring County Engineers to File Itemized Accounts: This act requires all engineers employed in drainage or road work for counties or drainage districts to file itemized accounts showing the time and place employed, the character of work done and vouchers for expenses incurred.

An Act Providing a City Special Bridge Fund: This act provides that cities of both the first and second class having a population of five thousand or over, if traversed by a stream two hundred feet or more in width from shore line to shore line, shall have full control of the bridge fund raised within the city, and shall have authority to issue bonds against this fund for the construction and maintenance of bridges.

PART THREE—CHAPTER ONE

EXPERIMENTS, TESTS AND TECHNICAL INVESTIGATIONS.

All laboratory tests of road and bridge materials are made in the chemical and physical laboratory of the Engineering Experiment Station of the Iowa State College. The standard laboratory tests are all made by the engineers of the college, and particularly of the Good Roads Section of the Engineering Experiment Station. All such tests are made without expense to the Commission, and the results furnished without charge to the counties. All special tests and investigations requiring field examinations, and the experimental road work requiring field supervision, have been made by the engineers of the Good Roads Section and the engineers of the Commission, working in co-operation.

Technical bulletins will be issued from time to time on the subjects which are reported here briefly as progress reports only, and on such other subjects as may be taken up for thorough study.

During the past year the Highway Commission, in co-operation with the Good Roads Section of the Engineering Experiment Station of the Iowa State College, has assisted on a number of important road projects.

Gravel Road Building.

Three gravel road experiments were started this year. A mile of road leading out of Fort Dodge, Webster County, on the Hawkeye Highway, was completed in mid-summer. In Dickinson County, gravel construction was begun on one and one-half miles

of the Arnold's Park-Spirit Lake road. Owing to the extremely adverse weather conditions, this road has been about half completed. Construction was also begun on a mile of road in Calhoun County leading out of Rockwell City. These latter two roads will be completed as early as possible in the spring. In this work an engineer, steam roller and an operator for the roller were furnished by the State. All other expense for material and labor is borne by the county in which the work is carried on.

Labor costs on gravel roads constructed according to the section recommended by the Commission vary from sixteen hundred to two thousand dollars per mile for a one mile haul on the material. Under favorable conditions, the work can be done for the lower amount. Approximately 2,450 cubic yards of gravel are required per mile, the cost of which delivered at the railroad station or pit, plus the cost of hauling above one mile, must be added to the labor costs. At fifty cents per cubic yard for the material the total cost per mile would be about $2,800.00, under favorable conditions, and might reach three thousand dollars under less favorable conditions. These costs are given as approximate only.

In building these experimental roads the aim has been to demonstrate proper methods of construction, and to show that serviceable roads may be built with materials which in many portions of the State, are available at a low cost. It is planned to use an oil treatment on these gravel roads if necessary to protect the surface, as each road was selected on account of the amount of traffic which it carries. Under heavy motor traffic the oil treatment may be required. Traffic conditions will be observed and service records kept, so that full information will be available as to the length of service that may be expected of this type of road.

Road Oiling Experiments.

A number of earth roads in Iowa have been oiled during the past year, and various grades of oil have been used. Samples of this oil have been obtained and analyzed, and their behavior under service is being studied for the purpose of obtaining the necessary data to prepare an acceptable specification for an oil to be used for this purpose. The cost of the use of oil on earth roads has varied due to the differences in cost of transportation, length of wagon haul for oil and such causes.

At this time it is not possible to draw definite conclusions regarding the superiority of any one oil used. These roads will be closely watched, service record kept, and data published from time

This view affords an excellent comparison of an oiled and unoiled earth road. The background shows a portion of the road that has received an oil treatment. In the foreground appears the untreated road. The use of oil not only abates the dust nuisance, but in a large measure checks the penetration of water into the road surface and this tends to eliminate a rutted condition during wet weather.

to time for the guidance of county officials in the selection and application of oil for this purpose. The oils that are now offered on the market for this purpose vary greatly, and before purchasing an oil for road treatment an analysis should be secured, and advice obtained as to the value of the product for the work contemplated. Even products of the same trade name will have widely different chemical and physical properties. The Commission will have tests made of samples sent in, and advise as to the suitability of the materials.

Applying oil with a specially designed distributor. The method of applying the oil is equally as important as the quality of the oil itself. Improper and careless methods of application and a lack of a thorough preparation of the road bed vitiate results obtained, even with the very best quality of oil.

Bituminous Carpet Coats for Concrete Roads.

During the current year, in response to an increasing demand for information concerning the use of bituminous materials for carpet coats on concrete surfaces, a number of different samples of material were laid under the direction of the Good Roads Section on a concrete road in Cerro Gordo County on the Mason City-Clear Lake road. This road had an ideal surface for the experimental work, as it has been under traffic since 1913. Seven sections, covering a total length of about two thousand feet, were treated, the application in each case being one-half gallon per square yard. A bituminous material was applied hot, and clean trap rock chips were spread evenly over the surface in sufficient quantity to leave a slightly excess amount of the loose chips after the road was placed under service. Tars, native bitumens and oil asphalt were used for the several sections.

The cost on this work was 6.4 cents per square yard, which is at the rate of $600.00 per mile for a 16 foot road. On a longer

This picture shows the end of an oiled section on the Cedar-Fremont oiled road in Mahaska county. Note the clear line of demarkation where the oiled section leaves off.

stretch of road, using only one of the seven types, the cost could be reduced.

Investigation of Materials for Road and Street Surfaces.

The Commission is receiving an increasing number of requests from various county and municipal officials for information as to the relative values of various surfacing materials for roadway purposes. The increased use of various forms of pavement in the smaller towns of the State, and the frequent unsatisfactory results which are being obtained, demonstrate fully the need for wider distribution of information along this line. During the past year, through a co-operative arrangement with the City Council and the City of Des Moines, the Commission and the Engineering Experiment Station have secured a large number of samples of the various types of materials from pavements now in service on the streets of Des Moines. The samples were taken from concrete pavements, various types of bituminous surfaces, such as

View of an oiled road a few days after a hard rain. When the roads in the surrounding sections were badly rutted during periods of extended rain, this road was never in worse condition than shown in the above view. It is quite possible by thorough and efficient application of the proper quality of oil, to render an earth road capable of better withstanding the wet seasons of the year.

View of Mason City-Clear Lake concrete road. In the background is shown the original concrete surface and longitudinal cracks which have formed under traffic. These cracks are maintained by filling with tar or asphalt, which protect them from wear under traffic. The bituminous top coat has been applied to this road for experimental observation.

bitulithic, sheet asphalt, bituminous concrete and from creosoted wood block, and from various types of vitrified brick pavements.

The results of the field examinations and laboratory tests as they are completed, will be published for general distribution.

Services Tests on Bridge Paints.

The selection of suitable paint for the preservation of steel highway bridges has not received the attention its importanee demands in the State. During 1914, one hundred and sixteen test panels, consisting of square sections of iron, were painted with different combinations of commercial paints offered for this use. These test panels have been exposed to the weather, and during the year 1915, the number has been increased to one hundred and thirty-eight. Definite conclusions should not be formulated

Photo micrograph, showing poor contact in mortar, mixed with porous pebbles. In this view a very porous aggregate pebble has absorbed the film of water which originally surrounded it, leaving a line of connected air voids around its circumference. Such a pebble, under traffic, will be quickly picked out or torn from the surface, and the mortar adjacent thereto will rapidly break down.

from one year's service test, but the first annual inspection has shown some general facts, which may be stated in a tentative way as follows:

First: As a class the coal tar paints are forming alligator cracks, but as yet are giving good protection, with a single exception. The coal tar paint which has been exposed the longest time has more or less completely broken down, and there is evidence of rusting beneath the paint film.

Second: The asphalt paints are cracking and checking on the approach of cold weather. There is yet no evidence of rusting of the iron underneath.

Third: The red leads in general, especially where there is a large amount of inert material mixed in the pigment, are fading badly, and in some cases, checking, chalking and cracking. This fact would point to the recommendation that red lead paint be

View showing lean and porous mortar. Under the microscope, the structure of the mortars and concretes of the pavement mixture examined, was strongly brought out. The view above shows a lack of cement sufficient to fill the voids in the sand, resulting in a very porous mortar. The above view is magnified about 20 diameters.

Views of the pavement cores to be tested in the abrasion machine. The above cores were cut from existing pavement surface, and subjected to the abrasion test in the Deval Impact and Abrasion machine in order to determine the relative wearing qualities of concrete as compared with paving brick. The second view shown above is of the cores after being subjected to the test. Some of these cores showed an abrasion loss of from eight to ten times that of ordinary standard paving brick. However, some of the cores were found to withstand the abrasion test even better than the brick. This test would indicate that present field methods of mixing and placing concrete are not such as to produce a homogeneous mass. This would also indicate that it is within the limits of possibility to secure a concrete as resistant to abrasion as the best quality of brick.

used in connection with a covering coat of a more stable paint. These paints are in general wearing better than the coal tar or asphalt paints.

Fourth: The sublimed white leads are as a rule wearing well. There is some evidence of checking.

Fifth: The sublimed blue leads are in general wearing better than any of the other lead paints.

Sixth: The best grades of iron oxide paints are standing out exceptionally well, while the iron oxide paints which contain calcium sulphate or calcium carbonate, are showing signs of dissolution, leaving pit holes in the paint film.

Seventh: Where the graphite and carbon paints are placed next to the iron there are marked indications of corrosion or rusting. When used as a second coat over a prime coat of first quality iron oxide or lead, these paints appear to be very serviceable.

Eighth: The paints containing the highly inhibitive pigment, zinc chromate, or lead chromate, are standing the service tests exceptionally well. The results thus far are such as to substantiate the requirements of the standard specifications for paint of the Highway Commission. In general, the paints which can be admitted under these specifications are wearing well, while those

which would be excluded under these specifications are proving to be inferior in wearing quality and serviceability.

During the year, eighty-one samples of paint have been analysed by the Engineering Experiment Station, most of which were submitted to the Commission by County Engineers, or by the manufacturers of the paint.

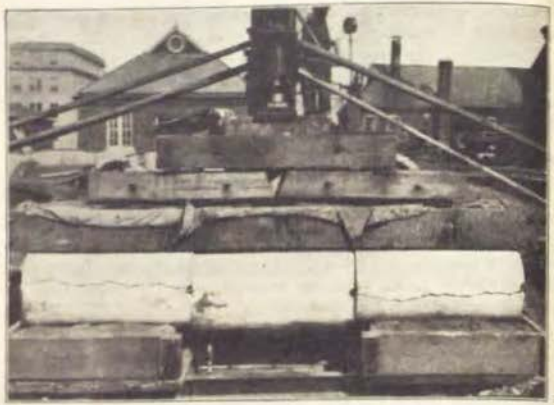
Service Tests on Corrugated Metal Culverts.

A brief description of the service tests now in progress on culvert metal was given in the last report of the Commission. These tests are being made by the Experiment Station on fifty samples of culvert metal, approximately two inches square, which were first subjected to an oxidizing atmosphere in the boiler room of the college buildings for seven months. The corrosion loss was then determined. The same pieces were next embedded in ordinary earth for six months and the corrosion loss again determined. These test pieces are now embedded in cinders for the purpose of obtaining the corrosion loss under such conditions.

In addition to the above, ten sections of commercial culverts were half embedded in cinders in the open air as formerly described. At the end of one year these culverts were removed and inspected, the inspection disclosing the fact that the zinc coating had been removed in varying degrees. It was also noted that the corrosion on the metal exhibited two different physical characteristics. The first type is confined to small areas more properly characterized as a pitting. The second type has extended over larger areas, constituting a superficial rusting. It is considered that the first annual inspection has small bearing on the final results. As the corrosion continues and the galvanizing ceases to be effective, doubtless the various grades of iron will begin to develop their relative degrees of resistance to corrosion.

Service Tests on Concrete Pipe Culverts.

For the smaller culvert openings, culvert pipe of concrete has proven a popular material, and during the past several years has been used to a considerable extent over the State. During the current year a field examination has been made of over one hundred thirty culverts of this type by engineers from the Experiment Station and the Commission. The need of such an investigation is shown by the fact that in the examinations made, eighty-four per cent of one type of pipe, forty-six per cent of the second type, and thirty-five per cent of the third type of such pipe were



Testing the efficiency of a culvert pipe joint. In order to determine the relative worth of different types of joint, a test as shown above has been devised. In this case the joint will not transmit concentrated pressure as will be noted by the fact that the end pipes have failed while the center pipe is simply shoved down. Under field conditions the center pipe would be represented by a portion of the culvert over a soft spot in the foundation.

found to be defective. In connection with the service tests, forty-three concrete pipes have been tested in the laboratories. These tests and examinations will be continued until sufficient data has been secured on which to formulate a satisfactory standard specification for concrete culvert pipe.

Distribution of Loads to Culverts Under Fills of Varying Depths and Character.

During the year, a test culvert has been constructed by the Experiment Station in such a way that the weight of the earth filling and any load passing over the culvert can be weighed directly. Experiments have been conducted on fills varying from two to ten feet in height.

There is little reliable data existing on this subject, and culverts have been designed by making arbitrary selection of the amount of the loads, both dead and live, which these structures would be required to carry under fills of varying heights. These tests will be continued until reliable data has been secured to be used in designing such structures.

Tests of Materials.

From December 1, 1914 to November 30, 1915, the following road materials have been tested for the Commission by the Engineering Experiment Station.

Paint samples	81
Road oils	25
Culvert metals	68
Steel reinforcing (chemical tests)	2
Steel reinforcing (physical tests)	2
Boiler pipe metals	6
Asphalt surfaces	5
Asphalt binders	5
Tars	1
Creosoted timber	1
Cement (chemical)	5
Cement (physical)	5
Gravels	3
Stone	4

PART FOUR

FINANCIAL REPORT.

Fiscal Year July 1, 1914, to June 30, 1915.

Prior to May, 1915, all bills incurred by the State Highway Commission were, under authority of law, approved and audited for payment by the Commission itself. The Thirty-sixth General Assembly created the State Board of Audit and required all bills of all the state departments to be audited by this Board. All bills are now prepared and approved by the Commission and forwarded to the Board of Audit for allowance. Under the previous arrangement the funds appropriated for the use of the Commission were paid out by the Treasurer of the Iowa State College. Under the present arrangement all funds are paid out by the State Treasurer on warrants issued by the State Auditor.

The State Document Editor, Mr. Ora Williams, to avoid duplication of printing, instructed the Commission to print a summary financial statement, as the full detailed and itemized account will appear in the expense report of the State Executive Council and the State Board of Audit for the biennial period.

RIVETED TRUSS SPAN.

This view shows a 90' low riveted truss span with concrete floor on concrete pedestal abutments. Constructed in 1913 in Crawford county, over the Boyer Creek drainage ditch at a cost of $6,000.00.

SALARIES AND TRAVELING EXPENSES.
JULY 1, 1914, TO JUNE 30, 1915.

ADMINISTRATIVE DEPARTMENT.

Name	Character of Employment	Salary	Expense	Total
A. Marston	Commissioner	.....	$ 199.58	$199.58
T. W. Holden	Commissioner	$1,000.00	486.40	1,486.40
H. C. Beard	Commissioner	1,000.00	721.65	1,721.65
T. H. MacDonald	Highway Engineer	1,600.00	251.61	1,851.61
J. E. Kirkham	Consulting Bridge Engineer	499.92	3.65	503.57
J. H. Ames	Asst. Highway Engineer	2,199.96	232.37	2,432.33
Extra help	Misc. traveling expense	.....	101.49	101.49
Total		$6,299.88	$1,996.75	$10,296.63

DESIGNING DEPARTMENT.

C. B. McCullough	Designing Engineer	$2,400.00	$ 249.21	$2,649.21
E. F. Kelley	Asst. Designing Engineer	2,100.00	41.56	2,141.56
L. H. Doughty	Designer	1,500.00	1.46	1,501.46
E. W. Blumenachein	Structural Engineer	1,920.00	20.50	1,940.50
J. A. Paulson	Chief Draftsman	1,599.96	.....	1,599.96
Ned Adams	Draftsman	1,200.00	.....	1,200.00
L. E. Trottnow	Draftsman	687.36	.....	687.36
L. S. Gates	Draftsman	1,200.00	21.28	1,221.26
Hans Hanson	Clerk	900.00	.....	900.00
Theo. Ohmann	Draftsman	539.08	.....	539.08
W. M. McGibbon	Draftsman	72.00	.....	72.00
W. A. Reeves	Draftsman	930.00	.....	930.00
M. G. Spangler	Draftsman	302.85	.....	302.85
Extra help	.....	379.23	.....	379.23
Total	.....	$15,730.48	$333.99	$16,064.47

FIELD DEPARTMENT.

F. R. White	Field Engineer	$2,700.00	$514.25	$3,214.25
W. E. Jones	District Engineer	1,800.00	525.72	2,325.72
A. L. Goldenstar	Assistant Engineer	158.05	.....	158.05
W. H. Root	District Engineer	1,800.00	795.55	2,595.55
F. Williams	Assistant Engineer	1,724.94	449.13	2,174.07
C. Coykendall	District Engineer	1,800.00	810.43	2,610.43
O. W. Crowley	Assistant Engineer	1,125.00	178.22	1,303.22
L. M. Martin	District Engineer	1,999.92	922.83	2,922.75
J. S. Morrison	District Engineer	1,699.98	830.83	2,530.81
W. F. Beard	District Engineer	1,699.98	694.05	2,394.05
R. W. Clyde	Drainage Engineer	60.00	.....	60.00
Extra help	.....	644.07	429.17	1,073.24
Total	.....	$17,211.94	$6,150.18	$23,362.12

OFFICE DEPARTMENT.

L. A. Wilkinson, Sr.	Accountant	$1,999.92	$52.55	$2,052.47
Janet Jacobsen	Stenographer	880.00	15.06	895.06
Annie Laurie Bowen	Clerk	900.00	.....	900.00
Anne Vanderlinden	File Clerk	960.00	.....	960.00
Mrs. G. L. Bartow	Stenographer	259.98	.....	259.98
Maud Spence	Stenographer	259.98	.....	259.98
Leona Pequignot	Stenographer	422.22	.....	422.22
Thora Tallman	Stenographer	720.00	.....	720.00
Anna Holden	Stenographer	194.78	.....	194.78
Ethel Seamands	Stenographer	900.00	.....	900.00
Extra help	.....	381.38	.....	381.38
Total	.....	$7,878.26	*$67.61	$7,945.87

*There is no classification of office expense. Above items in field expense and not classified.

EDUCATIONAL DEPARTMENT.

Name	Character of Employment	Salary	Expenses	Total
J. S. Dodds	Educational Engineer	$1,999.92	$532.98	$2,532.90
J. W. Eichinger	Bulletin Editor	1,800.00	212.95	2,012.95
Extra help		552.72	420.80	973.52
Check returned not claimed		.45		.45
Total		$4,352.19	$1,166.73	$5,518.92

SUMMARY OF EXPENDITURES.

Salaries and traveling expenses, regular employees	$60,117.23
Salaries and traveling expenses, extra employees	3,000.58
Office freight, drayage and express	275.80
Telegraph and telephone	900.95
Office postage and miscellaneous educational	648.49
Office supplies and stationery	949.78
Office printing and blank forms	1,114.09
Supplies and equipment for designing department	623.46
Supplies and equipment for field department	573.06
Educational photographs, halftones and printing	4,256.25
Postage on bulletins	1,405.60
Educational supplies and exhibits	1,356.93
Equipment and supplies for road work	205.26
Office furniture and equipment	691.83
Repairs and remodeling of offices and designing department	4,622.42
Sales gravel testers, county examinations and not otherwise classified	293.89
	$80,935.16

SUMMARY OF ROAD WORK AND EXPENDITURES FOR ENTIRE STATE.

Nov. 1, 1914 to Jan.1, 1916.

County Road Expenditures.

During this period of fourteen months the total expenditure from county road funds for road work on the county system, and for the filling of bridges and culverts was $3,396,365.00. This sum does not include the amount spent by the counties for culverts classified as road work nor for permanent culverts paid for from the county motor vehicle road fund.

Of the above expenditure, 34.1% or $1,159,764.00 was spent for permanent grading, tiling, and surfacing; 33.7% or $1,143,382.00 was spent for repairs and maintenance; 10.6% or $359,205.00 was spent for constructing roads to natural grades and standard widths; 7.3% or $249,016.00 was spent for filling bridges and culverts; 6.0% or $205,123.00 was spent for tools and machinery; 0.7% or $22,797.00 was spent for gravel pits and road material yet unused; 7.6% or $257,078.00 of the expenditure was for unreported and unclassified work.

A comparison of the expenditures during 1915 with the expenditures during 1914 is as follows:

TOTALS.

	1914	1915
Permanent work	$ 859,000.00	$ 1,159,764.00
Repairs and maintenance	969,000.00	1,143,382.00
Tractor grading	101,000.00	359,205.00
Filling bridges and culverts	.....	249,016.00
Road machinery	160,000.00	205,123.00
Road materials	22,000.00	22,797.00
Unreported and unclassified	1,292,000.00	257,078.00
Total	$ 3,403,000.00	$ 3,396,365.00

PERCENTAGES.

	1914	1915
Permanent work	25.3%	34.1%
Repairs and maintenance	28.6%	33.7%
Tractor grading	2.9%	10.6%
Filling bridges and culverts	.....	7.3%
Road machinery	4.7%	6.0%
Road materials on hand	0.6%	0.7%
Unreported and unclassified	37.9%	7.6%

"Permanent Work" includes constructing roads to the permanent grade lines established by the county engineer, and to standard sections; constructing roads to temporary grade lines and

standard sections, that is, widening cuts and fills to standard widths and working towards a permanent grade line; surfacing roads with gravel, macadam, sand-clay, or some form of paving, and tile drainage.

"Tractor Grading" includes constructing roads to natural grade lines and standard widths, that is, widening the roads to standard widths and crowning the roads so as to provide for adequate side ditches and surface drainage without cutting down the hills and making the fills necessary to work to either a temporary or permanent grade.

"Filling bridges and culverts" could legitimately be included as permanent work since the great majority of the filling was around bridges and culverts of a permanent or semi-permanent nature. Accordingly, 41.4% of the county road expenditure in 1915 was for permanent work, against 25.3% spent for permanent work during 1914. Also, the tractor grading, which is work of a semi-permanent nature, shows an increase of from 2.9% in 1914 to 10.6% in 1915.

It was hardly to be expected that this increase in the percentage of funds spent for permanent or semi-permanent work could be made during a season as bad as 1915.

"Repairs and maintenance" shows an increase of from 28.6% in 1914 to 33.7% in 1915. This was to be expected since the dragging alone cost almost twice as much in 1915 as in 1914 and other repairs and maintenance were increased proportionally. The average cost of repairs and maintenance was $74.00 per mile.

During 1915 there were 462.7 miles of road constructed to permanent grades at a cost of $618,138.00, or $1,336.00 per mile; 355.9 miles constructed to temporary grades at a cost of $242,868.00, or $682.00 per mile; 2,358.8 miles constructed to natural grades at a cost of $359,205.00, or $152.00 per mile; 182 miles were hard-surfaced, and 15,400 miles were dragged an average of twenty-nine times, at an average cost of $0.713 per mile one round trip.

A comparison of the work accomplished during 1915 with that accomplished during 1914, is as follows:

	1914	1915
Built to permanent grade	418 mi.	462.7 mi.
Built to temporary grade	416 mi.	355.9 mi.
Tractor grading	1,210 mi.	2,358.8 mi.
Surfaced	75.6 mi.	182 mi.

Due to the provision of the law requiring that road grading must be advertised, the contract price of such work has been forced down to an average of 18 cents or 20 cents per cubic yard, whereas formerly such work cost from 25 cents to 50 cents per cubic yard.

Township Road Expenditures.

It is impossible to give an accurate report concerning the township road work and expenditures. There are 1,646 townships in the state and reports were received from 1,046 townships, or approximately two-thirds of the total number. The reports which were received indicate that the total township road expenditure was approximately $3,500,000.00 as against a total approximate township expenditure in 1914, of $5,171,000.00.

It is not surprising that this fourteen-month period should show a material increase in the township road expenditures. The unusual amount of rainfall and the long-continued wet weather made it extremely expensive to maintain the roads in even a fair condition for traffic. The amount of dragging was increased to many times the usual requirements. Repairs became more necessary and maintenance which in an ordinary year would have been neglected, had to be attended to.

It should be borne in mind that the total mileage of township roads is approximately 88,300 miles, so that even a total expenditure of $3,500,000.00 is an average of slightly less than $40.00 per mile. This is only a little over one-half of the average cost of repairs and maintenance per mile of county road, and for this reason it is not surprising that many of the township roads were neglected or that so few of the townships were able to do any work of a permanent nature.

SUMMARY OF BRIDGE WORK AND EXPENDITURES FOR ENTIRE STATE.

Nov. 1, 1914 to Jan. 1, 1916.

A summary of the county engineers' annual reports for 1915 show a total expenditure for bridge work in the state of $6,629,252.00. A comparison of the classified expenditures for 1914 and 1915 are given in the table below:

	1914	1915
Completed bridges and culverts	$ 3,100,000.00	$ 5,170,000.00
Repair work	1,160,000.00	1,212,000.00
Bridge and culvert material on hand	260,000.00	217,000.00
Equipment purchased	50,000.00	30,000.00
Uncompleted construction and unclassified	357,000.00	.....
Total	$ 5,027,000.00	$ 6,629,000.00

COMPARISON OF CLASSIFIED EXPENDITURES BY PERCENTAGES.

	1914			1915		
	No.	Amount	%	No.	Amount	%
Permanent bridges and culverts	6,397	$ 2,655,000	53	7,131	$ 4,079,000	61.4
Temporary bridges and culverts	4,859	418,000	8.3	34,233	1,091,000	16.3
Repair work	.....	1,160,000	23.1	.....	1,212,000	18.3
Miscellaneous	.....	791,000	15.6	.....	247,000	3.8
Total	11,445	$ 5,027,000	100.0	41,364	$ 6,629,000	100.0

"Permanent bridges and culverts" include only completed structures composed entirely of masonry or steel construction. If a part of the construction is of a temporary nature the structure is classified as temporary construction in the table above.

"Temporary bridges and culverts" include all structures not included in the classification above. All pipe culverts not provided with bulkheads are included under this heading. All miscellaneous construction is placed under the heading of temporary construction.

It is interesting to note that during 1915 there has been an increase in the percentage of permanent bridge work constructed of 8.3% which amounts to an increased expenditure for permanent work over 1914 of $1,424,000.00.

There has also been an increase in the amount spent for temporary bridges and culverts of $673,000.00, or 8.2%. This increased expenditure can be explained by the fact that during 1915 the extremely wet season necessitated the use of a large amount of pipe culverts for emergency work, which increased the expenditure materially. Further, it is fair to assume that at least a major portion of the miscellaneous items in the 1914 report could not properly be classified under the heading of temporary bridges and culverts.

During 1915 the total amount spent for repair work increased by $52,000.00 over the expenditure for 1914, but the percentage of expenditure for this item decreased 4.8%.

The miscellaneous item was materially reduced in the 1915 report, which is largly due to a more careful preparation of the reports by the county engineers.

The 1915 reports show itemized cost on 41,364 structures which is a marked increase over the total of 11,589 structures reported in 1914. A detailed statement of the amounts spent for the

various types of construction during these two years is given in the table below:

Type	1914		1915	
	No.	Cost	No.	Cost
Concrete box	4,821	$ 1,432,849	4,886	$ 1,675,689
Circular concrete culverts	830	76,833	708	68,153
Concrete arch culverts	213	47,340	123	21,309
Concrete pipe	846	78,563	2,013	98,751
Encased vitrified pipe	215	16,155	518	35,084
Corrugated pipe	2,599	146,857	27,766	537,464
Masonry arch culverts	7	2,090	3	803
Boiler pipe culverts	886	74,032	1,859	98,018
Cast iron pipe	79	5,836	255	21,085
Masonry box culverts	.....	.....	23	5,421
Head walls on culverts	52	7,307	394	62,384
Concrete slab bridges	181	199,407	138	173,034
Concrete arch bridges	23	67,846	15	109,554
Concrete abutments	32	22,914	68	60,904
Concrete through girders	13	21,083	16	35,668
Concrete deck girders	49	115,788	55	167,273
Retaining walls	9	3,744	41	14,085
Masonry abutments	.....	.....	6	2,940
I-beam spans on piling abutments	21	7,523	110	53,533
I-beam spans on concrete abutments	245	249,576	404	44,479
Steel girders	1	1,659	7	21,200
Pony truss on piling wood floor	10	4,366	39	46,002
Pony truss on concrete abutments	153	349,488	214	566,449
High steel trusses	14	52,729	23	82,309
Wood pile bridges	444	99,914	834	210,305
Miscellaneous	83	15,474	644	186,788
Total	11,589	$ 3,100,203	41,364	$ 4,886,883

SUMMARY OF ROAD AND BRIDGE EXPENDITURES.

BY COUNTIES.

Nov. 1, 1914 to Jan. 1, 1915.

ADAIR COUNTY.

Roads.

The total county road expenditure was $26,268.93. Of this amount 32.7% or $8,594.72 was spent for permanent work; 25.9% or $6,800.50 was spent for repairs and maintenance; 4.5% or $1,182.82 was spent for constructing roads to natural grade; 26.2% or $6,890.00 was spent for filling bridges and culverts. 15 miles of road were crowned with graders; 2.5 miles were constructed to temporary grade lines, and 1.5 miles were built to the permanent grade. No hard surfacing was constructed. The average cost per mile for repairs and maintenance was $39.30.

The total township road expenditure was $27,316.51. No reports are available showing the work accomplished on township road system.

Bridges.

The total expenditure for bridge work during the period covered by this report was $59,096.14 of which $9,678 or 16.3% was spent for permanent bridge work; $24,953.21 or 42.2% was spent for temporary bridge work; $19,618.90 or 33.3% was spent for repair work.

The following construction was reported as completed during the period covered by this report: 14 concrete box culverts costing $5,673; 145 concrete pipe culverts costing $22,755.98; 39 corrugated pipe culverts costing $1,361.82; 4 wood pile bridges costing $835.41; 35 miscellaneous structures costing $4,846.93.

ADAMS COUNTY.

Roads.

The total county road expenditure was $25,539.93, of which 19.2% or $4,917.39 was spent for permanent work; 26.1% or $6,407.14 was spent for repairs and maintenance; 14.9% or $3,787.32 was spent for constructing roads to natural grade, and 6.2% or $1,598.94 was spent for filling bridges and culverts. 47 miles were constructed to natural grades, 12.5 miles built to temporary grade lines. No roads were permanently surfaced or constructed to permanent grade lines. The average cost per mile for repairs and maintenance was $51.70.

The township spent $23,784.17 on the township road system, of which $11,584.90 was spent for blade grader work on 264 miles of road. $1,275.50 was spent for constructing roads to temporary grades; $1,205.97 was spent for hauling and placing temporary culverts. $2,142.00 was spent for filling bridges and culverts, and $2,650.80 was spent for repairs.

Bridges.

The total expenditure for bridge work during the period covered by this report was $53,552.83, of which $20,298.14 or 37.9% was spent for permanent bridge work; $16,465.95 or 31.4% was spent for temporary bridge work; $7,402.73 or 15.6% was spent for repair work.

The following bridge expenditure was reported as completed during this period—16 concrete box culverts costing $12,999.61; 74 concrete pipe culverts costing $7,435.14; 138 corrugated pipe culverts costing $2,816.82; 9 boiler pipe culverts costing $562.64; 1 cast iron pipe culvert costing $72; 122 head walls were placed on culverts costing $6,100; 1 I-beam span on concrete abutment costing $1,198.53; 23 wood pile bridges costing $5,579.35.

This county manufactures their own concrete pipe for culvert construction. These pipes are used throughout the county in providing waterways for the smaller drainage areas.

ALLAMAKEE COUNTY.

Roads.

The total county road expenditure was $34,921.48; of which 63.1% or $22,050.97 was spent for permanent work; 36.9% or $12,870.50 was spent for repairs and maintenance. No expenditures were made from the county road fund for filling bridges and culverts or constructing roads to natural grade. 6.9 miles of road were permanently graded. The average cost of repairs and maintenance on the county road system was $110.95 per mile.

Reports received from 16 of the 18 townships indicate a total township road expenditure of $28,800.00. No information is available showing work accomplished on township road system.

Bridges.

The total expenditure for bridge work during the period covered by this report was $55,317.30, of which $30,542.18 or 55.2% was spent for permanent bridge construction; $6,757.14 or 12.3% was spent for temporary bridge construction; $18,017.22 or 32.5% was spent for repair work.

The following construction was reported as completed during the period covered by this report—14 concrete box culverts costing $5,673.95; 9 circular concrete culverts costing $927.37; 21 concrete pipe culverts costing $2,344.50; 116 corrugated pipe culverts costing $4,412.64; 5 masonry box culverts costing $1,663.97; 6 concrete slab bridges costing $4,291.82; 1 concrete deck girder costing $2,636.70; 5 I-beam spans on concrete abutments costing $4,358.40; 4 pony truss spans on concrete abutments costing $10,990.67.

APPANOOSE COUNTY.

Roads.

The total county road expenditure was $24,022.14; of which 6.2% or $1,480.83 was spent for permanent work; 34.4% or $8,269.82 was spent for filling bridges and culverts; 6.7% or $1,617.38 was spent for constructing roads to natural grade, and 43.4% or $10,917.00 was spent for repairs and maintenance. 4 miles of road were constructed to temporary grades and 17 miles were constructed to natural grade. No roads were constructed to permanent grades and no hard-surfacing was done. The average cost of maintenance and repairs was $42.05 per mile.

The township road expenditure was $27,618.28. Of this amount $3,364.65 was spent for filling bridges and culverts, $2,845.52 for placing and hauling temporary culverts, and $14,763.21 for repairs and maintenance.

Bridges.

The total expenditure for bridge work during the period covered by this report was $58,718.88, of which $26,150.33 or 44.6% was spent for permanent bridge work; $8,534.81 or 14.4% was spent for temporary bridge work; $9,101.18 or 15.2% was spent for repair work.

The following construction was reported as completed during the period covered by this report—29 concrete box culverts costing $16,311.99; 21 concrete pipe culverts costing $1,708.40; 3 encased vitrified pipe culverts at a cost of $26.18; 3 corrugated pipe culverts costing $45.29; 112 boiler pipe culverts costing $4,995.87; 32 cast iron pipe culverts costing $1,785.25; 10 head walls were constructed on culverts costing $370.75; 1 retaining wall costing $1,004; 8 I-beam spans on concrete abutments costing $5,572.55; 1 pony truss span on concrete abutments costing $2,582.66; erecting 1 high steel truss costing $282.20; 158 miscellaneous structures costing $5,342.85.

AUDUBON COUNTY.

Roads.

The total county road expenditure was $18,656.04, of which 14.2% or $2,654.27 was spent for permanent work. 14.8% or $2,767.67 was spent for filling bridges and culverts. 31.7% or $5,915.50 was spent for constructing roads to natural grade, and 26.7% or $4,997.42 was spent for repairs and maintenance. 90 miles of county road were constructed to natural grade, 2 miles constructed to temporary grade lines, and 0.1 mile was constructed to permanent grade line. No permanent surfacing was constructed. The average cost of repairs and maintenance was $34.90 per mile.

From reports by 10 of the 12 townships it appears that the total township road expenditure was $26,400.00. Of this amount $7,783.50 was spent for blade grader work; $1,852.80 was spent for filling bridges and culverts; $659.67 was spent for hauling and placing temporary culverts; $5,604.16 was spent for repairs.

Bridges.

The total expenditure for bridge work during the period covered by this report was $56,144.39, of which $12,525.54 or 22.3% was spent for permanent bridge work; $37,820.37 or 67.5% was spent for temporary bridge work; $5,116.39 or 9.1% was spent for repair work.

The following construction was reported as completed during the period covered by this report—14 concrete box culverts costing $9,483.39; 321 corrugated pipe culverts costing $9,545.04; 2 boiler pipe culverts costing $357.50; 3 head walls were constructed on culverts costing $615.30; 1 concrete deck girder costing $2,220; 1 retaining wall costing $206.85; 89 wood pile bridges costing $27,917.83; miscellaneous construction costing $95.94.

BENTON COUNTY.

Roads.

The total county road expenditure was $28,184.24. Of this amount 36.9% of $10,390.38 was spent for permanent work; 29.1% of $8,160.45 was spent for repairs and maintenance; 1.6% or $465.53 was spent for filling bridges and culverts; 29.9% or $8,427.36 was spent for constructing roads to natural grade. 3.25 miles were constructed to permanent grade lines and ½ of a mile was surfaced. The average cost for repairs and maintenance was $39.60 per mile.

Reports filed by 13 of the 20 townships indicate a total township road expenditure of $37,760.00.

Bridges.

The total expenditure for bridge work during the period covered by this report was $88,849.13, of which $59,773.80 or 67.2% was spent for permanent bridge work; $2,660.41 or 3.18% was spent for temporary bridge work; $25,782.02 or 29% was spent for repair work.

The following construction was reported as completed during the period covered by this report: 89 concrete box culverts costing $24,699; 27 circular concrete culverts costing $3,463.04; 4 encased vitrified pipe culverts costing $343.34; 95 corrugated pipe culverts costing $1,533.75; 4 boiler pipe culverts costing $24.45; 3 cast iron pipe culverts costing $231.90; 6 concrete slab bridges costing $7,630.27; 1 concrete arch bridge costing $6,081.06; 2 I-beam spans on concrete abutments costing $2,208.28; 4 pony truss spans on concrete abutments costing $9,228.81; 1 high steel truss costing $6,120; 3 wood pile bridges costing $870.31; 5 miscellaneous structures costing $47.48.

BLACK HAWK COUNTY.

Roads.

The total county road expenditure was $21,216.93. Of this amount 25% or $5,302.23 was spent for permanent work; 51% or $10,790.87 was spent for repairs and maintenance, and 24% or $5,117.83 was spent for constructing roads to natural grade. 70.5 miles were crowned with blade graders; 0.3 mile constructed to temporary grade; 0.9 mile constructed to permanent grade and 1.95 miles were hard-surfaced. Average cost for maintenance and repairs was $64.00 per mile.

Reports received from 12 of the 18 townships indicate a total township expenditure of $30,000.

Bridges.

The total expenditure for bridge work during the period covered by this report was $92,947.74, of which $59,543.52 or 64.2% was spent for permanent bridge work; $20,500.04 or 22% was spent for temporary bridge work; $12,630.86 or 13.6% was spent for repair work.

The following construction was reported as completed during the period covered by this report: 99 concrete box culverts costing $19,494.18; 445 corrugated pipe culverts costing $4,529.11; 3 head walls on culverts costing $51.96; 1 concrete arch bridge costing $3,067.31; 2 concrete abutments costing $3,755.81; 1 concrete deck girder costing $667.10; 7 I-beam spans on piling costing $15,047.42; 20 I-beam spans on concrete abutments costing $26,923.75; 1 pony truss span on concrete abutments costing $5,583.41; 2 wood pile bridges costing $923.51; 21 miscellaneous structures costing $273.32.

BOONE COUNTY.

Roads.

The total county road expenditure was $30,761.85. Of this amount 53.2% or $16,574.97 was spent for permanent work; 25.7% or $7,921.93 was spent for repairs and maintenance; 3.9% or $1,197.30 was spent for filling bridges and culverts, and 2% or $598.58 was spent for constructing roads to natural grade. 13 miles were constructed to the permanent grade lines; 12 miles were constructed to temporary grade lines, and 3.5 miles were constructed to natural grade line. No permanent surfacing was laid. The average cost for repairs and maintenance was $52.10 per mile.

No report was made concerning the township road expenditures, as 9 of the 17 townships failed to report.

Bridges.

The total expenditure for bridge work during the period covered by this report was $40,571.78, of which $19,833.56 or 49% was spent for permanent bridge work; $1,355.97 or 3.34% was spent for temporary bridge construction; $14,505 or 35.8% was spent for repair work.

The following construction was reported as completed: 19 concrete box culverts costing $5,889.86; 4 encased vitrified pipe culverts costing $488.67; 83 corrugated pipe culverts costing $1,270.02; 1 boiler pipe culvert costing $28.50; 1 cast iron pipe culvert costing $47.45; 1 concrete slab bridge costing $1,220.65; 1 concrete arch bridge costing $6,346; 3 I-beam spans on concrete abutments costing $3,872.88; 1 pony truss span on concrete abutments costing $2,015.50; 11 miscellaneous structures costing $3,323.98.

BREMER COUNTY.

Roads.

The total county road expenditure was $27,533.16, of which 43.6% or $12,014.68 was spent for permanent work; 29.5% or $8,132.75 was spent for repairs and maintenance; 5.2% or $1,445.33 was spent for filling bridges and culverts; 9.7% or $2,678.37 was spent for constructing roads to natural grade. 2 miles were constructed to permanent grade lines, ½ mile was constructed to temporary grade lines, 11.5 miles were constructed to natural grade, and 2 miles were permanently surfaced. The average cost of repairs and maintenance was $62.40 per mile.

Reports made by 9 of the 14 townships indicate a total township road expenditure of $44,000.00.

Bridges.

The total expenditure for bridge work during the period covered by this report was $55,381.97, of which $44,951.93 or 81.3% was spent for permanent bridge work; $2,980.88 or 5.4% was spent for temporary bridge work; $2,544.68 or 4.6% was spent for repairs.

The following construction was reported as completed during the period covered by this report: 57 concrete box culverts costing $12,528.16; 10 corrugated pipe culverts costing $245.46; 7 head walls on culverts costing $102.04; 7 concrete deck girders costing $11,528.32; 5 pony truss spans on concrete abutments costing $20,793.41; 9 wood pile bridges costing $2,645.42; 2 miscellaneous structures costing $395.67.

BUENA VISTA COUNTY.

Roads.

The total county road expenditure was $71,976.10, of which 63.3% or $45,557.93 was spent for permanent work; 14.3% or $10,276.08 was spent for repairs and maintenance; 5.4% or $3,867.17 was spent for constructing roads to natural grades. ½% or $369.69 was spent for filling bridges and culverts. 29.75 miles were permanently graded; 2.2 miles were hard surfaced, and 46.5 miles were constructed to natural grade. The average cost of repairs and maintenance was $61.75 per mile.

The amount paid into the township road fund was $37,538.27, but only 8 of the 17 townships reported a balance on hand January 1, 1916, so that no accurate figures are available as to the amount actually spent.

Bridges.

The total expenditure for bridge work during the period covered by this report was $124,053.17, of which $92,555.65 or 74.5% was spent for permanent bridge work; $272.71 or .2% was spent for temporary bridge work; $3,180.39 or 2.8% was spent for repair work.

The following construction was reported as completed during the period covered by this report: 67 concrete box culverts costing $23,272.83; 2 concrete arch culverts costing $596.60; 2 concrete pipe culverts costing $169.90; 1 corrugated pipe culvert costing $102.81; 1 head wall on culvert costing $715.72; 1 concrete slab bridge costing $1,453.63; 1 concrete abutment costing $1,723.35; 7 retaining walls costing $1,067.25; 49 I-beam spans on concrete abutments costing $47,023.65; 3 pony truss spans on concrete abutments costing $6,620.90; 1 high steel truss bridge costing $10,081.72, 4 miscellaneous structures costing $498.29.

BUCHANAN COUNTY.

Roads.

The total county road expenditure was $41,130.57. Of this amount 48.1% or $19,788.32 was spent for permanent work; 15.1% or $6,231.67 was spent for repairs and maintenance; 3.9% or $1,596.51 was spent for filling bridges and culverts, and 0.3% or $139.55 was spent for constructing roads to natural grade. 2.9 miles were permanently graded; 6 miles were permanently surfaced; 3.7 miles were constructed to temporary grade lines, and 2.6 miles were constructed to natural grade. The average cost for repairs and maintenance was $35.00 per mile.

The township road expenditure was $36,123.25. Of this amount $9,223.58 was spent for repairs and maintenance; $5,041.75 was spent for constructing roads to natural grade; $1,871.66 was spent for building roads to temporary grades; $3,188.62 was spent for surfacing; $1,871.55 was spent for filling bridges and culverts, and $1,014.60 was spent for hauling and placing temporary culverts.

Bridges.

The total expenditure for bridge work during the period covered by this report was $49,999.32, of which $38,778.14 or 77.7% was spent for permanent bridge work; $4,939.17 or 9.8% was spent for temporary bridge work; $1,896.92 or 3.8% was spent for repairs.

The following construction was reported as completed during the period covered by this report: 89 concrete box culverts costing $23,616.64; 6 circular concrete culverts costing $709.51; 289 corrugated pipe culverts costing $4,939.17; 1 concrete slab bridge costing $1,990.20; 1 concrete arch bridge costing $4,346.97; 2 concrete abutments costing $5,829.32; 1 concrete deck girder costing $2,740.50; miscellaneous structures costing $4,365.69.

BUTLER COUNTY.

Roads.

The total county road expenditure was $383,779.55. Of this amount 8.8% or $3,419.66 was spent for permanent work; 62.1% or $34,149.99 was spent for repairs and maintenance; 7.2% or $2,822.25 was spent for filling bridges and culverts, and 16% or $6,039.67 was spent for constructing roads to natural grade. 8 miles were constructed to natural grade. 6 miles were built to temporary grades, ¼ mile was constructed to permanent grade, and ¼ mile was hard surfaced. The average cost for repairs and maintenance was $137.50 per mile.

Reports received from 8 of the 16 townships indicate a total township road expenditure of $22,300.00.

Bridges.

The total expenditure for bridge work during the period covered by this report was $81,513.02, of which $47,466.01 or 58.2% was spent for permanent bridge work; $17,736.78 or 21.8% was spent for temporary bridge work; $7,846.75 or 9.6% was spent for repair work.

The following construction was reported as completed during the period covered by this report: 15 concrete box culverts costing $2,976.72; 158 corrugated pipe culverts costing $7,500; 3 concrete slab bridges costing $2,940.14; 2 concrete arch bridges costing $36,624.53; 4 I-beam spans on concrete abutments costing $4,924.63; 25 wood pile bridges costing $10,236.78; 125 miscellaneous structures costing $8,463.48.

CALHOUN COUNTY.

Roads.

The total county road expenditure was $63,406.43. Of this amount 69.1% or $43,820.45 was spent for permanent work; 9.2% or $5,827.55 was spent for repairs and maintenance; 0.3% or $223.11 was spent for filling bridges and culverts; 5.6% or $3,531.35 was spent for constructing roads to natural grade. 29.75 miles were permanently graded; 2 miles permanently surfaced; 2.75 miles were graded to temporary grade lines, and 25.75 miles were constructed to natural grade. The average cost of repairs and maintenance was $35.10.

The total township road expenditure was $39,919.36. Of this amount $14,082.79 was spent for tile drainage; $4,582.51 was spent for repairs; $5,713.90 was spent for permanent grading and surfacing; $2,133.97 was spent for filling bridges and culverts; $590.95 was spent for hauling and placing temporary culverts, and $4,015.10 was spent for constructing roads to natural grade.

Bridges.

The total expenditure for bridge work during the period covered by this report was $83,374.81, of which $47,252.31 or 56.6% was spent for permanent bridge work; $11,283.65 or 13.5% was spent for temporary bridge work; $6,091.02 or 7.3% was spent for repair work.

The following construction was reported as completed during the period covered by this report: 3 concrete box culverts costing $1,976; 192 circular concrete culverts costing $11,041.76; 1,010 concrete pipe culverts costing $9,383.04; 13 encased vitrified pipe culverts costing $744.89; 2 corrugated pipe culverts costing $35.10; 2 boiler pipe culverts costing $115.35; 1 head wall on culvert costing $33.01; 3 concrete slab bridges costing $2,114.50; 1 concrete arch bridge costing $13,530.89; 1 concrete abutment costing $703.10; 1 retaining wall costing $400.67; 3 pony truss spans on piling costing $1,750.16; 5 pony truss spans on concrete abutments costing $15,707.49; 2 miscellaneous structures costing $197.96.

CARROLL COUNTY.

Roads.

The total county road expenditure was $32,684.59. Of this amount 53.3% or $17,389.71 was spent for permanent work; 39.5% or $12,933.67 was spent for repairs and maintenance, and 3.6% or $1,195.40 was spent for filling bridges and culverts. 3 miles of road built to temporary grade lines; 9.25 miles built to permanent grade lines, and ¼ mile was hard surfaced. The average cost for repairs and maintenance was $74.00 per mile.

Reports received from 10 of the 16 townships indicate a total township road expenditure of $35,200.00.

Bridges.

The total expenditure for bridge work during the period covered by this report was $87,714.91, of which $35,377.89 or 40.3% was spent for permanent bridge work; $7,989.34 or 9.1% was spent for temporary bridge work; $19,122.84 or 21.8% was spent for repair work.

The following construction was reported as completed during the period covered by this report: 64 concrete box culverts costing $26,858.04; 4 circular concrete culverts costing $651.15; 345 corrugated pipe culverts costing $6,340.04; 1 concrete abutment costing $619.20; 1 steel girder on concrete abutments costing $7,249.50; 11 wood pile bridges costing $1,649.30; 2 miscellaneous structures costing $6,340.28.

CASS COUNTY.

Roads.

The total county road expenditure was $28,389.49. Of this amount 5.7% or $2,463.10 was spent for permanent work; 38.5% or $10,873.75 was spent for repairs and maintenance; 9.8% or $2,761.90 was spent for filling bridges and culverts, and 22.8% or $6,450.58 was spent for constructing roads to natural grade. 1.42 miles were constructed to permanent grades and 14.7 miles were constructed to natural grades. No permanent surfacing was done. The average cost for repairs and maintenance was $73.50 per mile.

Reports received from the 6 of the 16 townships indicate a total township road expenditure of $32,800.00.

Bridges.

The total expenditure for bridge work during the period covered by this report was $76,951.69, of which $7,785.91 or 10.1% was spent for permanent bridge work; $47,859.55 or 62.4% was spent for temporary work; $15,671.52 or 24.1% was spent for repair work.

The following construction was reported as completed during the period covered by this report: 10 concrete box culverts costing $7,747.35; 1 concrete pipe culvert costing $104.12; 570 corrugated pipe culverts costing $11,565.22; boiler pipe culverts costing $4,445.79; 1 head wall on culvert costing $38.56; 1 pony truss bridge on wood piling costing $4,432.95; 102 wood pile bridges costing $27,261.47; miscellaneous construction costing $2,634.71.

CEDAR COUNTY.

Roads.

The total county road expenditure was $32,480.57. Of this amount 31.2% or $10,140.43 was spent for permanent work; 35.7% or $11,594.39 was spent for repairs and maintenance; 16.3% or $5,298.69 was spent for filling bridges and culverts, and 6% or $1,928.07 was spent for constructing roads to natural grades. 32 miles were constructed to natural grades; ¾ mile was constructed to temporary grade; 5.7 miles were constructed to permanent grade. No permanent surfacing was done. The average cost of repairs and maintenance was $77.40 per mile.

None of the 18 townships filed reports in time to be included with the county engineer's report.

Bridges.

The total expenditure for bridge work during the period covered by this report was $77,111.87, of which $57,604.88 or 74.7% was spent for permanent bridge work; $3,364 or 4.37% was spent for temporary bridge work; $5,345.62 or 6.9% was spent for repair work.

The following construction was reported as completed during the period covered by this report: 141 concrete box culverts costing $41,747.79; 238 corrugated pipe culverts costing $3,180.14; 7 boiler pipe culverts costing $183.86; 1 head wall on culvert costing $103.83; 5 concrete slab bridges costing $5,500.18; 1 concrete abutment costing $1,575.20; 2 concrete deck girders costing $2,997.96; 2 I-beam spans on concrete abutments costing $1,672.50; 2 pony truss spans on concrete abutments costing $4,007.42.

CERRO GORDO COUNTY.

Roads.

The total county road expenditure was $65,452.64. Of this amount 46.6% or $30,371.99 was spent for permanent work; 12.7% or $8,304.30 was spent for repairs and maintenance; 6.3% or $4,142.67 was spent for constructing roads to natural grade. 14 miles were constructed to natural grade and 3 miles were built to temporary grade lines. 4 miles were built to permanent grade lines and 13.5 miles were hard surfaced. One of the miles which was hard-surfaced was paved with concrete 16 feet wide. The other surfacing was of gravel. The average cost for repairs and maintenance was $56.50 per mile.

The total township road expenditure was $41,490.60. Of this amount $7,422.09 was spent for repairs; $4,196.16 was spent for tile drainage; $7,131.76 was spent for constructing roads to natural grades; $1,555.84 was spent for hard surfacing; $922.60 was spent for filling bridges and culverts, and $413.50 was spent for hauling and placing temporary culverts.

Bridges.

The total expenditure for bridge work during the period covered by this report was $65,516.72, of which $48,311.84 or 73.8% was spent for permanent bridge work. There was no temporary bridge construction in this county during this period. $6,739.83 or 10.3% was spent for repair work.

The following construction was reported as completed during the period covered by this report: 66 concrete box culverts costing $16,541.96; 28 encased vitrified pipe culverts costing $1,949.46; 5 head walls on culverts costing $192.88; 5 concrete slab bridges costing $5,583.12; 1 concrete abutment costing $1,412.52; 2 concrete deck girders costing $6,081.85. 3 I-beam spans on concrete abutments costing $2,466.17; 4 pony truss spans on concrete abutments costing $14,083.88.

CHEROKEE COUNTY.

Roads.

The total county road expenditure was $33,449.08. Of this amount 56.6% or $18,924.23 was spent for permanent work; 25.5% or $8,539.41 was spent for repair and maintenance; 1.3% or $438.62 was spent for filling bridges and culverts; 9.5% or $3,155.35 was spent for constructing roads to natural grades. 31 miles were constructed to natural grade; 12.14 miles were constructed to permanent grade lines. There was no hard surfacing done. The average cost for repairs and maintenance was $62.40 per mile.

The total township road expenditure was $29,463.06. Of this amount $14,812.75 was spent for repairs. $1,066.85 was spent for hauling and placing temporary culverts; $1,729.17 was spent for filling bridges and culverts, and $1,251.55 was spent for constructing roads to natural grade.

Bridges.

The total expenditure for bridge work during the period covered by this report was $66,060.47, of which $48,868.37 or 74% was spent for permanent bridge work; $7,460.78 or 11.3% was spent for temporary bridge work; $7,673.20 or 11.6% was spent for repair work.

The following construction was reported as completed during the period covered by this report—59 concrete box culverts costing $21,907.49; 16 circular concrete culverts costing $1,780.58; 2 concrete arch culverts costing $859.80; 438 corrugated pipe culverts costing $7,460.78; 1 concrete slab bridge costing $1,889.00; 1 concrete deck girder costing $2,214.65; 2 retaining walls costing $647.58; 8 pony truss spans on concrete abutments costing $19,569.27.

CHICKASAW COUNTY.

Roads.

The total county road expenditure was $24,472.48. Of this amount 14.8% or $3,631.60 was spent for permanent work. 41.6% or $10,175.50 was spent for repairs and maintenance; 8.6% or $2,116.00 was spent for filling bridges and culverts; 7.1% or $1,738.81 was spent for constructing roads to natural grades. 3.75 miles were constructed to natural grades, and ½ mile was constructed to temporary grade line. There

were no roads constructed to permanent grades. 6.75 miles were surfaced. The average cost of repairs and maintenance was $79.50, per mile.

Total township road expenditure was $24,182.53. No accurate figures are available showing the distribution of the township expenditures.

Bridges.

The total expenditure for bridge work during the period covered by this report was $52,820.81, of which $31,046.23 or 58.7% was spent for permanent bridge work. No temporary construction was reported from this county during this period. $4,406.02 or 8.4% was spent for repairs.

The following construction was reported as completed during the period covered by this report—30 concrete box culverts costing $6,990.98; 4 circular concrete culverts costing $128.54; 1 concrete slab bridge costing $945.10; 15 I-beam spans on concrete abutments costing $11,239.86; 4 pony truss spans on concrete abutments costing $11,741.75; 1 miscellaneous structure costing $1,114.79.

CLARKE COUNTY.

Roads.

The total county road expenditure was $24,565.45. Of this amount 92.8% or $22,848.66 was spent for repairs and maintenance. 7.2% or $1,716.79 was spent for constructing roads to natural grade. There was no permanent work accomplished and no bridge and culvert fills paid from the county road fund. 13.25 miles were constructed to natural grade. The average cost for repairs and maintenance was $198.00 per mile. This county has spent for repairs and maintenance a greater percentage of their funds than any other county in the State and have secured no permanent work.

No reports were received from the townships in time to be included in the county engineer's report.

Bridges.

The total expenditure for bridge work during the period covered by this report was $44,103.29; of which $16,438.12 or 37.4% was spent for permanent bridge work; $1,794.87 or 4% was spent for temporary bridge work; $14,244.64 or 32.4% was spent for repair work.

The following construction was reported as completed during the period covered by this report—32 concrete box culverts costing $16,295.67; 5 boiler pipe culverts costing $313.56; 18 cast iron pipe culverts costing $1,481.31; 2 head walls on culverts costing $142.45; 1 miscellaneous structure costing $36.00.

CLAYTON COUNTY.

Roads.

The total county road expenditure was $36,976.60. Of this amount 5.5% or $2,039.17 was spent for permanent work; 52.4% or $19,378.62 was spent for repairs and maintenance; 6% or $2,211.85 was spent for filling bridges and culverts. 23.9% or $8,835.86 was spent for constructing roads to natural grades. 46.1 miles of road were constructed to natural grade; 0.6 mile was constructed to temporary grade and 0.3 mile was hard surfaced. The average cost for repairs and maintenance

was $85.70 per mile. This county has adopted a patrol system which covers the entire mileage of the county road system, each patrolman having about ten miles of road under his supervision. The county being very rough, the cost of repairs and maintenance is necessarily quite high.

Reports received from 17 of the 22 townships indicate a total township road expenditure of $38,600. These reports also indicate a balance on hand January 1, 1916, of $16,816.75.

Bridges.

The total expenditure for bridge work during the period covered by this report was $111,145.30, of which $93,535.27 or 84.2% was spent for permanent bridge work; $7,961.23 or 7.1% was spent for temporary bridge work; $8,901.30 or 8% was spent for repair work.

The following construction was reported as completed during the period covered by this report—94 concrete box culverts costing $40,074.99; 497 corrugated pipe culverts costing $7,466.23; 1 masonry arch culvert costing $525.00; 1 head wall on culvert costing $10.00; 2 concrete slab bridges costing $3,311.65; 2 concrete abutments costing $1,404.00; 1 concrete through girder costing $3,723.60; 2 concrete deck girders costing $6,662.80; 3 retaining walls costing $1,935.48; 21 I-beam spans on concrete abutments costing $11,229.57; 1 steel girder on concrete abutments costing $3,993.50; 10 pony truss spans on concrete abutments costing $19,695; 2 high steel trusses costing $968.68; 1 wood pile bridge costing $493.00; miscellaneous structures costing $747.50.

CLAY COUNTY.

Roads.

The total county road expenditure was $32,789.64. Of this amount 68.3% or $22,441.12 was spent for permanent work 14.6% or $4,828.00 was spent for repairs and maintenance. 8.3% or $2,709.54 was spent for constructing roads to natural grade, and 0.4% or $126.50 was spent for filling bridges and culverts. 11 miles were constructed to natural grade; 11.9 miles were permanently graded; 8.3 miles were surfaced. The average cost of repairs and maintenance was $31.50.

Reports received from 8 of the 16 townships indicate a total township road expenditure of $37,000.00. These reports also indicate a balance on hand of approximately $12,000.00 on January 1, 1916.

Bridges.

The total expenditure for bridge work during the period covered by this report was $131,817.25, of which $116,973.79 or 89.3% was spent for permanent bridge work; $1,230.64 or 1% was spent for temporary bridge work; $5,571.30 or 4.6% was spent for repair work.

The following construction was reported as completed during the period covered by this report—99 concrete box culverts costing $32,300.64; 372 corrugated pipe culverts costing $1,230.64; 1 concrete arch bridge costing $37,006.72; 3 concrete abutments costing $3,042.10; 13 I-beams spans on concrete abutments costing $18,775.56; 7 pony truss spans on concrete abutments costing $19,508.82; 1 high steel truss on concrete abutments costing $6,339.95; 2 miscellaneous structures costing $3,610.74.

CLINTON COUNTY.

Roads.

The total county road expenditure was $47,241.72. Of this amount 54.6% or $25,817.36 was spent for permanent work; 29.2% or $13,763.07 was spent for repairs and maintenance; 2.1% or $1,003.52 was spent for filling bridges and culverts, and 5.9% or $2,771.99 was spent for constructing roads to natural grade. 12.34 miles were graded to permanent grade lines, 42.5 miles were crowned with the graders, and 3.4 miles were hard-surfaced. The average cost of repairs and maintenance was $70.30 per mile.

None of the townships reported in time to be included in the county engineer's report.

Bridges.

The total expenditure for bridge work during the period covered by this report was $87,997.61, of which $44,447.70 or 50.6% was spent for permanent bridge work; $23,762.23 or 27% was spent for temporary bridge work; $8,650.81 or 9.8% was spent for repair work.

The following construction was reported as completed during the period covered by this report—concrete box culverts costing $19,992.43; 21 concrete pipe culverts costing $1,336.60; 438 corrugated pipe culverts costing $13,868.57; 1 cast iron pipe culvert costing $39.75; 1 concrete slab bridge costing $1,200; 1 concrete abutment costing $980.00; 1 concrete deck girder costing $5,889.28; 11 I-beam spans on piling costing $2,799.30; 6 I-beam spans on concrete abutments costing $11,943; 1 pony truss span on concrete abutments costing $443.00; 32 wood pile bridges costing $5,718.01; 1 miscellaneous structure costing $5,271.00.

CRAWFORD COUNTY.

Roads.

The total county road expenditure was $48,598.94. Of this amount 61.6% or $29,912.29 was spent for permanent work; 23.7% or $11,504.15 was spent for repairs and maintenance, and 0.3% or $128.56 was spent for constructing roads to natural grades. None of the bridge or culvert fills were paid from the road fund. 29.67 miles were permanently graded at an average cost of 18½ cents per cubic yard. 2 miles were constructed to natural grade. Average cost of repairs and maintenance was $77.20 per mile.

The amount spent on the township road system was $53,000.00, of which $32,500.00 was spent for repairs, $8,000.00 was spent for filling bridges and culverts, and $2,500.00 was spent for hauling and placing temporary culverts.

Bridges.

The total expenditure for bridge work during the period covered by this report was $115,916.09, of which $67,056.07 or 57.8% was spent for permanent bridge work; $14,298.36 or 12.3% was spent for temporary bridge work; $33,871.04 or 29.2% was spent for repair work.

The following construction was reported as completed during the period covered by this report—95 concrete box culverts costing $42,362.82; 1 encased vitrified pipe culvert costing $23.43; 290 corrugated pipe culverts costing $11,797.85; 25 boiler pipe culverts costing $1,541.75; 1 head wall on a culvert costing $71.30; 9 I-beam spans on concrete abutments costing $10,516.16; 6 pony truss spans on concrete abutments costing $14,082.36; 5 wood pile bridges costing $958.76; miscellaneous construction costing $334.01.

DALLAS COUNTY.

Roads.

The total county road expenditure was $36,654.36; of which 41.7% or $15,275.66 was spent for permanent work; 32.4% or $11,908.99 was spent for repairs and maintenance; 13.3% or $4,854.33 was spent for filling bridges and culverts, and 4.6% or $1,678.32 was spent for constructing roads to natural grade. 22.5 miles were constructed to natural grade, 2.75 miles constructed to permanent grade; ¼ mile was surfaced. The average cost for repairs and maintenance was $70.00 per mile.

Reports received from 15 of the 16 townships indicate a total township expenditure on roads of $46,100.00. Of this amount $17,172.34 was spent for repairs; $3,837.25 was spent for filling bridges and culverts; $2,059.72 was spent for tile drainage; $1,016.13 was spent for hauling and placing temporary culverts, and $1,121.50 was spent for constructing roads to natural grade.

Bridges.

The total expenditure for bridge work during the period covered by this report was $92,437.62, of which $66,067.07 or 72% was spent for permanent bridge work; $6,475.30 or 7% was spent for temporary bridge work; $17,054.11 or 18.3% was spent for repair work.

The following construction was reported as completed during the period covered by this report—111 concrete box culverts costing $35,500.92; 43 circular concrete culverts costing $5,876.04; 2 concrete arch culverts costing $1,158.14; 3 encased vitrified pipe culverts costing $233.91; 375 corrugated pipe culverts costing $6,283.90; 1 boiler pipe culvert costing $20.90; 1 head wall on culvert costing $198.05; 9 concrete slab bridges costing $7,602.81; 1 pony truss span on concrete abutments costing $4,897.60; 2 high steel trusses on concrete abutments costing $4,897.60; 2 high steel trusses on concrete abutments costing $10,599.80; 1 wood pile bridge costing $170.50; miscellaneous construction costing $18.72.

DAVIS COUNTY.

Roads.

The total county road expenditure was $29,391.15. Of this amount 15.1% or $4,435.52 was spent for permanent work; 57.5% or $16,872.25 was spent for repairs and maintenance; 11.1% or $3,258.78 was spent for filling bridges and culverts, and 9.1% or $2,663.32 was spent for constructing roads to natural grades. The average cost for repairs and maintenance was $111.50 per mile.

Reports are not available giving the amount spent by the townships.

Bridges.

The total expenditure for bridge work during the period covered by this report was $55,570.40, of which $21,141.31 or 38% was spent for permanent bridge work. $12,110.22 or 21.8% was spent for temporary bridge work. $11,865.35 or 21.4% was spent for repair work.

The following construction was reported as completed during the period covered by this report—23 concrete box culverts costing $10,186.94; 4 circular concrete culverts costing $520.61; 3 encased vitrified pipe culverts costing $549.31; 412 corrugated pipe culverts costing $8,540.84; 18 boiler pipe culverts costing $699.92; 3 headwalls on culverts costing $126.75; 1 concrete slab bridge costing $1,498.84; 1 I-beam span on piling costing $655.20; 1 I-beam span on concrete abutments costing $1,370.00; 1 pony truss on piling costing $2,214.26; 2 pony truss spans on concrete abutments costing $6,888.86; 18 miscellaneous structures costing $5,247.18.

DECATUR COUNTY.

Roads.

The total county road expenditure was $36,720.96; of this amount 14.2% or $5,197.63 was spent for repairs and maintenance; 4.5% or $1,632.56 was spent for filling bridges and culverts; 70% or $25,680.58 was spent for constructing roads to natural grade. There was no permanent work done. 129 miles were constructed to natural grade. The average cost of repairs and maintenance was $32.40 per mile.

Reports received from 8 of the 16 townships indicate a total township road expenditure of $27,800.00.

Bridges.

The total expenditure for bridge work during the period covered by this report was $56,752.91, of which $15,225.42 or 26.8% was spent for permanent bridge work; $16,884.46 or 29.7% was spent for temporary bridge work; $12,924.76 or 22.8% was spent for repair work.

The following construction was reported as completed during the period covered by this report—11 concrete box culverts costing $4,623.53; 15 concrete pipe culverts costing $2,498.13; 499 corrugated pipe culverts costing $9,461.57; 6 boiler pipe culverts costing $924.31; 16 cast iron pipe culverts costing $2,659.17; 1 pony truss span on piling costing $1,341.28; 3 pony truss spans on concrete abutments costing $10,601.89.

DELAWARE COUNTY.

Roads.

The total county road expenditure was $35,283.88, of which amount 27.3% or $9,622.48 was spent for permanent road work; 24.8% or $8,744.20 was spent for repairs and maintenance; 28.6% or $10,060.85 was spent for constructing roads to natural grade. 0.3% or $103.50 was spent for filling bridges and culverts; 3.75 miles were permanently graded; 3.25 miles were surfaced. The average cost of repairs and maintenance was $51.40 per mile.

Reports are not available showing the township road expenditures.

Bridges.

The total expenditure for bridge work during the period covered by this report was $55,056.74, of which $36,181.97 or 65.6% was spent for permanent bridge work; $11,132.87 or 20.2% was spent for temporary bridge work; $7,751.90 or 14.2% was spent for repair work.

The following construction was reported as completed during the period covered by this report—64 concrete box culverts costing $19,892.45; 334 corrugated pipe culverts costing $6,287.89; 1 boiler pipe culvert costing $54.00; 1 concrete slab bridge costing $998.37; 1 concrete deck girder bridge costing $5,014.60; 5 I-beam spans on concrete abutments costing $4,026.75; 3 pony truss spans on concrete abutments costing $6,249.80; 20 wood pile bridges costing $4,790.98.

DES MOINES COUNTY.

Roads.

The total county road expenditure was $35,391.45. Of this amount 62.7% or $22,204.59 was spent for permanent work; 13.5% or $4,782.08 was spent for repairs and maintenance; 12.4% or $4,382.70 was spent for filling bridges and culverts; 11.3% or $4,002.08 was spent for constructing roads to natural grade. 1.55 miles were constructed to permanent grade; 1.26 miles were surfaced, of which 1 mile was paved with concrete; and 115 miles were constructed to natural grade. The average cost for repairs was $58.70 per mile.

The mile of concrete paving cost $17,170.00, which includes all expense for grading, tile drainage, engineering services, etc. The price for the paving itself was $1.31 per square yard, or approximately $12,576.00 per mile. This road was constructed under the provisions of the permanent road district law passed by the 33d G. A. Half of the cost was paid by the county and the remaining portion was paid by direct assessment against the property included within this road district. This is the only mile of road constructed under this law.

The total township expenditure was $24,128.05, of which $5,166.48 was spent for repairs; $1,311.98 was spent for filling bridges and culverts; $486.19 was spent for hauling and placing temporary culverts. $197.90 was spent for permanent surfacing. $1,209.45 was spent for constructing roads to natural grades; $4,180.37 was spent for permanent grading, and $4,443.07 was spent for dragging.

Bridges.

The total expenditure for bridge work during the period covered by this report was $25,734.99, of which $6,732.61 or 26.1% was spent for permanent bridge work; $9,741.24 or 37.8% was spent for temporary bridge work; $2,764.56 or 10.7% was spent for repair work.

The following construction was reported as completed during the period covered by this report—box culverts costing $3,362.98; 6 concrete pipe culverts costing $722.40; 162 boiler pipe culverts costing $6,838.42; 2 head walls on culverts costing $311.15; 1 I-beam span on piling costing $257.25; 1 I-beam span on concrete abutments costing $966.10; 2 pony truss spans on piling costing $1,923.17; 1 pony truss on concrete abutments costing $1,082.73; 1 high steel truss costing $1,009.85; 6 miscellaneous structures costing $3,544.16.

DICKINSON COUNTY.

Roads.

The total county road expenditure was $35,726.26 of which 54% or $19,256.09 was spent for permanent road work. 20.1% or $7,160.11 was spent for repairs and maintenance. 1.1% or $408.00 was spent for constructing roads to natural grades. 0.7% or $267.62 was spent for filling bridges and culverts. 2.3 miles of road were constructed to natural grades; 1.22 miles were constructed to temporary grades; 4.08 miles were constructed to permanent grades, and 4.14 miles were hard-surfaced. The average cost for repairs and maintenance was $75.70 per mile. One of the most important pieces of road work undertaken by this county during the year was the construction of a high class gravel surfacing on a portion of the Spirit Lake-Arnolds Park road. About ¾ mile of this surfacing has been completed to date at a cost of $3,443.47. The gravel was shipped in and then hauled 1.75 miles to the road. This work will be completed in 1916.

The total township road expenditure was $24,284.23. Reports are not available showing the distribution of this expenditure.

Bridges.

The total expenditure for bridge work during the period covered by this report was 53,576, of which $39,035.76 or 73% was spent for permanent bridge work; $6,173.50 or 11.5% was spent for temporary bridge work; $1,067.58 or 2% was spent for repair work.

The following construction was reported as completed during the period covered by this report—28 concrete box culverts costing $9,581.90; 1 concrete arch culvert costing $218.96; 1 concrete pipe culvert costing $180.50; 259 corrugated pipe culverts costing $5,698; 2 boiler pipe culverts costing $99.00; 6 concrete slab bridges costing $7,508.39; 1 concrete abutment costing $836.40; 9 I-beam spans on concrete abutments costing $5,387.29; 6 pony truss spans on concrete abutments costing $15,502.82; 2 wood pile bridges costing $196; miscellaneous construction costing $140.

DUBUQUE COUNTY.

Roads.

The total county road expenditure was $31,290.41. Of this amount 86.2% or $26,952.04 was spent for repairs and maintenance, ½% or $146.85 was spent for filling bridges and culverts; 7% or $2,191.52 was spent for constructing to natural grades; 6.2% or $1,950.00 was spent for permanent road work. This does not include the work done on the Hawkeye Highway between Dyersville and Dubuque. This piece of road is about 20 miles in length and is being constructed under the supervision of the United States Government, $30,000 of the funds having been appropriated by the Federal Government from the Post Road Funds appropriated for the fiscal year ending June 30, 1913. Contracts were let in March, 1915, for the grading and hard-surfacing of the entire twenty miles for constructing the necessary bridges and culverts of permanent construction. Three very dangerous railroad crossings, the

estimated cost of which is $42,000.00, will be eliminated. The Illinois Central Railroad Company will bear about 50% of the cost. The total estimated cost of this road is $160,000.00. About half of the road has already been graded and surfaced.

There were 26 miles constructed to natural grades. The average cost of repairs and maintenance was $240.00 per mile.

Reports are not available showing township road expenditures.

Bridges.

The total expenditure for bridge work during the period covered by this report was $103,270.04, of which $75,438.08 or 73% was spent for permanent bridge work; $5,284.96 or 5.1% was spent for temporary bridge construction; $17,982.47 or 17.4% was spent for repair work.

The following construction was reported as completed during the period covered by this report—90 concrete box culverts costing $44,361.05; 6 circular concrete culverts costing $1,134.86; 165 corrugated pipe culverts costing $5,284.96; 78 headwalls on culverts costing $10,054.45; 3 concrete abutments costing $3,301.30; 8 I-beam spans on concrete abutments costing $9,350.05; 4 pony truss spans on concrete abutments costing $7,236.37; 8 miscellaneous structures costing $4,243.01.

EMMETT COUNTY.

Roads.

The total county road expenditure was $33,021.53. Of this amount 60.8% or $20,177.94 was spent for permanent work; 17.8% or $5,871.22 was spent for repairs and maintenance; 1.2% or $385.00 was spent for filling bridges and culverts; 2.5% or $825.25 was spent for constructing roads to natural grades. 13 miles were constructed to permanent grade; 8 miles were constructed to temporary grade; 9 miles were constructed to natural grades and 13 miles were surfaced. The average cost for repairs and maintenance was $58.30 per mile.

There is no report available showing the township expenditures.

Bridges.

The total expenditure for bridge work during the period covered by this report was $51,437.96, of which $36,604.86 or 71.3% was spent for permanent bridge work; $8,880.84 or 16.4% was spent for temporary bridge work; $3,216.64 or 6.7% was spent for repair work.

The following construction was reported as completed during the period covered by this report—22 box culverts costing $8,620.83; 34 circular concrete culverts costing $2,544.39; 2 concrete arch culverts costing $438.96; 123 concrete pipe culverts costing $1,540.52; 100 corrugated pipe culverts costing $1,242.18; 2 concrete slab bridges costing $2,400.10; 4 concrete deck girders costing $22,600.59; 4 I-beam spans on piling costing $4,540.15; 3 wood pile bridges costing $1,557.99; 6 miscellaneous structures costing $2,735.62.

FAYETTE COUNTY.

Roads.

The total county road expenditure was $33,965.34. Of this amount, 10.8% or $3,684.45 was for permanent work; 23.3% or $7,924.75 was spent for repairs and maintenance, and 40% or $13,562.84 was spent for constructing roads to natural grades. 4.50 miles were constructed to permanent grade, and 117 miles were constructed to natural grades. The average cost of repairs and maintenance was $40.00 per mile.

The total township road expenditure was $35,349.94. This total amount was spent for repairs and maintenance.

Bridges.

The total expenditure for bridge work during the period covered by this report was $84,965.71, of which $61,283.78 or 72.2% was spent for permanent bridge work; $7,239.38 or 8.5% was spent for temporary bridge work; $14,216.56 or 16.7% was spent for repair work.

The following construction was reported as completed during the period covered by this report—100 concrete box culverts costing $17,352.51; 558 corrugated pipe culverts costing $6,978.68; 1 boiler pipe culvert costing $225.50; 1 cast iron pipe culvert costing $35.20; 1 head wall on culvert costing $52.83; 4 slab bridges costing $2,746.84; 1 concrete arch bridge costing $2,196; 4 concrete abutments costing $1,843.45; 6 concrete through girders costing $11,599.85; 4 concrete deck girders costing $7,349.35; 1 retaining wall costing $779.66; 4 I-beam spans on concrete abutments costing $6,965.29; 2 pony truss spans on concrete abutments costing $6,598.50; 1 high steel truss costing $3,799.50; miscellaneous construction costing $1,141.37.

FLOYD COUNTY.

Roads.

Total county road expenditure was $30,025.84. Of this amount 13.3% or $4,010.60 was spent for permanent work; 34.4% or $10,335.42 was spent for repairs and maintenance; 8.8% or $2,638.50 was spent for filling bridges and culverts. 50.3% or $4,591.00 was spent for constructing roads to natural grades. ¾ mile was constructed to permanent grade; 34 miles were constructed to natural grade. The average cost of repairs and maintenance was $73.10 per mile.

The total township road expenditure was $29,234.50.

Bridges.

The total expenditure for bridge work during the period covered by this report was $70,296.01, of which $47,798.80 or 68% was spent for permanent bridge work; $3,686.03 or 5.2% was spent for temporary bridge work; $7,908.59 or 11.2% was spent for repair work.

The following construction was reported as completed during the period covered by this report—77 concrete box culverts costing $15,516.59; 113 corrugated pipe culverts costing $2,270.43; 1 boiler pipe culvert costing $34; 3 concrete slab bridges costing $3,810.94; 1 concrete arch bridge costing $24,541.46; 4 concrete abutments costing $1,806.56; 2 retaining walls costing $1,044.92; 1 I-beam span on concrete abutments costing

$1,078.33; 3 wood pile bridges costing $1,381.61; miscellaneous construction costing $192.07.

FRANKLIN COUNTY.

Roads.

The total county road expenditure was $34,140.79. Of this amount, 24.7% or $8,423.38 was spent for permanent work; 38.7% or $13,227.29 was spent for repairs and maintenance; 8.3% or $2,830.22 was spent for filling bridges and culverts. 16.5% or $5,604.25 was spent for constructing roads to natural grades. 1.50 miles were constructed to permanent grade; 5.75 miles were surfaced; 2.25 miles were constructed to temporary grades, and 30 miles were constructed to natural grades. The average cost for repairs and maintenance was $77.80 per mile.

The total township expenditure as indicated by reports from 11 of the 16 townships was $37,600.00.

Bridges.

The total expenditure for bridge work during the period covered by this report was $39,480.14, of which $17,261.50 or 43.7% was spent for permanent bridge work; $1,119.71 or 2.8% was spent for temporary bridge work; $5,874.92 or 14.9% was spent for repair work.

The following construction was reported as completed during this period covered by this report—50 concrete box culverts costing $11,689.44; 7 encased vitrified pipe culverts costing $524.74; 1 head wall on culvert costing $76.47; 1 concrete slab bridge costing $948.65; 1 concrete deck girder costing $2,900.29; 1 I-beam span on concrete abutments costing $1,121.91; 4 wood pile bridges costing $1,119.71.

FREMONT COUNTY.

Roads.

The total county road expenditure was $27,267.45. Of this amount 2.5% or $673.01 was spent for permanent work; 58.7% or $16,015.45 was spent for repairs and maintenance; 30% or $8,177.49 was spent for filling bridges and culverts; 4.3% or $1,155.43 was spent for constructing roads to natural grades. 1-3 mile was constructed to temporary grade; 18 miles were constructed to natural grades. The average cost of repairs and maintenance was $118.50 per mile.

Reports were not received from all the townships in time to be included with the county engineer's report.

Bridges.

The total expenditure for bridge work during the period covered by this report was $66,787.27, of which $19,297.62 or 28.9% was spent for permanent bridge work; $15,278.48 or 22.9% was spent for temporary bridge work; $20,720.28 or 31.2% was spent for repair work.

The following construction was reported as completed during the period covered by this report—28 box culverts costing $17,500.43; 309 corrugated pipe culverts costing $6,191.58; 4 boiler pipe culverts costing $882.30; 2 head walls on culverts costing $294.81; 1 retaining wall costing $102.94; 2 I-beam spans on piling costing $586.22;

1 I-beam span on concrete abutments costing $1,399.45; 2 pony truss spans on wood piling costing $961.75; 22 wood pile bridges costing $6,656.63; miscellaneous construction costing $2,062.35.

GREENE COUNTY.

Roads.

The total county road expenditure was $32,936.00. Of this amount 74.2% or $24,387.48 was spent for permanent work; 13.5% or $4,446.61 was spent for repairs and maintenance; 1.9% or $622.61 was spent for filling bridges and culverts. 13.25 miles were permanently graded. 10 miles were permanently surfaced. The average cost of repairs and maintenance was $37.80 per mile.

Reports received from 8 of the 16 townships indicate a total expenditure of $37,900.00. The townships of Greene County have done more permanent grading work than the township of any other county in the State. In the past three years, 45 miles of such permanent grading has been completed on the township roads.

Bridges.

The total expenditure for bridge work during the period covered by this report was $36,797.71, of which $22,214.58 or 60.7% was spent for permanent bridge work; $2,909.47 or 7.8% was spent for temporary bridge work; $9,679.49 or 26.3% was spent for repair work.

The following construction was reported as completed during the period covered by this report—17 concrete box culverts costing $5,514.63; 72 circular concrete culverts costing $5,872.99; 25 concrete pipe culverts costing $963.73; 104 corrugated pipe culverts costing $1,697.75; 1 cast iron pipe culvert costing $247.99; 1 head wall on culvert costing $62.57; 1 concrete slab bridge costing $1,350.85; 3 concrete abutments costing $2,334.05; 3 concrete deck girders costing $7,079.50; 2 miscellaneous structures costing $434.37.

GRUNDY COUNTY.

Roads.

The total county road expenditure was $22,195.24. Of this amount 24.3% or $5,394.84 was spent for permanent work; 54.7% or $12,126.14 has been spent for repairs and maintenance; 15.3% or $3,413.61 was spent for constructing roads to natural grades. One mile was permanently graded; 10.25 miles graded to temporary grades, and 29 miles constructed to natural grades. The average cost of repairs and maintenance was $78.00 per mile.

Reports received from 12 of the 14 townships indicate a total expenditure of $31,560.00.

Bridges.

The total expenditure for bridge work during the period covered by this report was $81,425.23, of which $43,536.95 or 53.6% was spent for permanent bridge work; $9,229.42 or 11.3% was spent for temporary bridge work; $8,324.35 or 10.2% was spent for repair work.

The following construction was reported as completed during the period covered by this report: 82 concrete box culverts costing $24,023.32;

562 corrugated pipe culverts costing $7,356.61; 2 head walls on culverts costing $101.04; 4 concrete slab bridges costing $7,842.30; 1 concrete abutment costing $1,387.05; 1 concrete deck girder costing $6,187.60; 1 pony truss span on concrete abutments costing $3,995.64; 2 wood pile bridges costing $1,872.81; miscellaneous construction costing $16,675.55.

GUTHRIE COUNTY.

Roads.

The total county road expenditure was $38,054.29. Of this amount, 4.3% or $1,650.57 was spent for permanent work; 78.3% or $29,783.58 was spent for repairs and maintenance; 3.5% or $1,317.13 was spent for filling bridges and culverts; 5.5% or $2,068.86 was spent for constructing roads to natural grade. One mile of road was constructed to permanent grade. 65 miles were constructed to natural grades. Average cost for repairs and maintenance was $153.00 per mile.

Reports received from 6 of the 17 townships indicate a total expenditure of $39,800.00.

Bridges.

The total expenditure for bridge work during the period covered by this report was $81,394.76, of which $37,508.35 or 46.2% was spent for permanent bridge work; $4,052.23 or 4.9% was spent for temporary bridge work; $18,410.27 or 22.7% was spent for repair work.

The following construction was reported as completed during the period covered by this report—61 concrete box culverts costing $27,812.41; 1 circular concrete culvert costing $151.73; 6 encased vitrified pipe culverts costing $923.02; 30 corrugated pipe culverts, costing $2,005.00; 9 boiler pipe culverts, costing $770.91; 1 concrete slab bridge costing $1,530.00; 1 retaining wall costing $826.64; 2 I-beam spans on concrete abutments costing $2,775.45; 1 pony truss span on concrete abutments costing $4,412.12; 3 wood pile bridges costing $353.30; 1 miscellaneous structure costing $1,675.48.

HAMILTON COUNTY.

Roads.

The total county road expenditure was $65,079.07. Of this amount, 76.9% or $50,132.61 has been spent for permanent work; 13.3% or $8,636.85 was spent for repairs and maintenance; 6.6% or $4,274.30 was spent for constructing roads to natural grades. 22.25 miles were constructed to permanent grades; 1.6 miles were constructed to temporary grades; 35.75 miles were crowned with graders. The average cost of repairs and maintenance was $66.50 per mile.

Reports received from 7 of the 16 townships indicate a total expenditure of $46,000.00.

Bridges.

The total expenditure for bridge work during the period covered by this report was $69,466.53 of which $48,514.43 or 70% was spent for permanent bridge work; $9,259.59 or 13.2% was spent for temporary bridge work; $4,243.89 or 6.1% was spent for repair work.

The following construction was reported as completed during the period covered by this report—37 concrete box culverts costing $22,964.46; 1 concrete pipe culvert costing $680.25; 620 corrugated pipe culverts costing $8,579.34; 4 concrete slab bridges costing $5,497.59; 2 concrete abutments costing $1,261; 3 concrete through girders costing $5,267.15; 4 concrete deck girders costing $9,005.69; 1 I-beam span on concrete abutments costing $2,101.20; 1 pony truss span on concrete abutments costing $2,417.40; miscellaneous construction costing $7,448.62.

HANCOCK COUNTY.

Roads.

The total county road expenditure was $47,507.92. Of this amount, 58.5% or $27,825.30 was spent for permanent work; 19.9% or $9,428.72 was spent for repairs and maintenance; 1.1% or $500.00 was spent for filling bridges and culverts, and 6.3% or $3,018.55 was spent for constructing roads to natural grades. 14.75 miles were graded to permanent grade lines; 7.8 miles were graded to temporary grade lines; 6.6 miles were constructed to natural grades, and 14.7 were surfaced. The average cost of repairs and maintenance was $62.70 per mile.

Reports received from 11 of the 16 townships indicate a total expenditure of $32,400.00.

Bridges.

The total expenditure for bridge work during the period covered by this report was $32,163.23, of which $16,946.41 or 52.8% was spent for permanent bridge work; $2,235.68 or 6.9% was spent for temporary bridge work; $4,197.09 or 13.1% was spent for repair work.

The following construction was reported as completed during the period covered by this report—23 concrete box culverts costing $9,641.88; 13 circular concrete culverts costing $1,827.40; 75 corrugated pipe culverts costing $1,478.86; 1 head wall on culvert costing $98.61; 3 concrete abutments costing $2,219.26; 2 retaining walls costing $207.82; 2 I-beam spans on concrete abutments costing $2,951.50; 3 wood pile bridges costing $756.82; miscellaneous constructions costing $3,281.36.

HARDIN COUNTY.

Roads.

The total county road expenditure was $37,686.45. Of this amount, 61% or $23,049.13 were spent for permanent work; 13% or $4,943.68 was spent for repairs and maintenance; 3.2% or $1,222.74 was spent for filling bridges and culverts; 7.4% or $2,818.05 was spent for constructing roads to natural grades. 17 miles were constructed to permanent grades; 17.6 miles were constructed to natural grades; 5.2 miles were surfaced. The average cost of repairs and maintenance was $28.50 per mile.

The total township road expenditure was $38,148.50.

Bridges.

The total expenditure for bridge work during the period covered by this report was $57,297.76, of which $32,571.53 or 56.8% was spent for permanent bridge work; $3,048.49 or 5.3% was spent for temporary bridge work; $8,981.80 or 15.7% was spent for repair work.

The following construction was reported as completed during the period covered by this report—107 concrete box culverts costing $22,118.89; 2 circular concrete culverts costing $1,250.35; 175 corrugated pipe culverts costing $2,199.81; 2 concrete slab bridges costing $1,750.54; 1 concrete deck girder costing $2,335.83; 2 I-beam spans on concrete abutments costing $2,188.14; 1 pony truss span on concrete abutments costing $2,927.78; 3 wood pile bridges costing $848.68; 3 miscellaneous structures costing $1,366.98.

HARRISON COUNTY.

Roads.

The total county road expenditure was $32,716.10. Of this amount 18.7% or $6,104.30 was spent for permanent work; 56.8% or $18,573.93 was spent for repairs and maintenance; 1% or $335.85 was spent for filling bridges and culverts; 23.5% or $7,702.02 was spent for constructing roads to natural grades. 9 miles were graded to temporary grades; 40 miles were constructed to natural grades. The aveage cost for repairs and maintenance was $111.20 per mile.

Reports received from 6 of the 20 townships indicate a total expenditure of $71,600.00.

Bridges.

The total expenditure for bridge work during the period covered by this report was $92,112.77, of which $13,192.16 or 14.3% was spent for permanent bridge work; $22,843.65 or 24.8% was spent for temporary bridge work; $51,453.52 or 55.8% was spent for repair work.

The following construction was reported as completed during the period covered by this report—7 concrete box culverts costing $9,360.47; 18 concrete pipe culverts costing $3,143.20; 81 corrugated pipe culverts costing $3,947.72; 4 boiler pipe culverts costing $2,267.99; 1 cast iron pipe culvert costing $503.78; 3 head walls on culverts costing $449.34; 3 I-beam spans on piling costing $1,149.00; 3 pony truss spans on piling costing $4,589.69; 2 high steel trusses costing $3,382.35; 36 wood pile bridges costing $7,242.27.

HENRY COUNTY.

Roads.

The total county road expenditure was $17,359.11. Of this amount, 17.5% or $3,031.95 was spent for permanent work; 9.6% or $1,676.70 was spent for constructing roads to natural grades; 50.6% or $8,811.57 was spent for repairs and maintenance; 16.7% or $2,905.42 was spent for filling bridges and culverts; 33 miles were constructed to natural grades; ½ mile was constructed to permanent grades. The average cost for repairs and maintenance was $70.00 per mile.

The total township road expenditure was $26,740.59.

Bridges.

The total expenditure for bridge work during the period covered by this report was $34,473.50 of which $21,535.17 or 62.5% was spent for

permanent bridge work; $5,694.75 or 16.2% was spent for temporary bridge work; $7,333.58 or 21.3% was spent for repair work.

The following construction was reported as completed during the period covered by this report—29 concrete box culverts costing $12,492.64; 1 circular concrete culvert costing $166.33; 266 corrugated pipe culverts costing $5,467; 2 boiler pipe culverts costing $147.75; 4 concrete slab bridges costing $4,185.96; 2 concrete abutments costing $837.08. 1 I-beam span on concrete abutments costing $358.44; 1 pony truss span on concrete abutments costing $3,495.32.

HOWARD COUNTY.

Roads.

The total county road expenditure was $17,103.36. Of this amount, 29.2% or $5,008.75 was spent for permanent work; 25.1% or $4,285.93 was spent for repairs and maintenance; 5.3% or $907.04 was spent for filling bridges and culverts, and 40% or $6,845.25 was spent for constructing roads to natural grades. ½ mile was constructed to permanent grade; 2.25 miles were constructed to temporary grades; 14.75 miles were constructed to natural grades; 1.12 miles were surfaced. The average cost of repairs and maintenance was $35.70 per mile.

The total township road expenditure was $13,333.19.

Bridges.

The total expenditure for bridge work during the period covered by this report was $72,556.75, of which $36,860.57 or 50.8% was spent for permanent bridge work; $9,013.36 or 12.4% was spent for temporary bridge work; $6,633.10 or 9.2% was spent for repair work.

The following construction was reported as completed during the period covered by this report—82 concrete box culverts costing $20,759.03; 46 circular concrete culverts costing $4,738.29; 362 corrugated pipe culverts costing $5,459.20; 2 concrete slab bridges costing $1,936.58; 5 I-beam spans on concrete abutments costing $6,071.52; 1 pony truss span on concrete abutments costing $3,355.15; 15 wood pile bridges costing $3,554.16.

HUMBOLDT COUNTY.

Roads.

The total county road expenditure was $22,938.62. Of this amount, 57.6% or $13,203.15 was spent for permanent work; 30.1% or $6,941.37 was spent for repairs and maintenance; 1.8% or $409.77 was spent for filling bridges and culverts; 10.4% or $2,385.33 was spent for constructing roads to natural grades; 9.5 miles were built to permanent grades; 3.50 miles were surfaced; 16 miles were constructed to natural grades. The average cost for repairs and maintenance was $51.80 per mile.

Reports received from 12 of the 14 townships indicate a total expenditure of $39,836.60.

Bridges.

The total expenditure for bridge work during the period covered by this report was $38,704.20, of which $27,449.19 or 70.8% was spent for permanent bridge work; $5,229.45 or 13.5% was spent for temporary bridge work; $3,783.02 or 9.8% was spent for repair work.

The following construction was reported as completed during the period covered by this report—55 concrete box culverts costing $22,541.46; 545 corrugated pipe culverts costing $5,229.45; 2 I-beam spans on concrete abutments costing $4,907.73; 26 miscellaneous structures costing $1,963.89.

IDA COUNTY.

Roads.

The total county road expenditure was $18,125.54. Of this amount, 7.5% or $1,365.74 was spent for permanent work; 26.5% or $4,757.90 was spent for repairs and maintenance; 24.3% or $4,416.10 was spent for filling bridges and culverts, and 10.3% or $1,868.59 was spent for constructing roads to natural grades; ¾ mile was constructed to temporary grade; 39 miles were constructed to natural grades. The average cost for repairs and maintenance was $27.20 per mile.

The total township road expenditure was $29,069.81.

Bridges.

The total expenditure for bridge work during the period covered by this report was $56,123.32, of which $26,205.89 or 46.7% was spent for permanent bridge work; $11,130.33 or 19.8% was spent for temporary bridge work; $16,134.09 or 28.7% was spent for repair work.

The following construction was reported as completed during the period covered by this report—27 concrete box culverts costing $10,398.78; 417 corrugated pipe culverts costing $9,037.09; 2 headwalls on culverts costing $312.02; 1 concrete slab bridge costing $2,764.06; 1 concrete deck girder costing $2,253.37; 1 I-beam span on piling costing $448.49; 2 I-beam spans on concrete abutments costing $1,760.35; 5 pony truss spans on concrete abutments costing $8,717.31; 1 wood pile bridge costing $1,644.75; miscellaneous construction costing $2,653.01.

IOWA COUNTY.

Roads.

The total county road expenditure was $37,757.63. Of this amount, 53.2% or $20,224.42 was spent for permanent work; 27.4% or $10,328.28 was spent for repairs and maintenance; 2.6% or $1,000.55 was spent for filling bridges and culverts; 14.2% or $5,340.17 was spent constructing roads to natural grades. 2.50 miles were constructed to permanent grades; 25 miles were constructed to temporary grades, and 30 miles were constructed to natural grades. The average cost for repairs and maintenance was $59.00 per mile.

The total township road expenditure was $48,029.83.

Bridges.

The total expenditure for bridge work during the period covered by this report was $78,260.32, of which $41,277.50 or 52.7% was spent for permanent bridge work; $12,391.08 or 15.8% was spent for temporary bridge work; $20,146.99 or 25.7% was spent for repair work.

The following construction was reported as completed during the period covered by this report—38 concrete box culverts costing $15,550.46; 1 circular concrete culvert costing $84.32; 500 corrugated pipe culverts costing $11,081.48; 2 concrete abutments costing $2,847.43; 2 retaining walls costing $727.40; 15 I-beam spans on concrete abutments costing $15,506.15; 1 pony truss span on piling costing $885.90; 1 pony truss span on concrete abutments costing $1,963.66; 1 high steel truss costing $4,658.08; 1 wood pile bridge costing $423.70.

JACKSON COUNTY.

Roads.

The total county road expenditure was $21,348.65. Of this amount only .2% or $52.00 was spent for permanent work. 97.3% or $20,788.10 was spent for repairs and maintenance. .2% or $45.50 was spent for filling bridges and culverts. The average cost of repairs and maintenance was $132.50 per mile.

Reports received from 5 of the 18 townships indicate a total township expenditure of $28,600.00.

Bridges.

The total expenditure for bridge work during the period covered by this report was $63,304.96, of which $27,390.17 or 43.3% was spent for permanent bridge work; $12,228.80 or 19.3% was spent for temporary bridge work; $22,688.94 or 35.8% was spent for repair work.

The following construction was reported as completed during the period covered by this report—16 concrete box culverts costing $9,204.89; 3 encased vitrified pipe culverts costing $543.31; 200 corrugated pipe culverts costing $4,822.60; 3 head walls on culverts costing $620.31; 1 masonry abutment costing $1,066.25; 11 I-beam spans on piling costing $4,614.37; 4 I-beam spans on concrete abutments costing $8,738.45; 4 pony truss spans on concrete abutments costing $7,216.96; 14 wood pile bridges costing $2,790.83; miscellaneous construction costing $997.05.

JASPER COUNTY.

Roads.

The total county road expenditure was $51,260.63. Of this amount, 40.3% or $20,733.89 was spent for permanent work; 34.5% or $17,682.44 was spent for repairs and maintenance; 22% or $11,280.97 was spent for filling bridges and culverts, and 2.8% or $1,450.83 was spent for constructing roads to natural grades. 9 miles were constructed to temporary grades; 15.5 miles were constructed to natural grades. The average cost for repairs and maintenance was $86.10.

The total township road expenditure was $55,069.42.

Bridges.

The total expenditure for bridge work during the period covered by this report was $98,544.00, of which $54,332.24 or 55.2% was spent for permanent bridg work; $22,920.57 or 23.3% was spent for temporary bridge work; $13,963.40 or 14.1% was spent for repair work.

The following construction was reported as completed during the period covered by this report—62 box culverts costing $21,543.31; 1 encased vitrified pipe culvert costing $442.49; 474 corrugated pipe culverts costing $12,826.46; 155 boiler pipe culverts costing $6,642.89; 8 cast iron pipe culverts costing $374.95; 4 head walls on culverts costing $789.27; 6 concrete slab bridges costing $10,350.37; 1 concrete through girder costing $2,203.30; 6 pony truss spans on concrete abutments costing $16,807.10; 1 high steel truss costing $2,196.40; 15 wood pile bridges costing $3,076.27; miscellaneous construction costing $5,302.55.

JEFFERSON COUNTY.

Roads.

The total county road expenditure was $25,236.92. Of this amount, .9% or $217.35 was spent for permanent work; 27.3% or $6,865.93 was spent for repairs and maintenance; 10.5% or $2,638.91 was spent for filling bridges and culverts; 47.2% or $11,856.19 was spent for constructing roads to natural grades. There were no roads constructed to permanent grades and no roads surfaced. 33.1 miles were crowned with the blade graders. The average cost for repairs and maintenance was $50.80 per mile.

The total township road expenditure was 32,823.37. Of this amount $6,747.12 was spent for building roads to natural grades; $5,658.17 was spent for filling bridges and culverts; $1,612.46 was spent for hauling and placing temporary culverts and $5,933.91 was spent for repairs.

Bridges.

The total expenditure for bridge work during the period covered by this report was $54,987.17, of which $31,218.10 or 56.4% was spent for permanent bridge work; $14,612.81 or 26.6% was spent for temporary bridge work; $7,108.69 or 12.8% was spent for repair work.

The following construction was reported as completed during the period covered by this report—75 concrete box culverts costing $19,029.97; 1 concrete pipe culvert costing $160.72; 1 encased vitrified pipe culvert costing $88.82; 468 corrugated pipe culverts costing $10,747.02; 14 boiler pipe culverts costing $774.15; 14 head walls on culverts costing $1,160.34; 2 I-beam spans on piling costing $686.60; 4 I-beam spans on concrete abutments, $4,201.70; 2 pony truss spans on piling costing $421.14; 2 pony truss spans on concrete abutments costing $6,737.27; 14 wood pile bridges costing $1,823.18; 5 miscellaneous structures costing $740.49.

JOHNSON COUNTY.

Roads.

The total county road expenditure was $40,358.98. Of this amount, 15.4% or $6,198.58 was spent for permanent work; 36.1% or $14,574.47 was spent for repairs and maintenance; 6.6% or $2,674.80 was spent for filling bridges and culverts. 3.5% or $1,430.88 was spent for constructing roads to natural grades. One mile was graded to temporary grade lines. 6.8 of a mile was graded to permanent grade line, and 0.6 of a mile was constructed to natural. No permanent surfacing work was done. The average of repair and maintenance was $93.00 per mile.

The total township road expenditure was $36,215.06. Of this amount, $25,039.36 was spent for repairs; $2,200.00 was spent for constructing roads to natural grades.

Bridges.

The total expenditure for bridge work during the period covered by this report was $130,349.92, of which $104,531.60 or 80.2% was spent for permanent bridge work; $5,694.71 or 4.4% was spent for temporary bridge work; $11,729.92 or 9% was spent for repair work.

The following construction was reported as completed during the period covered by this report—142 concrete box culverts costing $8,756.67; 482 corrugated pipe culverts costing $5,694.71; 4 head walls on culverts costing $476.55; 1 concrete slab bridge costing $643.67; 1 concrete arch costing $52,750; 1 concrete abutment costing $4,056.26; 17 I-Beam spans on concrete abutments costing $15,538.45; 1 pony truss on concrete abutments costing $2,310; 2 miscellaneous structures costing $78.94.

JONES COUNTY.

Roads.

The total county road expenditure was $36,104.18. Of this amount, 16.1% or $5,765.88 was spent for permanent work; 59% or $21,328.66 was spent for repairs and maintenance; 20.5% or $7,298.76 was spent for filling bridges and culverts. .7% or $265.34 was spent for constructing roads to natural grades. ½ mile was permanently graded; 0.2 of a mile was graded to temporary grade line; 0.1 of a mile was constructed to natural grades, and ½ mile was permanently surfaced. The average cost for repairs and maintenance ws $118.50 per mile.

The total township road expenditure was $24,635.42. Of this amount, $7,189.43 was spent for repairs; $2,280.98 was spent for filling bridges and culverts; $7,189.43 was spent for building roads to temporary grades and $4,129.54 was spent for building roads to permanent grades.

Bridges.

The total expenditure for bridge work during the period covered by this report was $32,501.52, of which $20,937.73 or 64.4% was spent for permanent bridge work; $2,111.77 or 6.5% was spent for temporary bridge work; $8,462.04 or 26% was spent for repair work.

The following construction was reported as completed during the period covered by this report—37 concrete box culverts costing $9,872.53; 18 corrugated pipe culverts costing $294.97; 2 masonry arch culverts costing $278.00 1 cast iron pipe culvert costing $294.00; 1 concrete abutment costing $841.00; 1 retaining wall costing $99.00; 1 masonry abutment costing $381.00; 1 I-beam span costing $1,610.00; 3 pony truss spans on concrete abutments costing $7,856.20; 7 wood pile bridges costing $1,522.80.

KEOKUK COUNTY.

Roads.

The total county road expenditure was $24,437.01. Of this amount, 14% or $3,420.00 was spent for permanent work; 45.9% or $11,201.50 was spent for repairs and maintenance; 8.2% or $1,990.84 was spent for filling bridges and culverts; 17.6% or $4,290.30 was spent for constructing roads to natural grades. 45 miles of road were constructed to natural grades and 2 miles were constructed to permanent grades. The average cost for repairs and maintenance was $66.70 per mile.

Reports received from 10 out of 17 townships indicate a total township expenditure of $31,240.00. Reports are not available showing the amount of work accomplished on the township road system.

Bridges.

The total expenditure for bridge work during the period covered by this report was $42,701.55, of which $22,540.83 or 52% was spent for permanent bridge work; $9,775.56 or 22.8% was spent for temporary bridge work; $9,568.75 or 22.6% was spent for repair work.

The following construction was reported as completed during the period covered by this report—2 concrete box culverts costing $22,290.77; 52 concrete pipe culverts costing $6,453.26; 1 encased vitrified pipe culvert costing $250.11; 197 corrugated pipe culverts costing $2,914.09; 1 pony truss span on concrete abutments costing $408.21; miscellaneous construction costing $816.00.

KOSSUTH COUNTY.

Roads.

The total county road expenditure was $49,893.46. Of this amount, 39.1% or $19,508.05 was spent for permanent work and 55.6% or $27,840.51 was spent for repairs and maintenance. There were 2 miles constructed to temporary grades and 5 miles constructed to permanent grades. The average cost for repairs and maintenance was $108.00 per mile.

No reports are available concerning the township work or expenditures.

Bridges.

The total expenditure for bridge work during the period covered by this report was $98,080.79, of which $40,025.37 or 40.8% was spent for permanent bridge work; $7,861.22 or 8% was spent for temporary bridge work; $30,977.89 or 31.5% was spent for repair work.

The following construction was reported as completed during the period covered by this report—20 concrete box culverts costing $9,471.66; 22 encased vitrified pipe culverts costing $1,904.30; 824 corrugated pipe culverts costing $7,861.22; 10 concrete slab bridges costing $14,401.88; 3 concrete through girders costing $9,564.85; 2 concrete deck girders costing $4,682.68.

LEE COUNTY.

Roads.

The total county road expenditure is $19,574.13. Of this amount, 4.5% or $891.50 was spent for permanent work; 54.6% or $10,701.59 was spent for repairs and maintenance; 1.4% or $265.85 was spent for filling bridges and culverts, and 29.6% or $5,787.79 was spent for constructing roads to natural grades. One mile was permanently surfaced. 30.50 miles were constructed to natural grades. The average cost of repairs and maintenance was $68.00 per mile.

The total township road expenditure was $28,770.81. Of this amount, $17,154.85 was spent for repairs; $941.83 was spent for hauling and placing temporary culverts; $1,229.95 was spent for filling bridges and culverts; $1,275.58 was spent for permanent surfacing; $1,663.87 was spent for constructing roads to natural grades, and $762.90 was spent for permanent grading.

Bridges.

The total expenditure for bridge work during the period covered by this report was $63,180.30, of which $31,688.91 or 50.1% was spent for permanent bridge work; $521.20 or .9% was spent for temporary bridge work; $8,638.18 or 13.6% was spent for repair work.

The following construction was reported as completed during the period covered by this report—17 concrete box culverts costing $9,787.58; 2 boiler pipe culverts costing $150.00; 1 head wall on culvert costing $70.75; 1 concrete slab bridge costing $818.72; 1 concrete deck girder costing $6,803.97; 1 I-beam span on concrete abutments costing $1,413.32; 4 pony truss spans on concrete abutments costing $12,794.57; 1 wood pile bridge costing $401.20.

LINN COUNTY.

Roads.

The total county road expenditure was $26,154.44. Of this amount, 41.6% or $10,925.78 was spent for permanent work; 45.4% or $11,982.18 was spent for repairs and maintenance; 1.7% or $444.83 was spent for filling bridges and culverts and 3.9% or $1,029.82 was spent for constructing roads to natural grades. 0.8 mile was built to permanent grade and 2.6 miles were built to temporary grades. 1.25 miles were permanently surfaced and 6.25 miles were constructed to natural grades. The average cost for repairs and maintenance was $59.50 per mile.

Reports are not available showing the total township road expenditure.

Bridges.

The total expenditure for bridge work during the period covered by this report was $74,525.37, of which $62,658.68 or 84.2% was spent for permanent bridge work; $4,559.05 or 6% was spent for temporary bridge work; $6,519.54 or 8.7% was spent for repair work.

The following construction was reported as completed during the period covered by this report—95 concrete box culverts costing $20,587.40; 15 circular concrete culverts costing $1,226.69; 1 encased vitrified pipe culvert costing $52.55; 191 corrugated pipe culverts costing $4,046.50; 1 head wall on culvert costing $422.50; 1 concrete slab bridge costing $689.50; 1 concrete arch bridge costing $541.50; 4 concrete abutments costing $2,430.75; 1 concrete deck girder costing $1,522.49; 1 retaining wall costing $219.75; 2 I-beam spans on concrete abutments costing $2,675.50; 9 pony truss spans on concrete abutments costing $26,055.60; 1 high steel truss costing $6,567; 2 wood pile bridges costing $460.00; miscellaneous construction costing $788.00.

LOUISA COUNTY.

Roads.

The total county road expenditure was $15,716.90. Of this amount, 28.7% or $4,514.00 was spent for permanent work. 43.3% or $6,831.28 was spent for repairs and maintenance; 1.2% or $194.80 was spent for filling bridges and culverts; 15.6% or $2,445.59 was spent for constructing roads to natural grade. 1.50 miles were constructed to temporary grade; 1.50 miles were constructed to permanent grade. 51 miles were constructed to natural grade. The average cost for repairs and maintenance was $59.80 per mile.

No reports are available showing total township road expenditures.

Bridges.

The total expenditure for bridge work during the period covered by this report was $41,511.89, of which $20,356.36 or 49% was spent for permanent bridge construction; $5,003.63 or 12% was spent for temporary bridge work; $7,624.46 or 18.3% was spent for repair work.

The following construction was reported as completed during the period covered by this report—29 concrete box culverts costing $9,270.59; 2 concrete pipe culverts costing $272.83; 24 encased vitrified pipe culverts costing $3,268.05; 250 corrugated pipe culverts costing $4,730.80; 1 head wall on culvert costing $37.07; 2 concrete abutments costing $1,943.15; 7 I-beam spans on concrete abutments costing $5,737.50; 11 miscellaneous structures costing $7,375.23.

LUCAS COUNTY.

Roads.

The total county road expenditure was $24,430.32. Of this amount, 46.3% or $11,329.91 was spent for repairs and maintenance. 20.6% or $5,043.55 was spent for filling bridges and culverts. There was no permanent grading work done, and no surfacing. The average cost for repairs and maintenance was $80.40 per mile.

The reports received from eleven out of twelve townships indicate a total expenditure of $20,100.00.

Bridges.

The total expenditure for bridge work during the period covered by this report was $45,078.34, of which $17,781.57 or 39.6% was spent for permanent bridge work; $10,568.36 or 23.4% was spent for temporary bridge work; $3,712.30 or 8.2% was spent for repair work.

The following construction was reported as completed during the period covered by this report—17 concrete box culverts costing $8,819.22; 4 circular concrete culverts costing $414.35; 478 corrugated pipe culverts costing $8,076.10; 15 boiler pipe culverts costing $816.40; 48 cast iron pipe culverts costing $1,681.86; 1 deck girder costing $3,127.20; 1 pony truss span on concrete abutments costing $5,420.80; miscellaneous construction costing $232.70.

LYON COUNTY.

Roads.

The total county road expenditure was $32,376.00. Of this amount, 1.5% or $476.90 was spent for permanent work; 52.6% or $17,019.49 was spent for repairs and maintenance; 28.4% or $9,229.38 was spent for filling bridges and culverts; 12% or $3,913.00 was spent for constructing roads to natural grade. 2 miles were constructed to temporary grade and 54 miles were constructed to natural grades. The average cost for repairs and maintenance was $90.70 per mile.

No reports are available showing the township road expenditure.

Bridges.

The total expenditure for bridge work during the period covered by this report was $56,842.08, of which $40,146.28 or 70.6% was spent for permanent bridge work; $5,650.15 or 9.9% was spent for temporary bridge work; $9,232.27 or 16.2% was spent for repair work.

The following construction was reported as completed during the period covered by this report—57 concrete box culverts costing $23,327.05; 1 encased vitrified pipe culvert costing $23.07; 182 corrugated pipe culverts costing $5,650.15; 3 I-beam spans on concrete abutments costing $2,882.89; 2 pony truss spans on concrete abutments costing $9,500.00; 1 high steel truss costing $4,413.37; miscellaneous construction costing $1,813.28.

MADISON COUNTY.

Roads.

The total county road expenditure was $25,873.54. Of this amount, 8.5% or $2,190.33 was spent for permanent work; 68.3% or $17,706.50 was spent for repairs and maintenance; 10.4% or $2,735.60 was spent for filling bridges and culverts; 4.4% or $1,130.30 was spent for constructing roads to natural grade. ¾ mile was constructed to permanent grade; 0.4 mile was constructed to temporary grade; 17.50 miles were constructed to natural grade. No permanent surfacing was done. Average cost of repairs and maintenance was $107.50 per mile.

Reports from 12 out of 16 townships indicate a township expenditure of $38,800.00. Complete reports are not available showing the amount of work accomplished on township road system.

Bridges.

The total expenditure for bridge work during the period covered by this report was $52,210, of which $16,075.06 or 30.8% was spent for permanent bridge work; $10,929.96 or 20.9% was spent for temporary bridge work; $22,503.04 or 43.2% was spent for repair work.

The following construction was reported as completed during the period covered by this report—26 concrete box culverts costing $9,678.66; 237 corrugated pipe culverts costing $6,448.77; 1 boiler pipe culvert costing $457.42; 1 I-beam span on concrete abutments costing $1,114; 1 pony truss span on concrete abutments costing $5,282.40; 15 wood pile bridges costing $4,023.77.

MAHASKA COUNTY.

Roads.

The total county road expenditure was $41,546.53. Of this amount, 11.7% or $4,840.65 was spent for permanent work; 19.3% or $8,004.49 was spent for repairs and maintenance; 59% or $24,536.34 was spent for constructing roads to natural grades. One mile was built to temporary grade; 31 miles were constructed to natural grade. No permanent surfacing was done. The average cost for repairs and maintenance was $61.00 per mile.

The total township road expenditure was $19,351.10. Of this amount, $5,128.98 was spent for repairs; $5,968.36 was spent for filling bridges and culverts; $1,288.48 was spent for hauling and placing temporary culverts, and $6,115.24 was spent for constructing roads to temporary grades.

Bridges.

The total expenditure for bridge work during the period covered by this report was $73,116.24, of which $46,709.00 or 64% was spent for permanent bridge work; $13,915.95 or 19% was spent for temporary bridge work; $12,491.29 or 17% was spent for repair work.

The following construction was reported as completed during the period covered by this report—39 concrete box culverts costing $24,246.26; 265 corrugated pipe culverts costing $6,000.00; 195 boiler pipe culverts costing $7,915.95; 17 head walls on culverts costing $5,618.74; 1 concrete slab bridge costing $1,165.15; 1 concrete deck girder costing $3,456.39; 8 I-beam spans on concrete abutments costing $12,222.46.

MARION COUNTY.

Roads.

The total county road expenditure was $65,830.96. Of this amount, 16.8% or $11,057.59 was spent for permanent work; 14% or $9,263.15 was spent for repairs and maintenance; 8.8% or $5,761.34 was spent for filling bridges and culverts; 41.5% or $27,362.01 was spent for constructing roads to natural grade. 1.35 miles were permanently graded; 0.8 mile was constructed to temporary grade; 136 miles were constructed to natural grade. The average cost for repairs and maintenance was $54.40.

The total township road expenditure was $38,702.50. Of this amount, $22,402.50 was spent for repairs; $8,000.00 was spent for hauling and placing temporary culverts; $5,500 was spent for filling bridges and culverts, and $800 was spent for tile drainage.

Bridges.

The total expenditure for bridge work during the period covered by this report was $141,160.84, of which $90,980.22 or 64.4% was spent for permanent bridge work; $29,219.96 or 20.7% was spent for temporary bridge work; $20,961.66 or 14.8% was spent for repair work.

The following construction was reported as completed during the period covered by this report—105 concrete box culverts costing $52,283.95; 1,215 corrugated pipe culverts costing $26,834.63; 4 boiler pipe culverts costing $274.08; 3 cast iron pipe culverts costing $232.86; 20 I-beam spans on concrete abutments costing $29,884.84; 2 pony truss spans on piling costing $1,534.40; 3 pony truss spans on concrete abutments costing $8,811.43; 2 wood pile bridges costing $243.99.

MARSHALL COUNTY.

Roads.

The total county road expenditure was $28,258.14. Of this amount, 24½% or $6,903.54 was spent for permanent work; 36.3% or $10,269.76 was spent for repairs and maintenance; 15.2% or $4,309.89 was spent for filling bridges and culverts; 7.2% or $2,051.23 was spent for constructing

roads to natural grade. 0.85 mile was constructed to permanent grade; ¼ of a mile was constructed to temporary grade; 5 miles were constructed to natural grade. There was no permanent surfacing done. The average cost for repairs and maintenance was $95.90 per mile.

The total township road expenditure was $36,601.52. No reports are available showing the amount of work accomplished on the township road system.

Bridges.

The total expenditure for bridge work during the period covered by this report was $51,330.65, of which $21,437.20 or 41.7% was spent for permanent bridge work; $12,122.56 or 23.6% was spent for temporary bridge work; $12,111.00 or 23.6% was spent for repair work.

The following construction was reported as completed during the period covered by this report—28 concrete box culverts costing $10,394.46; 2 circular concrete culverts costing $547.84; 144 corrugated pipe culverts costing $10,917.44; 11 cast iron pipe culverts costing $950.68; 1 concrete slab bridge costing $3,533.40; 2 concrete deck girders costing $4,736.50; 1 pony truss on concrete abutments costing $2,225; 2 wood pile bridges costing $254.44; miscellaneous construction costing $35.00.

MILLS COUNTY.

Roads.

The total county road expenditure was $26,985.06. Of this amount, 35.5% or $9,571.39 was spent for permanent work; 13.7% or $3,706.82 was spent for repairs and maintenance; 15.7% or $4,245.50 was spent for filling bridges and culverts; 16.6% or $4,485.21 was spent for constructing roads to natural grade. 3 miles were permanently graded; 8 miles were constructed to temporary grade; 33.50 miles were constructed to natural grade. There was no permanent surfacing done. The average cost of repairs and maintenance was $32.80 per mile.

The total township road expenditure was $30,403.50. Of this amount, $15,000.00 was spent for repairs; $5,122.36 was spent for constructing roads to natural grade; $3,083.95 was spent for filling bridges and culverts, and $1,114.14 was spent for hauling and placing temporary culverts.

Bridges.

The total expenditure for bridge work during the period covered by this report was $59,492.56, of which $25,433.54 or 42.7% was spent for permanent bridge work; $23,229.48 or 39.2% was spent for temporary bridge work; $9,975.38 or 16.8% was spent for repair work.

The following construction was reported as completed during the period covered by this report—27 concrete box culverts costing $18,182.35; 9 circular concrete culverts costing $1,694.86; 3 concrete arch culverts costing $1,150.41; 11 concrete pipe culverts costing $1,184.93; 78 corrugated pipe culverts costing $5,035.63; 28 boiler pipe culverts costing $2,892.80; 7 head walls on culverts costing $695.98; 2 steel girders costing $990.62; 1 pony truss span on piling costing $981.49; 1 pony truss on concrete abutments costing $2,719.32; 28 wood pile bridges costing $13,134.63; miscellaneous construction costing $322.90.

MITCHELL COUNTY.

Roads.

The total county road expenditure was $23,863.42. Of this amount, 53.4% or $12,736.87 was spent for permanent work; 25.1% or $6,011.04 was spent for repairs and maintenance; 1.7% or $289.00 was spent for constructing roads to natural grade. 7 miles were constructed to natural grade; 26.5 miles were constructed to temporary grade; 15.75 miles were surfaced with gravel. The average cost for repairs and maintenance was $48.00 per mile.

Reports received from 10 of the 16 townships indicate a total township road expenditure of $25,400.00. No information is available as to the amount of work accomplished on the township road system.

Bridges.

The total expenditure for bridge work during the period covered by this report was $55,916.07, of which $30,875.63 or 55.2% was spent for permanent bridge construction; $4,841.31 or 8.7% was spent for temporary bridge construction; $10,411.12 or 18.6% was spent for repair work.

The following construction was reported as completed during the period covered by this report—97 concrete box culverts costing $17,063.25; 363 corrugated pipe culverts costing $4,841.31; 1 concrete slab bridge costing $700.96; 9 I-beam spans on concrete abutments costing $6,625.72; 2 pony truss spans on concrete abutments costing $6,485.70; 2 miscellaneous structures costing $5,802.80.

MONONA COUNTY.

Roads.

The total county road expenditure was $41,308.62. Of this amount, 8% or $3,285.40 was spent for permanent work; 35.6% or $14,716.04 was spent for repairs and maintenance, and 3.6% or $1,482.80 was spent for filling bridge and culverts; 2.50 miles were constructed to temporary grade. The average cost for repairs and maintenance was $4.10 per mile.

Reports received from 6 of the 19 townships indicate a total township expenditure of $36,100.00. No information is available showing the amount of work accomplished on the township road system.

Bridges.

The total expenditure for bridge work during the period covered by this report was $57,637.89, of which $12,457.69 or 21.6% was spent for permanent bridge work; $16,229.34 or 28% was spent for temporary bridge work; $10,998.87 or 19.1% was spent for repair work.

The following construction was reported as completed during the period covered by this report—19 concrete box culverts costing $3,605.48; 10 circular concrete culverts costing $2,439.11; 236 corrugated pipe culverts costing $6,679.67; 24 boiler pipe culverts costing $1,527.40; 6 head walls on culverts costing $307.78; 1 concrete deck girder costing $2,747.88; 31 I-beam spans on piling costing $6,658.94; 2 pony truss spans on piling costing $1,159.64; 1 pony truss on concrete abutments costing $3,357.44; 2 wood pile bridges costing $203.69; 3 miscellaneous structures costing $8,255.

MONROE COUNTY.

Roads.

The total county road expenditure was $18,773.65. Of this amount, 22.9% or $4,301.15 was spent for permanent work; 44.5% or $8,361.84 was spent for repairs and maintenance, and 19.7% or $3,710.65 was spent for filling bridges and culverts. 1.12 miles were constructed to temporary grade. The average cost for repairs and maintenance was $55.40 per mile.

No reports are available showing the total township road expenditure.

Bridges.

The total expenditure for bridge work during the period covered by this report was $47,641.77, of which $17,606.00 or 37% was spent for permanent bridge work; $17,467.89 or 36.6% was spent for temporary bridge work; $8,667.66 or 18.1% was spent for repair work.

The following construction was reported as completed during the period covered by this report—13 concrete box culverts costing $8,195.77; 52 concrete pipe culverts costing $2,150; 630 corrugated pipe culverts costing $12,711.89; 1 boiler pipe costing $99.00; 4 masonry box culverts costing $1,290.82; 1 retaining wall costing $335.91; 1 I-beam span on concrete abutments costing $1,289.80; 4 pony truss spans on concrete abutments costing $6,493.70; 10 wood pile bridges costing $2,507; miscellaneous construction costing $3,635.22.

MONTGOMERY COUNTY.

Roads.

The total county road expenditure was $14,712.41. Of this amount, 24.5% or $3,611.60 was spent for permanent work; 46.6% or $6,860.59 was spent for repairs and maintenance; 14.2% or $2,093.00 was spent for filling bridges and culverts, and 1.7% or $253.11 was spent for constructing roads to natural grade. 1.58 miles were constructed to temporary grade; 3 miles were constructed to natural grade. The average cost for repairs and maintenance was $50.50 per mile.

Reports received from 5 of the 12 townships indicate a total township expenditure of $22,800.00. No information is available showing the amount of work accomplished on the township road system.

Bridges.

The total expenditure for bridge work during the period covered by this report was $53,199.20, of which $33,157.51 or 62.4% was spent for permanent bridge work; $6,514.37 or 12.4% was spent for temporary bridge work; $10,388.25 or 19.5% was spent for repair work.

The following construction was reported as completed during the period covered by this report—20 concrete box culverts costing $12,040.50; 100 concrete pipe culverts costing $4,186.30; 75 corrugated pipe culverts costing $1,852.94; 12 boiler pipe culverts costing $575.13; 65 head walls on culverts costing $4,892.11; 1 concrete slab bridge costing $1,392.88; 2 concrete abutments costing $1,093.70; 2 I-beam spans on concrete abutments costing $4,920.53; 2 pony trusses on concrete abutments costing $8,817.79; miscellaneous construction costing $3,029.07.

MUSCATINE COUNTY.

Roads.

The total county road expenditure was $25,852.21. Of this amount, 25.4% or $10,158.53 was spent for permanent work; 34.2% or $8,846.81 was spent for repairs and maintenance; 6% or $1,535.91 was spent for filling bridges and culverts; 20.3% or $5,212.18 was spent for constructing roads to natural grades. 46 miles were constructed to temporary grades; ¾ of a mile was built to permanent grade; 2.33 miles were surfaced with gravel. The average cost for repairs and maintenance was $65.00 per mile.

The total township road expenditure was $28,754.30. Of this amount, $8,200.66 was spent for repairs; $4,722.46 was spent for constructing roads to natural grades; $1,243.36 was spent for filling bridges and culverts, and $947.55 was spent for hauling and placing temporary culverts.

Bridges.

The total expenditure for bridge work during the period covered by this report was $35,197.56, of which $18,454.74 or 52.6% was spent for permanent bridge work; $8,678.26 or 24.6% was spent for temporary bridge work; $5,267.64 or 15% was spent for repair work.

The following construction was reported as completed during the period covered by this report—61 concrete box culverts costing $16,393.65; 1 circular concrete culvert costing $38.16; 17 concrete pipe culverts costing $1,015.53; 3 encased vitrified pipe culverts costing $419.30; 387 corrugated pipe culverts costing $6,766.25; 15 boiler pipe culverts costing $896.48; 4 head walls on culverts costing $265.47; 1 concrete abutment costing $168.82; 1 retaining wall costing $62.99; 1 pony truss on concrete abutments costing $1,106.35; 7 miscellaneous structures costing $2,028.39.

O'BRIEN COUNTY.

Roads.

The total county road expenditure was $30,834.95. Of this amount, 39.7% or $12,236.44 was spent for permanent work; 28.6% or $8,821.26 was spent for repairs and maintenance; 11.2% or $3,432.08 was spent for filling bridges and culverts; 12.8% or $3,950.98 was spent for constructing roads to natural grade. 7 miles were constructed to permanent grade; 2.25 miles were constructed to temporary grade; 31 miles were constructed to natural grade. The average cost of repairs and maintenance was $48.40 per mile.

Reports received from 16 out of 17 townships indicate a total township road expenditure of $43,436.00. Of this amount, $11,676.97 was spent for repairs; $3,423.07 was spent for filling bridges and culverts; $1,074.36 was spent for constructing roads to natural grades, and $423.00 was spent for hauling and placing temporary culverts.

Bridges.

The total expenditure for bridge work during the period covered by this report was $72,451.83, of which $60,147.80 or 83% was spent for permanent bridge work; $3,405.40 or 4.8% was spent for temporary bridge work; $8,898.63 or 12.3% was spent for repair work.

The following construction was reported as completed during the period covered by this report—176 concrete box culverts costing $41,751.05; 19 circular concrete culverts costing $1,172.37; 2 encased vitrified pipe culverts costing $85.47; 195 corrugated pipe culverts costing $3,495.40; 5 head walls on culverts costing $249.78; 1 concrete slab bridge costing $1,763.40; 1 retaining wall costing $46.15; 3 I-beam spans on concrete abutments costing $1,998; 5 pony trusses on concrete abutments costing $13,081.38.

OSCEOLA COUNTY.

Roads.

The total county road expenditure was $13,527.09. Of this amount, 19.6% or $2,643.50 was spent for permanent work; 34.1% or $4,633.62 was spent for repairs and maintenance; 7.4% or $1,000.00 was spent for filling bridges and culverts; 31.8% or $4,289.84 was spent for constructing roads to natural grade. Ten miles were constructed to temporary grade; 39.25 miles were constructed to natural grade. No roads were constructed to permanent grade and no permanent surfacing was done. The average cost for repairs and maintenance was $42.10 per mile.

Reports received from 10 out of 12 townships indicate a total township road expenditure of $23,630.00. No information is available showing the amount of work accomplished on the township road system.

Bridges.

The total expenditure for bridge work during the period covered by this report was $29,662.58, of which $11,491.12 or 38.8% was spent for permanent bridge work; $4,294 or 14.5% was spent for temporary bridge work; $9,108.26 or 30.7% was spent for repair work.

The following construction was reported as completed during the period covered by this report—21 concrete box culverts costing $4,789.52; 47 concrete pipe culverts costing $4,294; 1 concrete slab bridge costing $735; 2 pony truss spans on concrete abutments costing $5,957.60.

PAGE COUNTY.

Roads.

The total county road expenditure was $56,038.46. Of this amount 46.4% or $26,002.96 was spent for permanent work; 2.3% or $1,296.33 was spent for constructing roads to natural grade. 20.4% or $11,339.92 was spent for repairs and maintenance, and 8.9% or $4,969.42 was spent for filling bridges and culverts. 55 miles were constructed to temporary grade and 8 miles were constructed to natural grades. There were no roads constructed to permanent grade and no permanent surfacing done. The average cost of repairs and maintenance was $64.80. The total township road expenditures was $36,962.94. Of this amount $22,352.94 was spent for repairs; $1,527.15 was spent for filling bridges and culverts; $894.55 was spent for constructing roads to natural grade, and $7,638.51 was spent for dragging.

Bridges.

The total expenditure for bridge work during the period covered by this report was $80,710.29, of which $28,271.39 or 35% was spent for permanent bridge work; $17,017.57 or 21% was spent for temporary bridge work; $32,279.90 or 39.9% was spent for repair work.

The following construction was reported as completed during the period covered by this report—31 concrete box culverts costing $26,841.86; 1 concrete arch culvert costing $2,706.32; 18 concrete pipe culverts costing $1,447.99; 146 encased vitrified pipe culverts costing $1,369.64; 193 corrugated pipe culverts costing $4,680.26; 26 boiler pipe culverts costing $2,295.66; 52 cast iron pipe culverts costing $4,545.62; 1 head wall on culvert costing $152.56; 3 pony truss spans on wood pile bridges costing $1,589.32; 2 high steel trusses costing $3,261.01; wood pile bridge costing $2,478.72 miscellaneous construction costing $3,141.43.

PALO ALTO COUNTY.

Roads.

The total county road expenditures were $25,871.82. Of this amount 62.5% or $16,158.33 was spent for permanent work; 32.1% or $8,310.77 was spent for repairs and maintenance; 1.7% or $488.40 was spent for filling bridges and culverts; 2.7% or $712.73 was spent for constructing roads to natural grade. 7.75 miles were constructed to permanent grade; 3.4 miles were constructed to temporary grade; 7.50 miles were constructed to natural grade; 1.4 miles were permanently surfaced. The average cost for repairs and maintenance was $53.80 per mile.

The total township road expenditure was $32,542.10. Of this amount $18,584.14 was spent for repairs; $4,048.99 was spent for tile drainage; $2,085.81 was spent for constructing roads to permanent grades; $1,094.43 was spent for constructing roads to natural grades, and $923.60 was spent for filling bridges and culverts.

Bridges.

The total expenditure for bridge work during the period covered by this report was $43,287.51, of which $26,197.84 or 60.5% was spent for permanent bridge work; $9,273.73 or 21.5% was spent for temporary bridge work; $7,815.94 or 18% was spent for repair work.

The following construction was reported as completed during the period covered by this report: 40 concrete box culverts costing $13,216.95; 4 circular concrete culverts costing $488.91; 339 corrugated pipe culverts costing $4,973.88; 1 head wall on culvert costing $81.51; 2 concrete slab bridges costing $3,000.02; 3 I-beam spans on concrete abutments costing $4,357.70; 2 pony truss spans on piling costing $2,590.90; 2 pony truss spans on concrete abutments costing $5,052.75; 5 wood pile bridges costing $1,708.95.

POLK COUNTY.

Roads.

The total county expenditure was $48,589.29. Of this amount 20.8% or $10,103.81 was spent for permanent work; 28.3% or $13,760.71 was spent for repairs and maintenance; 17.1% or $8,304.69 was spent for

filling bridges and culverts; 12.1% or $5,905.95 was spent for constructing roads to natural grades. ½ mile of road was constructed to permanent grade; 84.75 miles were constructed to natural grades; 2.5 miles were surfaced with gravel. The average cost of repairs and maintenance was $72.70 per mile.

Reports received from 18 out of 22 townships indicate a total township road expenditure of $46,500.00. The township reports regarding the work accomplished are not complete.

Bridges.

The total expenditure for bridge work during the period covered by this report was $138,122.22, of which $74,808.24 or 54.2% was spent for permanent bridge work; $12,268.85 or 8.8% was spent for temporary bridge work; $35,107.60 or 24.6% was spent for repair work.

The following construction was reported as completed during the period covered by this report—38 concrete box culverts costing $21,589.03; 1 circular concrete culvert costing $150; 7 concrete arch culverts costing $8,893.20; 481 corrugated pipe culverts costing $8,944.20; 55 boiler culverts costing $3,324.65; 5 head walls on culverts costing $1,196.57; 7 concrete slab bridges costing $13,643.75; 2 concrete arch bridges costing $9,357.84; 1 concrete thru girder costing $2,349.30; 2 concrete deck girders costing $9,249.40; 3 retaining walls costing $477.50; 1 pony truss span on concrete abutments costing $3,850; 1 high steel truss costing $4,051.65; miscellaneous construction costing $296.00.

POTTAWATTAMIE COUNTY.

Roads.

The total county expenditure was $89,709.49. Of this amount 42.6% or $38,150.95 was spent for permanent work; 26.9% or $24,148.64 was spent for repairs and maintenance; 6.8% or $6,081.51 was spent for filling bridges and culverts; 13.7% or $12,270.15 was spent for constructing roads to natural grades. 4.5 miles were constructed to permanent grades; 13 miles were constructed to temporary grades; 105.75 miles were constructed to natural grades. One mile was surfaced. The average cost of repairs and maintenance was $86.20.

No reports are available concerning the township road work.

Bridges.

The total expenditure for bridge work during the period covered by this report was $157,626.65, of which $65,518.42 or 41.7% was spent for permanent bridge work; $38,287.23 or 24.3% was spent for temporary bridge work; $38,489.36 or 24.5% was spent for repair work.

The following construction was reported as completed during the period covered by this report—21 concrete box culverts costing $19,801.91; 104 concrete pipe culverts costing $5,828.89; 13 encased vitrified pipe culverts costing $172.15; 191 corrugated pipe culverts costing $6,441.29; 42 boiler pipe culverts costing $5,592.22; 4 cast iron pipe culverts costing $1,179.80; 121 head walls on culverts costing $17,571.62; 3 concrete slab bridges costing $1,646.31. 1 concrete deck girder costing $4,662.14; 1 retaining wall costing $536.12; 2 I-beam spans on piling costing $746.52; 3 I-beam spans on concrete abutments costing $6,408.90; 1 steel girder costing $3,069.01; 7 pony truss spans on piling costing $8,809.61; 4 pony truss spans on concrete abutments costing $8,922.73; 1 high steel truss costing $2,727.53; 36 wood pile bridges costing $10,697.90; miscellaneous construction costing $4,334.70.

PLYMOUTH COUNTY.

Roads.

The total county road expenditure was $24,880.44. Of this amount 5.1% or $1,261.65 was spent for permanent work; 57.1% or $14,213.23 was spent for repairs and maintenance; 35.9% or $8,923.76 was spent for constructing roads to natural grades. One mile was constructed to temporary grade. There was no permanent work or surfacing done. The average cost for repairs and maintenance was $78.80 per mile.

The total township road expenditure was $44,474.04.

Bridges.

The total expenditure for bridge work during the period covered by this report was $94,597.82, of which $37,215.15 or 39.4% was spent for permanent bridge work; $23,240.75 or 24.6% was spent for temporary bridge work; $12,140.68 or 12.8% was spent for repair work.

The following construction was reported as completed during the period covered by this report—39 concrete box culverts costing $14,478.66; 611 corrugated pipe culverts costing $11,290.85; 7 concrete slab bridges costing $9,804.77; 1 concrete thru girder costing $960.41; 2 I-beam spans on concrete abutments costing $4,013.79; 3 pony truss spans on concrete abutments costing $4,013.79; 3 pony truss spans on concrete abutments costing $7,957.52; 66 wood pile bridges costing $11,836.50; miscellaneous construction costing $113.40.

POCAHONTAS COUNTY.

Roads.

The total county road expenditure was $63,745.64. Of this amount 45.1% or $28,676.31 was spent for permanent work; 13.9% or $8,847.06 was spent for repairs and maintenance; 2.7% or $1,730.10 was spent for constructing roads to natural grades; 17 miles were built to permanent grades; 30 miles were constructed to temporary grades; 43 miles were constructed to natural grades; 2.5 miles were surfaced with gravel. The average cost for repairs and maintenance was $57.00 per mile.

Reports received from 17 out of 19 townships indicated a total road expenditure of $55,000.00. Reports are not complete as to the amount of work accomplished on the township road system.

Bridges.

The total expenditure for bridge work during the period covered by this report was $83,732.87, of which $56,799.18 or 68.2% was spent for permanent bridge work; $8,673.04 or 10.4% was spent for temporary bridge work; $16,841.12 or 20.1% was spent for repair work.

The following construction was reported as completed during the period covered by this report—42 concrete box culverts costing $9,-

622.31; 6 circular concrete culverts costing $790.86; 814 corrugated pipe culverts costing $8,334.96; 4 I-beam spans on concrete abutments costing $5,485.40; 17 pony truss spans on concrete abutments costing $32,829.19; 1 high steel truss costing $8,080.44; 1 wood pile bridge costing $338.06.

POWESHIEK COUNTY.

Roads.

The total county road expenditure was $38,513.44. Of this about 28.3% or $10,852.60 was spent for permanent work; 28.1% or $10,812.37 was spent for repairs and maintenance; 7.2% or $2,772.91 was spent for filling bridges and culverts; 21.9% or $8,453.53 was spent for constructing roads to natural grade. 1.75 miles were constructed to permanent grade. No permanent surfacing was done. Average cost for repairs and maintenance was $72.00.

No reports are available concerning the township road work.

Bridges.

The total expenditure for bridge work during the period covered by this report was $81,454.42, of which $33,029.80 or 40.5% was spent for permanent bridge work; $15,837.65 or 19.4% was spent for temporary bridge work; $16,186.18 or 19.8% was spent for repair work.

The following construction was reported as completed during the period covered by this report—26 concrete box culverts costing $15,633.95; 2 encased vitrified pipe culverts costing $262.73; 315 corrugated pipe culverts costing $6,571.72; 118 boiler pipe culverts costing $5,073.64; 39 cast iron pipe culverts costing $1,469.55; 7 head walls on culverts costing $291.07; 7 I-beam spans on concrete abutments costing $8,037.99; 1 steel girder costing $2,460.49; 3 pony truss spans on concrete abutments costing $6,543.57; 20 wood pile bridges costing $2,722.74; miscellaneous construction costing $8,113.91.

RINGGOLD COUNTY.

Roads.

The total county road expenditure was $23,144.60. Of this amount, 52% or $12,022.60 was spent for repairs and maintenance; 48% or $11,122.00 was spent for filling bridges and culverts. There was no permanent grading done and no roads constructed to natural grade. The average cost for repairs and maintenance was $68.75 per mile.

No reports are available concerning the township road work.

Bridges.

The total expenditure for bridge work during the period covered by this report was $42,287.71, of which $13,376.00 or 31.6% was spent for permanent bridge work; $8,575.40 or 20.3% was spent for temporary bridge work; $6,941.71 or 16.4% was spent for repair work.

The following construction was reported as completed during the period covered by this report—32 concrete box culverts costing $7,360.90; 107 corrugated pipe culverts costing $4,215.00; 1 cast iron pipe culvert costing $258.00; 4 head walls on culverts costing $250.00; 8 I-beam spans on concrete abutments costing $5,765.10; 32 wood pile bridges costing $4,102.40.

SAC COUNTY.

Roads.

The total county road expenditure was $51,592.69. Of this amount, 67.1% or $34,624.92 was spent for permanent work; 13.9% or $7,187.37 was spent for repairs and maintenance; 0.4% or $213.75 was spent for filling bridges and culverts; 0.1% or $75.50 was spent for constructing roads to natural grade. 25.3 miles were constructed to permanent grade, one mile was constructed to natural grade, and 16.14 miles were surfaced with gravel. The average cost of repairs and maintenance was $48.60 per mile.

Reports received from 12 of 16 townships indicate a total township road expenditure of $50,000.00.

Bridges.

The total expenditure for bridge work during the period covered by this report was $62,812.45, of which $39,882.36 or 63.5% was spent for permanent bridge work; $2,785.79 or 4.4% was spent for temporary bridge work; $10,155.28 or 16% was spent for repair work.

The following construction was reported as completed during the period covered by this report—81 concrete box culverts costing $16,444.36; 92 concrete arch culverts costing $5,745.58; 84 encased vitrified pipe culverts costing $4,665.71; 154 corrugated pipe culverts costing $1,876.53; 25 head walls on culverts costing $722.54; 5 I-beams on piling costing $715.14; 9 I-beam spans on concrete abutments costing $5,890.89; 2 pony truss spans on concrete abutments costing $6,413.28; 1 wood pile bridge costing $194.12; miscellaneous construction costing $197.31.

SCOTT COUNTY.

Roads.

The total county road expenditure was $39,393.50. Of this amount, 26.7% or $10,521.41 was spent for permanent work; 35.5% or $14,010.18 was spent for repairs and maintenance; 6.3% or $2,509.75 was spent for constructing roads to natural grade. 4 miles were constructed to permanent grade; 19 miles were constructed to natural grade, and 1.6 miles were surfaced. The average cost for repairs and maintenance was $112.50 per mile.

Reports received from 9 out of 16 townships indicate a total township road expenditure of $42,000.00.

Bridges.

The total expenditure for bridge work during the period covered by this report was $34,948.20, of which $9,685.15 or 27.7% was spent for permanent bridge work; $8,316.27 or 23.7% was spent for temporary bridge work; $8,520.74 or 24.4% was spent for repair work.

The following construction was reported as completed during the period covered by this report—30 concrete box culverts costing $7,992.49; 5 corrugated pipe culverts costing $50.48; 165 boiler pipe culverts costing $7,911.61; 11 head walls on culverts costing $1,692.66; 2 wood pile bridges costing $354.18.

SHELBY COUNTY.

Roads.

The total county road expenditure was $16,603.25. Of this amount, 6% or $1,000.00 was spent for permanent work; 72.4% or $12,029.65 was spent for repairs and maintenance; 14.1% or $2,340.45 was spent for filling bridges and culverts. ½ mile was constructed to temporary grade. The average cost for repairs and maintenance was $75.30 per mile.

Reports received from 15 out of 16 townships indicate a total road expenditure of $29,800.00. Of this amount $22,954.75 was spent for repairs and maintenance; $1,041.57 was spent for hauling and placing temporary culverts, and $1,715.10 was spent for filling bridges and culverts.

Bridges.

The total expenditure for bridge work during the period covered by this report was $64,630.30, of which $25,081.84 or 38.8% was spent for permanent bridge work; $25,863.51 or 40% was spent for temporary bridge work; $13,684.95 or 21.2% was spent for repair work.

The following construction was reported as completed during the period covered by this report—17 concrete box culverts costing $10,474.50; 10 concrete pipe culverts costing $382.10; 214 corrugated pipe culverts costing $7,459.82; 75 boiler pipe culverts costing $6,962.83; 13 head walls on culverts costing $2,753.76; 7 I-beam spans on piling costing $5,500.91; 1 pony truss on piling costing $1,250.00; 3 pony truss spans on concrete abutments costing $8,977.96; 1 high steel truss costing $2,875.62; 12 wood pile bridges costing $4,307.85.

SIOUX COUNTY.

Roads.

The total county road expenditure was $19,066.78. Of this amount, 71.7% or $13,694.78 was spent for repairs and maintenance; 11.4% or $2,169.80 was spent for filling bridges and culverts. 7.3% or $1,408.72 was spent for constructing roads to natural grades. No permanent grading work was done. 12.50 miles were constructed to natural grade. The average cost for repairs and maintenance was $64.60 per mile.

The total township road expenditure was $46,892.87. Of this amount, $30,425.35 was spent for repairs; $4,415.57 was spent for constructing roads to natural grade, 50.50 miles being so constructed.

Bridges.

The total expenditure for bridge work during the period covered by this report was $73,200.27, of which $51,012.06 or 69.6% was spent for permanent bridge work; $6,534.42 or 8.9% was spent for temporary bridge work; $15,752.79 or 21.5% was spent for repair work.

The following construction was reported as completed during the period covered by this report—160 concrete box culverts costing $34,553.62; 336 corrugated pipe culverts costing $4,563.71; 1 concrete slab bridge costing $1,631.16; 2 concrete abutments costing $2,735.84; 2 concrete deck girders costing $12,092.44; 6 wood pile bridges costing $1,970.71.

STORY COUNTY.

Roads.

The total county road expenditures was $32,735.84. Of this amount 57.4% or $18,772.45 was spent for permanent work; 32.7% or $10,717.91 was spent for repairs and maintenance; 6% or $1,948.85 was spent for filling bridges and culverts. 24.75 miles were constructed to permanent grade; 2.50 miles were surfaced with gravel. The average cost for repairs and maintenance was $80.50 per mile.

Reports are not available showing the township work or expenditures.

Bridges.

The total expenditure for bridge work during the period covered by this report was $58,046.11, of which $44,807.96 or 77.3% was spent for permanent bridge work; $4,390.27 or 7.6% was spent for temporary bridge work; $4,768.71 or 8.2% was spent for repair work.

The following construction was reported as completed during the period covered by this report—91 concrete box culverts costing $25,459.15; 120 encased vitrified pipe culverts costing $8,857.60; 243 corrugated pipe culverts costing $2,930.90; 4 concrete slab bridges costing $4,535.50; 1 concrete abutment costing $574.40; 3 I-beam spans on concrete abutments costing $3,431.31; 1 pony truss on concrete abutments costing $1,650.00; 2 wood pile bridges costing $1,459.27.

TAMA COUNTY.

Roads.

The total county road expenditure was $48,676.98. Of this amount 34.9% or $16,983.82 was spent for permanent work; 36.7% or $17,861.19 was spent for repairs and maintenance; 0.8% or $409.21 was spent for filling bridges and culverts; 0.5% or $253.20 was spent for constructing roads to natural grade. 5 miles were constructed to permanent grade; ¼ mile was constructed to temporary grade. No permanent surfacing was done. The average cost of repairs and maintenance was $85.00 per mile.

The total township road expenditure was $59,243.68. Of this amount $24,694.77 was spent for repairs; $2,414.01 was spent for hauling and placing temporary culverts; $3,371.97 was spent for tile drainage; $3,328.73 was spent for filling bridges and culverts; $2,083.16 was spent for constructing roads to temporary grades, and $2,432.18 was spent for constructing roads to natural grade.

Bridges.

The total expenditure for bridge work during the period covered by this report was $76,759.64, of which $45,770.70 or 59.6% was spent for permanent bridge work; $13,198.18 or 17.2% was spent for temporary bridge work; $14,507.66 or 19% was spent for repair work.

The following construction was reported as completed during the period covered by this report—86 concrete box culverts costing $21,668.20; 2 circular concrete culverts costing $236.26; 460 concrete pipe culverts costing $10,271.90; 1 head wall on culvert costing $43.93; 1 concrete slab bridge costing $1,020; 1 concrete arch bridge costing

$2,163; 1 retaining wall costing $87.50; 5 I-beam spans on concrete abutments costing $8,476.14; 5 pony truss spans on concrete abutments costing $4,075.67; 12 wood pile bridges costing $2,926.28; miscellaneous construction costing $3,283.10.

TAYLOR COUNTY.

Roads.

The total county road expenditure was $25,926.56. Of this amount 0.6% or $150.78 was spent for permanent work; 69.3% or $17,945.49 was spent for repairs and maintenance; 23.6% or $6,118.87 was spent for filling bridges and culverts; 6.6% or $1,705.42 was spent for constructing roads to natural grades. No permanent surfacing was done, and no permanent grading. The averge cost for repairs and maintenance was $112.00 per mile.

No reports are available showing the township expenditures.

Bridges.

The total expenditure for bridge work during the period covered by this report was $45,219.52, of which $14,831.69 or 32.8% was spent for permanent bridge work; $11,434.61 or 25.3% was spent for temporary bridge work; $17,241.16 or 38.1% was spent for repair work.

The following construction was reported as completed during the period covered by this report—22 concrete box culverts costing $12,804.15; 298 corrugated pipe culverts costing $6,172.94; 70 boiler pipe culverts costing $3,854.54; 1 head wall on culvert costing $242.62; 1 I-beam span on piling costing $335.97; 1 I-beam span on concrete abutments costing $919.07; 1 pony truss span on concrete abutments costing $865.85; 4 wood pile bridges costing $1,071.16; miscellaneous construction costing $1,703.06.

UNION COUNTY.

Roads.

The total county road expenditure was $19,185.25. Of this amount 36.9% or $7,084.94 was spent for repairs and maintenance; 47.1% or $9,038.59 was spent for filling bridges and culverts. No permanent grading nor permanent surfacing was done. The average cost for repairs and maintenance was $43.80 per mile.

Reports are not available showing the township road work or expenditures.

Bridges.

The total expenditure for bridge work during the period covered by this report was $56,612.67, of which $37,835.85 or 67% was spent for permanent bridge work; $8,152.51 or 14.4% was spent for temporary bridge work; $8,060.27 or 14.2% was spent for repair work.

The following construction was reported as completed during the period covered by this report—70 concrete box culverts costing $30,305.71; 4 concrete arch culverts costing $793.54; 258 corrugated pipe culverts costing $8,152.51; 1 concrete abutment costing $608.35; 2 retaining walls costing $805.69; 1 I-beam span on concrete abutments costing $1,550; 1 pony truss on concrete abutments costing $3,772.56.

VAN BUREN COUNTY.

Roads.

The total county road expenditure was $11,137.65. Of this amount 68.5% or $7,615.33 was spent for repairs and maintenance; 31.7% or $3,522.32 was spent for filling bridges and culverts. No permanent grading nor permanent surfacing was done. The average cost for repairs and maintenance was $53.60 per mile.

The total township road expenditure was $31,436.51. Of this amount $13,405.49 was spent for repairs; $1,783.82 was spent for hauling and placing temporary culverts; $1,637.36 was spent for filling bridges and culverts.

Bridges.

The total expenditure for bridge work during the period covered by this report was $54,325.09, of which $16,431.88 or 30.3% was spent for permanent bridge work; $16,160.90 or 29.8% was spent for temporary bridge work; $21,732.31 or 39.9% was spent for repair work.

The following construction was reported as completed during the period covered by this report—28 concrete box culverts costing$7,789.81; 285 corrugated pipe culverts costing $10,520.98; 113 boiler pipe culverts costing $4,904.93; 4 head walls on culverts costing $311.04; 1 slab bridge costing $754.22; 6 concrete abutments costing $1,810.93; 2 masonry abutments costing $122.62; 2 I-beam spans on piling costing $734.99; 3 I-beam spans on concrete abutments costing $593.32; 1 pony truss span on concrete abutments costing $5,049.94.

WAPELLO COUNTY.

Roads.

The total county road expenditure was $43,595.58. Of this amount 31.1% or $13,510.34 was spent for permanent work; 42.9% or $18,638.78 was spent for repairs and maintenance; 3.9% or $1,673.28 was spent for filling bridges and culverts; 2.1% or $905.09 was spent for constructing roads to natural grade. 4.9 miles were constructed to temporary grade, and 10 miles were constructed to natural grade. The average cost of repairs and maintenance was $152.50 per mile.

The total township road expenditure was $31,221.47. Of this amount $12,641.33 was spent for repairs; $2,323.91 was spent for constructing roads to temporary grade, $2,082.86 was spent for constructing roads to natural grade; $3,264.18 was spent for filling bridges and culverts, and $1,632.42 was spent for hauling and placing temporary culverts.

Bridges.

The total expenditure for bridge work during the period covered by this report was $74,907.78, of which $30,453.36 or 40.6% was spent for permanent bridge work; $12,169.81 or 16.3% was spent for temporary bridge work; $29,765.10 was spent for repair work.

The following construction was reported as completed during the period covered by this report—33 concrete box culverts costing $13,790.61; 5 concrete pipe culverts costing $556.03; 1,186 corrugated pipe culverts costing $10,632.19; 2 boiler pipe culverts costing $747.74; 2 masonry

box culverts costing $789; 1 masonry abutment costing $827.88; 1 I-beam span on piling costing $233.85; 7 I-beam spans on concrete abutments costing $9,088.08; 1 steel girder costing $3,436.69; 1 pony truss on concrete abutments costing $2,521.10; miscellaneous construction costing $1,209.41.

WARREN COUNTY.

Roads.

The total county road expenditure was $27,265.60. Of this amount 7.7% or $2,083.90 was spent for permanent work; 49.7% or $13,562.85 was spent for repairs and maintenance; 33.5% or $9,697.23 was spent for filling bridges and culverts, and 0.1% or $34.75 was spent for constructing roads to natural grade. 2.25 miles were constructed to permanent grade; ½ mile was constructed to temporary grade; ¼ mile was constructed to natural grade. No permanent surfacing was done. The average cost for repairs and maintenance was $90.40 per mile.

The total township road expenditure was $33,326.27. Of this amount $17,488.88 was spent for repairs; $1,835.38 was spent for hauling and placing temporary culverts, and $2,522.82 was spent for filling bridges and culverts.

Bridges.

The total expenditure for bridge work during the period covered by this report was $72,910.42, of which $25,983.40 or 35.6% was spent for permanent bridge work; $21,333.90 or 29.2% was spent for temporary bridge work; $13,275.47 or 18.2% was spent for repair work.

The following construction was reported as completed during the period covered by this report—26 concrete box culverts costing $10,865.61; 74 circular concrete culverts costing $8,224.79; 225 corrugated pipe culverts costing $4,510.11; 1 boiler pipe culvert costing $708.08; 1 concrete slab bridge costing $976; 2 I-beam spans on piling costing $1,682.26; 1 I-beam span on concrete abutments costing $759; 1 pony truss on piling costing $2,112; 1 pony truss on concrete abutments costing $5,158; 85 wood bridges costing $12,321.45.

WASHINGTON COUNTY.

Roads.

The total county road expenditure was $47,997.03. Of this amount 33.7% or $16,133.70 was spent for permanent work; 20.7% or $9,871.83 was spent for repairs and maintenance; 2.7% or $1,289.55 was spent for filling bridges and culverts; 12% or $5,753.37 was spent for constructing roads to natural grade. 5.5 miles were constructed to permanent grade; 36.8 miles were constructed to natural grade. The average cost for repairs and maintenance was $57.50 per mile.

The total township expenditure was $35,895.18. Reports are not available showing the amount of work accomplished on the township road system.

Bridges.

The total expenditure for bridge work during the period covered by this report was $58,545.21, of which $24,864.97 or 42.4% was spent for permanent bridge work; $8,242.74 or 14% was spent for temporary bridge work; $6,099.53 or 10.4% was spent for repair work.

The following construction was reported as completed during the period covered by this report—43 concrete box culverts costing $13,126.51; 6 circular concrete culverts costing $828.12; 19 encased vitrified pipe culverts costing $2,737.13; 26 corrugated pipe culverts costing $362.60; 282 boiler pipe culverts costing $7,880.14; 4 head walls on culverts costing $216.33; 4 concrete abutments costing $1,890.19; 5 I-beam spans on concrete abutments costing $6,066.69; miscellaneous construction costing $2,291.09.

WAYNE COUNTY.

Roads.

The total county road expenditure was $30,311.01. Of this amount 44.9% or $13,587.59 was spent for repairs and maintenance; 53.5% or $16,222.03 was spent for filling bridges and culverts. No permanent grading work or surfacing was done. The average cost for repairs and maintenance was $78.60 per mile.

The total township road expenditure was $24,172.42. Of this amount $19,153.54 was spent for repairs.

Bridges.

The total expenditure for bridge work during the period covered by this report was $33,643.76, of which $17,802.23 or 53% was spent for permanent bridge work; $10,084.85 or 30% was spent for temporary bridge work; $4,696.98 or 13.9% was spent for repair work.

The following construction was reported as completed during the period covered by this report—concrete box culverts costing $17,399.93; concrete pipe culverts costing $988.06; corrugated pipe culverts costing $6,612.32; cast iron pipe culverts costing $2,484.47; 2 head walls on culverts costing $402.30.

WEBSTER COUNTY.

Roads.

The total county road expenditure was $53,494.23. Of this amount 62.7% or $33,505.55 was spent for permanent work; 21.9% or $11,696.00 was spent for repairs and maintenance; 1.7% or $955.71 was spent for constructing roads to natural grades. 17.3 miles were constructed to permanent grade; 6.15 miles were constructed to natural grades, and ½ mile was surfaced with gravel. The average cost for repairs and maintenance was $63.20 per mile.

The total township road expenditure was $56,612.29. Of this amount $16,840.80 was spent for repairs; $12,373.44 was spent for tile drainage; $3,873.40 was spent for constructing roads to natural grades; $1,401.37 was spent for hauling and placing temporary culverts, and $730.00 was spent for filling bridges and culverts.

Bridges.

The total expenditure for bridge work during the period covered by this report was $63,127.26, of which $33,502.03 or 53% was spent for permanent bridge work; $12,442.94 or 19.8% was spent for temporary bridge work; $8,065.26 or 12.8% was spent for repair work.

The following construction was reported as completed during the period covered by this report—53 concrete box culverts costing $16,666.02; 1 circular concrete culvert costing $167.02; 502 corrugated pipe culverts costing $6,959.20; 13 cast iron pipe culverts costing $509.56; 1 head wall on culvert costing $41.95; 2 concrete deck girders costing $5,824.48; 5 I-beam spans on piling costing $1,912.64; 8 I-beam spans on concrete abutments costing $8,373.83; 1 pony truss on concrete abutments costing $2,428.73; 3 wood pile bridges costing $1,143.64; pony truss on piling $1,917.80; 7 miscellaneous structures costing $6,174.29.

WINNEBAGO COUNTY.

Roads.

The total county road expenditure was $38,104.21. Of this amount 55.5% or $21,196.45 was spent for permanent work; 16.6% or $6,323.74 was spent for repairs and maintenance; 7% or $2,604.94 was spent for constructing roads to natural grades. 11.75 miles were constructed to permanent grade; 5.5 miles were constructed to temporary grade; and 23.4 miles were constructed to natural grades. There was no permanent surfacing done. The average cost for repairs and maintenance was $49.40 per mile.

No reports are available concerning the township expenditures.

Bridges.

The total expenditure for bridge work during the period covered by this report was $25,430.58, of which $11,175.17 or 44% was spent for permanent bridge work; $5,593.39 or 22% was spent for temporary bridge work; $4,288.60 or 16.7% was spent for repair work.

The following construction was reported as completed during the period covered by this report—10 concrete box culverts costing $5,273.27; 7 circular concrete culverts costing $671; 2 concrete pipe culverts costing $18; 3 encased vitrified pipe culverts costing $35.40; 396 corrugated pipe culverts costing $5,080.64; 1 I-beam span on concrete abutments costing $1,836; 1 pony truss on concrete abutments costing $3,359.50; 3 wood pile bridges costing $494.75; miscellaneous construction costing $4,432.42.

WINNISHIEK COUNTY.

Roads.

The total county road expenditure was $26,891.13. Of this amount 24.1% or $6,470.15 was spent for permanent work; 60.2% or $16,181.50 was spent for repairs and maintenance; 3.3% or $885.13 was spent for filling bridges and culverts; 8.2% or $2,203.91 was spent for constructing roads to natural grade. ¾ mile was constructed to natural grade. 1.2 miles to temporary grade. No permanent surfacing was done. The average cost of repairs and maintenance was $76.60 per mile.

Reports from 11 of the 20 townships indicate a total township expenditure of $38,600.00.

Bridges.

The total expenditure for bridge work during the period covered by this report was $80,548.31, of which $58,470.08 or 72.8% was spent for permanent bridge work; $6,970.98 or 8.7% was spent for temporary bridge work; $6,922.77 or 8.6% was spent for repair work.

The following construction was reported as completed during the period covered by this report—80 concrete box culverts costing $18,350.61; 60 circular concrete culverts costing $5,995.36; 7 concrete arch culverts costing $747.36; 307 corrugated pipe culverts costing $4,158.70; 12 masonry box culverts costing $1,677.48; 1 head wall on culvert costing $103; 1 concrete abutment costing $784.28; 5 retaining walls costing $2,463.75; 1 masonry abutment costing $542.95; 5 I-beam spans on piling costing $2,601.56; 8 I-beam spans on concrete abutments costing $10,845.66; 5 pony truss spans on concrete abutments costing $16,006.15; 1 high steel truss costing $954.08; 1 wood pile bridge costing $210.72; miscellaneous construction costing $5,259.06.

WOODBURY COUNTY.

Roads.

The total county road expenditure was $55,007.83. Of this amount 23.5% or $12,929.99 was spent for permanent work. 35.9% or $19,744.97 was spent for repairs and maintenance; 5.5% or $3,001.94 was spent for filling bridges and culverts. 1.4% or $785.39 was spent for constructing roads to natural grade. 7 miles were constructed to permanent grade; 28.25 miles were constructed to temporary grade; 11.75 miles were constructed to natural grade, and 0.2 mile was permanently surfaced. The average cost of repairs and maintenance was $87.50 per mile.

Reports received from 11 of 24 townships indicate a total township expenditure of $44,806.00.

Bridges.

The total expenditure for bridge work during the period covered by this report was $66,452.19, of which $22,593.27 or 33.9% was spent for permanent bridge work; $23,672.08 or 35.7% was spent for temporary bridge work; $18,906.63 or 28.6% was spent for repair work.

The following construction was reported as completed during the period covered by this report—25 concrete box culverts costing $12,117.38; 108 concrete pipe culverts costing $14,845.93; 52 corrugated pipe culverts costing $1,470.02; 2 boiler pipe culverts costing $101.84; 3 head walls on culverts costing $316.58; 4 concrete slab bridges costing $3,560.78; 6 I-beam spans on piling costing $1,626.37; one I-beam span on concrete abutments costing $2,132.13; 3 pony truss spans on piling costing $3,921.01; 2 pony truss spans on concrete abutments costing $4,666.40; 15 wood pile bridges costing $1,706.91.

WORTH COUNTY.

Roads.

The total county road expenditure was $22,928.00. Of this amount 47.1% or $10,794.76 was spent for permanent work; 11% or $2,528.01 was spent for repairs and maintenance; 1% or $218.25 was spent for filling bridges and culverts, and 13.1% or $2,990.46 was spent for constructing roads to natural grades. One mile was constructed to permanent grade and 10 miles to temporary grade; 33.75 miles were constructed to natural grades, and 19 miles were surfaced with light layer of gravel. The average cost for repairs and maintenance was $27.50 per mile.

The township road expenditure was $22,998.92. Of this amount $5,811.92 was spent for repairs; $4,258.17 was spent for constructing roads to natural grade; $3,122.41 was spent for tile drainage; $2,729.24 was spent for constructing roads to temporary grade, and $912.80 was spent for filling bridges and culverts.

Bridges.

The total expenditure for bridge work during the period covered by this report was $16,229.76, of which $10,706.77 or 66.3% was spent for permanent bridge work. $2,889.40 or 17.7% was spent for temporary bridge work; $674.89 or 4% was spent for repair work.

The following construction was reported as completed during the period covered by this report—60 concrete box culverts costing $7,082.10; 102 corrugated pipe culverts costing $894.40; 1 head wall on culvert costing $81.67; 1 concrete abutment costing $1,813; 1 I-beam span on concrete abutments costing $1,730; 1 pony truss span on piling costing $1,995; miscellaneous construction costing $1,958.70.

WRIGHT COUNTY.

Roads.

The total county road expenditure was $43, 976.17. Of this amount 52% or $22,837.57 was spent for permanent work; 24.9% or $12,906.60 was spent for repairs and maintenance; 3.2% or $1,401.23 was spent for constructing roads to natural grade. 11.75 miles were constructed to permanent grade; 7 miles were constructed to temporary grade; 14.50 miles were constructed to natural grade and 4.25 miles were surfaced with gravel. The average cost of repairs and maintenance was $76.00 per mile.

The total township road expenditure was $21,151.85.

Bridges.

The total expenditure for bridge work during the period covered by this report was $65,437.58, of which $39,237.87 or 70.8% was spent for permanent bridge work; $7,912.69 or 14.3% was spent for temporary bridge work; $7,564.75 or 13.6% was spent for repair work.

The following construction was reported as completed during the period covered by this report—24 concrete box culverts costing $18,250.15; 606 corrugated pipe culverts costing $7,156.69; 1 concrete slab bridge costing $723.87; 1 concrete abutment costing $435; 15 I-beam spans on concrete abutments $13,653.82; 3 pony trusses on concrete abutments costing $6,175; 1 wood pile bridge costing $756; miscellaneous construction costing $244.07.

ROAD CONSTRUCTION.

COUNTY EXPENDITURES.

County	Built to finished grade.		Built to temporary grade.		Built to natural grade.		Permanently surfaced.		bridges Filling and culverts.	Tile drainage.
	Miles	Cost	Miles	Cost	Miles	Cost	Miles	Cost		
Adair	1.5	$ 2,347.36	2.5	$ 6,052.65	15.0	3,187.82	.....	.....	$ 6,890.00	$ 194.71
Adams	.....	.....	12.5	4,917.39	47.0	3,787.32	.....	.....	1,598.94	.....
Allamakee	6.9	22,080.97	.....	.....	.....	.....	.....	.....	.....	.....
Appanoose	.....	.....	4.0	1,480.83	17.0	1,617.38	.....	.....	8,269.82	.....
Audubon	0.1	371.50	2.0	1,419.12	90.0	5,915.50	.....	.....	2,767.67	661.65
Benton	3.25	9,067.84	.....	.....	.....	6,422.36	0.25	$ 927.18	465.53	375.36
Benton	0.93	3,355.43	0.3	1,125.60	70.5	5,317.83	1.95	489.21	.....	331.99
Black Hawk	13.0	12,537.77	12.0	3,531.35	3.5	598.58	.....	.....	1,197.30	501.85
Boone	2.0	4,241.19	0.5	292.50	11.5	2,678.37	2.0	3,833.66	1,445.33	3,657.33
Bremer	3.9	7,330.82	3.7	6,758.48	2.6	139.25	6.0	5,523.47	1,596.51	125.50
Buchanan	29.75	30,952.22	.....	.....	46.5	3,867.17	2.2	3,746.94	369.09	10,858.77
Buena Vista	0.25	805.00	6.0	2,074.28	8.0	6,039.62	0.25	301.10	2,832.25	235.28
Butler	29.75	36,088.38	2.75	1,846.00	25.75	4,531.35	2.0	2,268.40	223.11	3,597.65
Calhoun	9.25	14,731.66	3.0	2,116.10	.....	.....	0.25	408.73	1,195.40	133.20
Carroll	1.42	2,418.90	.....	.....	14.7	6,455.58	.....	.....	2,761.95	44.20
Cass	5.66	6,647.20	0.75	1,147.40	22.0	1,928.02	.....	1,972.06	5,298.69	371.77
Cedar	4.0	4,461.59	3.0	648.85	14.0	4,142.62	11.5	20,131.65	.....	5,129.93
Cerro Gordo	12.14	18,924.23	.....	.....	31.0	3,155.35	.....	.....	438.62	.....
Cherokee	.....	.....	0.5	309.00	10.75	1,738.81	6.75	2,061.33	2,116.00	1,362.25
Chickasaw	.....	.....	.....	.....	13.25	1,716.79	.....	.....	.....	.....
Clarke	.....	.....	.....	.....	11.0	2,709.54	8.3	7,215.06	126.50	1,401.29
Clay	11.90	13,824.77	.....	.....	46.1	6,815.85	0.3	667.08	2,211.85	.....
Clayton	.....	.....	0.60	1,352.09	43.5	4,771.99	3.4	7,279.71	1,003.52	213.17
Clinton	12.34	17,864.48	.....	.....	2.0	125.56	.....	.....	.....	.....
Crawford	29.67	29,912.29	.....	.....	22.5	1,878.32	0.25	3,173.50	4,854.33	2,255.66
Dallas	2.75	9,846.30	.....	.....	.....	2,663.32	.....	.....	3,256.78	.....
Davis	.....	.....	.....	4,435.52	.....	2,603.32	.....	.....	1,632.56	.....
Decatur	.....	.....	.....	.....	129.0	24,603.58	.....	.....	1,030.50	2,463.91
Delaware	3.75	4,221.15	.....	.....	115.0	10,060.85	3.25	2,937.43	103.50	.....
Des Moines	1.55	4,477.54	.....	.....	.....	4,002.08	1.26	17,727.03	4,362.70	.....
Dickinson	4.08	6,993.52	1.22	2,594.96	2.32	408.00	4.14	7,306.11	267.62	2,362.50
Dubuque	0.18	1,950.00	.....	.....	26.0	2,191.52	.....	.....	146.85	.....
Emmet	11.0	9,093.47	8.0	5,673.53	9.0	825.25	12.0	3,930.11	385.00	1,480.93
Fayette	4.50	3,684.45	.....	.....	117.0	13,562.84	.....	.....	.....	.....
Floyd	0.75	3,739.65	.....	.....	34.0	4,391.00	.....	.....	2,688.50	270.98

Franklin	1.50	2,599.88	2.25	1,537.05	30.0	5,604.25	5.75	2,688.95	2,830.23	1,356.50
Fremont	.....	.....	0.33	494.30	18.0	1,155.43	.....	.....	8,177.49	178.71
Greene	13.75	17,549.29	.....	.....	.....	.....	10.0	5,331.84	622.64	1,506.35
Grundy	1.0	1,332.85	10.25	3,259.26	29.0	3,413.61	.....	.....	.....	302.73
Guthrie	1.0	360.88	.....	.....	65.0	2,066.86	.....	703.35	1,317.13	586.33
Hamilton	22.25	32,856.53	1.63	1,852.52	35.75	4,274.30	.....	.....	.....	15,403.56
Hancock	14.75	12,273.60	7.8	6,569.67	6.6	35.53	14.65	6,497.00	500.00	2,485.68
Hardin	17.0	15,522.35	.....	.....	17.6	2,816.05	5.2	3,705.98	1,220.74	3,826.60
Harrison	.....	.....	9.9	6,304.30	40.0	7,762.02	.....	.....	335.85	.....
Henry	0.8	2,729.32	.....	.....	33.0	1,676.70	.....	.....	2,905.42	392.63
Howard	0.5	1,792.04	2.25	2,581.92	14.75	6,845.25	1.12	139.05	900.04	493.74
Humboldt	9.5	6,649.65	.....	.....	16.0	2,585.35	3.5	3,182.65	449.27	2,370.85
Ida	.....	.....	0.75	1,213.96	39.0	1,568.59	.....	.....	4,115.52	51.74
Iowa	2.5	4,405.58	25.0	15,575.57	30.0	5,540.17	.....	.....	1,900.53	241.27
Jackson	.....	.....	.....	.....	.....	.....	.....	.....	45.50	52.00
Jasper	.....	.....	9.0	19,738.65	15.5	1,450.83	.....	.....	11,280.97	995.24
Jefferson	.....	.....	.....	.....	33.13	11,856.19	.....	.....	2,658.91	717.35
Johnson	0.83	2,016.40	1.0	4,182.18	0.6	1,430.68	.....	.....	2,674.80	.....
Jones	0.5	958.74	0.32	562.49	0.08	265.34	0.5	4,244.15	7,208.76	.....
Keokuk	1.99	3,430.00	.....	.....	45.0	4,893.30	.....	.....	1,990.84	.....
Kossuth	5.0	14,054.39	2.0	4,045.05	.....	.....	.....	.....	.....	1,408.61
Lee	.....	.....	.....	.....	30.46	3,767.79	1.0	891.30	365.85	.....
Linn	.83	968.10	2.6	4,087.37	6.21	1,029.83	1.25	5,502.22	444.83	361.49
Louisa	1.5	2,643.71	1.5	1,870.29	51.0	2,445.59	.....	.....	194.80	.....
Lucas	.....	.....	.....	.....	.....	.....	.....	.....	5,043.55	.....
Lyon	.....	.....	2.0	476.90	34.0	3,913.00	.....	.....	9,279.38	.....
Madison	0.75	1,435.50	0.4	416.90	17.5	1,133.30	.....	.....	2,745.69	337.91
Mahaska	.....	.....	1.0	4,821.13	31.0	21,376.31	.....	.....	.....	19.52
Marion	1.35	8,342.29	0.77	1,941.96	136	27,361.01	.....	.....	5,761.14	1,671.35
Marshall	0.85	6,176.89	0.25	596.20	5.0	2,071.23	.....	.....	4,309.09	130.45
Mills	3.0	2,238.36	8.0	7,333.03	33.5	4,465.21	.....	.....	4,245.50	.....
Mitchell	.....	.....	26.5	5,321.03	7.0	280.00	15.75	6,067.06	.....	1,368.75
Monona	.....	.....	2.5	1,285.43	.....	.....	.....	.....	1,482.80	.....
Monroe	.....	.....	1.12	4,015.84	.....	.....	.....	.....	2,733.65	285.71
Montgomery	.....	.....	1.58	3,606.10	2.0	254.11	.....	.....	2,081.00	5.80
Muscatine	0.73	2,495.65	.....	.....	46.0	5,512.18	2.33	7,279.57	1,535.91	581.31
O'Brien	7.0	9,725.14	2.25	2,511.30	31.0	3,950.98	.....	.....	3,432.98	.....
Osceola	.....	.....	10.0	1,843.15	39.25	4,289.84	.....	.....	1,093.00	830.35
Page	.....	.....	35.0	25,772.14	8.03	1,269.33	0.0	.....	4,369.42	231.82
Palo Alto	7.73	9,799.18	3.38	5,506.68	7.5	712.73	1.4	889.20	488.40	467.27
Plymouth	.....	.....	1.0	1,228.25	.....	8,921.76	.....	.....	.....	1,140.40
Pocahontas	17.0	7,808.82	30.0	7,751.15	43.0	1,730.10	2.5	3,041.33	.....	10,071.91
Polk	0.5	755.25	.....	.....	84.75	5,905.95	2.5	7,634.26	8,304.69	1,714.30
Pottawattamie	4.5	14,242.63	13.0	12,613.91	105.75	12,570.15	1.0	11,294.41	6,081.57	.....
Poweshiek	1.75	10,322.90	.....	.....	.....	8,453.53	.....	.....	2,772.91	529.70
Ringgold	.....	.....	.....	.....	.....	.....	.....	.....	11,122.90	.....
Sac	25.3	25,579.55	.....	.....	1.0	75.50	16.14	7,923.83	213.75	1,121.54
Scott	4.0	4,624.63	.....	.....	19.0	2,509.75	1.6	5,681.13	.....	425.65

COUNTY EXPENDITURES—Continued.

County	Built to finished grade.		Built to temporary grade.		Built to natural grade.		Permanently surfaced.		Filling bridges and culverts.	Tile drainage.
	Miles	Cost	Miles	Cost	Miles	Cost	Miles	Cost		
Shelby	.....	.....	0.5	1,000.00	.....	.....	.....	.....	2,340.45	.....
Sioux	.....	.....	.....	.....	12.5	1,408.72	.....	.....	2,169.80	.....
Story	24.75	16,430.66	.....	.....	.....	.....	2.5	1,998.90	1,948.85	342.89
Tama	5.0	15,614.33	0.25	895.49	0.25	253.20	.....	.....	409.23	474.00
Taylor	.....	.....	.....	.....	.....	1,705.42	.....	.....	6,318.87	130.78
Union	.....	.....	.....	.....	.....	.....	.....	.....	9,038.59	.....
Van Buren	.....	.....	.....	.....	.....	.....	.....	.....	3,522.32	.....
Wapello	.....	.....	4.9	13,388.71	10.0	905.09	.....	.....	1,673.28	121.63
Warren	2.25	1,670.40	0.5	293.50	0.25	34.75	.....	.....	9,697.23	130.00
Washington	5.5	15,957.85	.....	.....	36.8	5,753.37	.....	.....	1,289.55	165.86
Wayne	.....	.....	.....	.....	.....	.....	.....	.....	16,222.03	.....
Webster	17.30	23,695.48	.....	.....	6.15	945.71	0.5	1,202.03	.....	8,608.04
Winnebago	11.75	15,824.80	5.5	1,240.97	23.37	2,604.94	.....	.....	.....	4,130.68
Winneshiek	0.26	1,041.32	1.2	3,790.83	.....	2,203.91	.....	.....	885.13	1,638.00
Woodbury	7.0	6,574.73	28.25	6,332.26	11.75	785.30	.02	23.00	3,001.94	.....
Worth	1.0	548.60	10.0	2,917.85	33.75	2,990.46	10.0	6,534.62	218.25	803.69
Wright	11.75	13,108.51	7.0	3,275.88	14.5	1,401.23	4.25	3,663.10	.....	2,770.08
Total	462.7	$618,137.82	355.9	$242,867.79	2,358.76	$359,204.53	182.01	$188,537.45	$249,016.59	$110,221.05

REPAIRS AND MAINTENANCE.

COUNTY ROAD SYSTEM.

County	Maintenance.					Total cost of repairs.	Total cost of repairs and maintenance.	Average cost per mile for repairs and maintenance.
	Number of miles regularly dragged.	Average number of times dragged.	Cost of dragging per mile one round trip.	Total cost of maintenance.	Average cost per mile.			
Adair	173.0	24.9	$0.70	$ 4,308.27	24.30	$ 2,492.23	$ 6,800.50	39.30
Adams	125.0	22.0	.70	3,346.03	26.80	3,058.11	6,447.14	51.7
Allamakee	116.0	3.72	.50	2,156.40	16.50	10,714.10	12,870.50	110.91
Appanoose	164.0	20.0	.80	4,004.17	24.20	6,912.84	10,917.01	62.05
Audubon	143.0	34.8	.70	3,484.91	24.40	1,512.51	4,997.43	34.90
Benton	206.0	15.0	.75	4,591.89	22.30	3,568.56	8,160.45	39.60
Black Hawk	168.2	37.2	.75	4,759.64	28.30	6,031.23	10,790.87	64.00
Boone	152.0	43.3	.75	5,227.28	34.40	2,694.65	7,921.93	52.10
Bremer	130.0	28.0	.73	3,687.21	28.05	5,445.34	8,132.73	62.40
Buchanan	179.0	18.0	.75	2,403.00	13.50	3,828.67	6,231.67	35.00
Buena Vista	167.0	36.0	.75	4,506.68	27.00	5,769.40	10,276.08	61.75
Butler	175.0	33.0	.60	3,497.00	19.90	20,652.90	24,149.90	137.50
Calhoun	166.75	31.0	.73	3,929.50	23.50	1,848.05	5,827.55	33.10
Carroll	175.0	34.18	.77	4,583.66	25.20	8,350.01	12,933.67	74.00
Cass	147.0	.....	.75	6,450.58	43.80	4,423.17	10,873.75	73.50
Cedar	150.0	24.0	.75	4,272.24	28.50	7,122.15	11,394.39	77.80
Cerro Gordo	147.0	25.3	.76	3,441.68	23.40	4,962.62	8,404.30	56.50
Cherokee	137.0	23.5	.80	2,585.05	20.80	5,953.46	8,539.41	62.40
Chickasaw	128.0	25.0	.80	3,000.00	23.50	5,173.50	8,173.50	76.50
Clarke	114.0	34.7	.70	2,768.96	24.30	20,079.70	22,848.66	198.00
Clay	153.0	20.5	.70	2,354.70	14.70	2,473.30	4,828.00	31.50
Clayton	225.0	41.25	.36½	5,320.67	23.30	14,057.35	19,379.02	85.70
Clinton	196.0	33.64	.75	7,923.53	40.50	3,839.54	11,763.07	59.30
Crawford	144.0	.....	.75	4,204.16	28.30	7,290.99	11,504.15	77.20
Dallas	170.0	43.0	.75	5,482.64	32.20	6,426.35	11,908.99	70.00
Davis	150.0	67.5	.52	2,629.50	17.50	14,242.75	16,872.25	111.50
Decatur	160.0	40.0	.70	4,173.14	26.00	1,024.40	5,197.63	32.40
Delaware	170.0	30.0	.78	3,973.25	23.30	4,770.95	8,744.20	51.40
Des Moines	81.5	.....	.....	2,342.75	31.30	2,219.33	4,562.08	56.70
Dickinson	94.6	22.0	.80	3,051.47	32.20	4,108.64	7,160.11	75.70

COUNTY ROAD SYSTEM—Continued.

County	Maintenance.							
	Number of miles regularly dragged.	Average number of times dragged.	Cost of dragging per mile one round trip.	Total cost of maintenance.	Average cost per mile.	Total cost of repairs.	Total cost of repairs and maintenance.	Average cost per mile for repairs and maintenance.
Dubuque	132.0	26.0	.80	4,069.88	30.90	22,882.16	26,952.04	240.00
Emmet	101	13.1	.73	2,435.42	24.00	3,435.81	5,871.23	58.30
Fayette	198.0	22.0	.68	3,237.44	16.20	4,702.31	7,924.75	40.00
Floyd	141.62	36.82	.75	3,916.42	27.60	6,419.09	10,335.42	73.10
Franklin	170.0	37.0	.70	4,688.54	27.60	10,745.68	15,437.29	77.80
Fremont	135.0			5,269.77	39.00	4,546.01	16,015.45	118.50
Greene	130.0	31.4	.70	2,824.75	23.6	1,721.26	4,546.01	37.80
Grundy	154.0	27.5	.75	5,171.63	32.5	6,954.51	12,126.14	78.00
Guthrie	194.0	46.0	.80	7,465.76	38.5	22,317.82	29,783.58	153.00
Hamilton	130.0	33.0	1.00	5,758.96	44.30	2,877.89	8,636.85	66.50
Hancock	150.0	47.7	.75	6,378.75	42.60	3,049.97	9,428.72	62.70
Hardin	173.0	37.0	.75	2,792.10	16.10	2,151.58	4,943.68	28.50
Harrison	167.0	41.0	.60	4,093.87	24.50	14,480.06	18,573.93	111.21
Henry	126.0	67.5	.70	5,913.72	46.90	2,897.85	8,811.57	70.00
Howard	120.0	18.9	.75	1,609.98	13.40	2,675.95	4,285.93	35.70
Humboldt	134.0	27.0	.75	3,620.75	27.10	5,319.64	8,940.37	51.80
Ida	127.0	25.0	.75	2,582.55	18.70	2,275.33	4,757.90	37.20
Iowa	175.8	32.9	.80	5,665.09	32.30	4,663.29	10,328.38	59.6
Jackson	156.0	34.0	.75	3,861.76	24.70	16,926.34	20,788.10	132.50
Jasper	205.0	34.0	.70	6,000.48	29.30	11,681.96	17,682.44	86.10
Jefferson	115.0	24.0	.35	5,042.27	37.40	1,823.66	6,865.93	59.80
Johnson	157.0	21.0	.75	3,692.35	23.50	10,882.12	14,574.47	93.00
Jones	180.0	35.0	.75	4,313.24	22.80	17,215.42	21,528.66	118.50
Keokuk	168.0	7.3	.65	1,568.70	9.30	9,632.83	11,201.53	66.70
Kossuth	260.0	25.0	.75	7,497.30	24.00	20,343.21	27,840.51	108.00
Lee	154.9	29.0	.70	5,087.10	19.90	7,614.49	10,701.59	69.0
Linn	200.0			5,405.61		6,576.57	11,982.18	59.80
Louisa	114.0	22.2	.87	6,107.73	53.50	723.55	6,831.28	59.80
Lucas	141.0	22.0	.70	4,408.22	28.40	5,807.51	10,215.73	72.60
Lyon	188.0		.75	3,034.35	16.10	13,985.14	17,019.49	90.70
Madison	165.0			6,635.52	40.20	11,071.18	17,706.50	107.30
Mahaska	131.0	5.0	.31	7,716.31	58.80	288.18	8,004.49	61.00

Marion	170.13	18.0	.77	7,723.47	45.50	1,539.68	9,263.15	54.40
Marshall	107.0	39.0	.75	5,914.38	55.20	4,355.38	10,269.76	95.90
Mills	113.0	37.0	.50	2,038.19	17.93	1,668.61	3,706.81	32.80
Mitchell	128.0	25.0	.75	2,555.39	20.40	3,445.74	6,011.04	48.00
Monona	175.0	26.2	.81	3,869.04	21.00	11,026.00	14,716.04	84.10
Monroe	151.25	25.0	.75	3,362.09	22.30	5,000.75	8,362.84	55.40
Montgomery	123.0	22.0	.70	1,990.00	15.40	4,970.50	6,960.50	50.50
Muscatine	136.0	43.7	.75	4,464.30	32.80	4,382.51	8,846.81	65.00
O'Brien	183.0	24.8	.76	3,479.46	18.80	5,391.89	8,831.26	48.40
Osceola	110.0	30.0	.75	3,028.86	27.50	1,604.77	4,633.63	42.10
Page	175.0	29.0	.75	5,652.00	32.30	5,687.92	11,339.92	64.80
Palo Alto	156.0	24.5	.72	2,799.46	17.80	5,511.31	8,310.77	53.30
Plymouth	180.0	30.0	.80	5,345.45	29.70	8,867.78	14,213.23	78.80
Pocahontas	155.0	37.0	.76	5,221.74	33.70	3,625.32	8,847.06	57.00
Polk	185.0	2.0	1.00	4,628.52	24.40	9,132.19	13,760.71	72.70
Pottawattamie	280.0	40.0	.75	8,356.94	29.80	15,791.71	24,148.65	86.20
Poweshiek	150.0	25.0	.80	5,978.76	39.80	4,833.61	10,812.37	72.00
Ringgold	175.0	20.0	.50	4,022.60	23.10	8,000.00	12,022.60	68.73
Sac	148.0	22.0	.75	2,926.84	19.70	4,360.53	7,187.37	48.60
Scott	124.6	31.0	.85	3,272.43	26.30	10,737.75	14,010.18	112.50
Shelby	160.0	30.0	.75	3,990.00	18.70	9,039.05	12,029.05	75.30
Sioux	212.0	14.5	.75	3,134.07	14.70	10,570.71	13,694.78	64.60
Story	133.0	30.0	.75	4,201.27	31.60	6,516.64	10,717.91	80.50
Tama	210.0	32.0	.80	5,392.84	25.50	12,468.35	17,861.19	85.00
Taylor	160.0	36.0	.60	3,624.57	22.60	14,320.92	17,945.49	112.00
Union	162.0	21.5	.60	2,090.00	12.90	4,994.94	7,084.94	43.80
Van Buren	142.0	23.0	.72	4,693.70	33.00	2,921.63	7,615.33	53.60
Wapello	121.8	2.0	.40	5,261.55	43.30	13,377.23	18,638.78	152.50
Warren	150.0	30.0	.70	6,582.92	44.00	6,679.93	13,262.85	90.40
Washington	172.0	56.0	.80	7,628.23	44.30	2,243.60	9,871.83	57.50
Wayne	173.0	26.7	1.00	5,124.97	29.6	8,462.62	13,587.59	78.6
Webster	184.25	35.88	1.00	6,611.70	35.81	5,084.30	11,696.00	63.20
Winnebago	128.0	34.0	.75	4,029.46	31.20	2,294.28	6,323.74	49.40
Winneshiek	231.0	28.0	.83	5,249.03	24.93	10,932.27	16,181.30	76.60
Woodbury	32.5	80.0	.70	6,213.91	57.80	13,531.06	19,744.97	87.50
Worth	97.0	24.0	.75	1,640.70	17.50	887.31	2,528.01	27.50
Wright	170.0	30.45	.75	3,883.37	22.80	9,023.23	12,906.60	76.00
Average	155.0	29.40	$0.713		27.80			75.00
Totals				$433,120.17		$707,148.05	$1,137,268.22	

REPAIRS AND MAINTENANCE.

TOWNSHIP ROAD SYSTEM.

County	Maintenance. Number of miles regularly dragged.	Average number of times dragged.	Cost of dragging per mile per round trip.	Total cost of maintenance.	Average cost per mile.	Average cost per mile.	Total cost of repairs and maintenance.	Average cost per mile for repairs and maintenance.
Adair	.....	.....	...	$ 2,630.45	.....	.....	$ 2,630.45	.....
Adams	624.00	13.0	$ .60	4,925.00	7.87	2,650.80	7,575.80	12.15
Appanoose	600.00	18.0	.53	5,753.43	9.59	14,763.21	20,516.64	34.40
Audubon	440.00	20.2	.65	5,733.84	13.05	5,604.16	11,338.00	25.70
Benton	900.00	.....	.75	10,220.00	11.30	10,500.00	20,720.00	23.00
Black Hawk	370.00	18.0	.75	5,363.64	14.50	11,901.23	17,264.84	46.70
Bremer	.....	.....	...	3,345.97	.....	4,835.33	8,181.32	.....
Buchanan	650.00	18.0	.60	7,035.95	10.80	9,223.58	16,259.53	25.10
Buena Vista	.....	.....	.72½	.....	.....	5,528.95	5,528.95	.....
Butler	.....	.....	...	4,565.35	.....	4,123.59	8,688.94	.....
Calhoun	680.00	16.0	.73	7,951.96	11.70	4,582.51	12,534.47	18.40
Carroll	292.00	19.82	.67	5,644.75	19.40	6,780.06	12,424.81	42.50
Cass	.....	.....	...	3,842.23	.....	4,873.45	8,715.68	.....
Cerro Gordo	.....	.....	...	7,579.03	.....	7,432.09	15,011.12	.....
Cherokee	.....	.....	.80	6,602.41	.....	14,812.75	21,415.16	.....
Chickasaw	.....	.....	...	.....	.....	30,532.09	30,532.09	.....
Clay	.....	15.0	.80	3,574.00	.....	2,397.91	5,971.91	.....
Clayton	425.00	22.5	.64	6,085.53	14.20	9,887.24	15,972.77	37.60
Crawford	.....	.....	.75	10,000.00	.....	32,500.00	42,500.00	.....
Dallas	800.00	16.6	.76	10,085.47	12.60	17,172.34	27,257.81	34.10
Decatur	624.00	.....	.60	.....	.....	5,166.48	5,166.48	8.40
Des Moines	.....	.....	...	788.61	.....	.....	788.61	.....
Dickinson	462.00	14.0	.75	4,850.00	10.50	10,996.00	15,846.00	34.30
Emmet	.....	.....	.60	.....	.....	2,435.42	2,435.42	.....
Fayette	786.00	20.0	.60	9,487.19	12.20	35,349.94	44,837.13	56.50
Floyd	.....	.....	.75	.....	.....	3,558.29	3,558.29	.....
Greene	.....	.....	.63	6,209.34	.....	7,410.24	13,619.58	.....
Grundy	672.00	.....	.70	7,766.25	11.50	19,949.28	27,715.53	41.20
Hamilton	.....	.....	.76	4,507.62	.....	2,480.00	6,987.62	.....
Hancock	.....	.....	.75	5,075.28	.....	7,698.43	12,773.71	.....
Harrison	.....	.....	.80	4,931.62	.....	11,027.43	16,029.05	.....
Henry	.....	.....	...	.....	.....	24,138.32	24,138.32	.....
Howard	514.00	13.0	.75	4,770.21	9.28	6,067.12	10,837.33	21.00
Humboldt	366.00	20.2	.80	5,928.34	16.20	.....	5,928.34	16.20
Ida	528.00	11.0	.75	4,443.87	8.40	18,320.38	22,764.25	43.00
Iowa	976.00	21.5	.80	16,787.20	17.20	16,517.52	33,304.72	34.00
Jackson	.....	.....	.70	5,339.38	.....	17,623.63	22,963.63	.....
Jasper	800.00	20.0	.60	9,600.00	12.00	.....	9,600.00	12.00
Jefferson	698.5	16.3	.65	7,411.85	10.60	5,933.91	13,345.76	19.00
Johnson	700.0	18.0	.60	7,554.30	10.60	25,039.36	32,593.66	46.50
Jones	503.00	18.0	.60	5,338.17	10.20	7,189.43	12,527.60	24.70
Keokuk	.....	.....	.65	199.04	.....	14,382.76	14,581.80	.....
Lee	519.00	18.0	.60	5,941.98	11.50	17,154.85	23,096.83	44.50
Linn	.....	.....	...	.....	.....	.....	.....	.....
Lucas	500.00	.....	.60	4,658.10	9.03	7,434.10	12,092.20	24.20
Madison	.....	.....	...	5,583.59	.....	17,442.02	23,025.61	.....
Mahaska	.....	.....	.60	.....	.....	5,128.98	5,128.98	.....
Marion	600.00	15.0	.65	9,310.65	15.60	23,402.50	32,713.15	5.45
Mills	400.00	18.0	.60	4,320.00	10.80	15,000.00	19,320.00	48.30
Mitchell	.....	.....	.75	3,492.83	.....	.....	3,492.83	.....
Monona	.....	.....	.66	1,882.24	.....	8,996.38	10,878.62	.....
Monroe	.....	.....	.70	.....	.....	.....	.....	.....
Montgomery	.....	.....	...	.....	.....	2,139.31	2,139.31	.....
Muscatine	530.00	22.80	.70	8,089.76	15.20	8,200.66	16,290.42	30.50
O'Brien	558.6	33.40	.74	13,858.29	25.00	11,676.97	25,535.26	45.60
Page	600.00	15.0	.60	7,638.51	12.70	22,352.94	29,991.45	49.90
Palo Alto	530.00	16.00	.65	5,330.51	10.20	18,584.14	23,914.65	45.00
Plymouth	.....	.....	.85	.....	.....	5,083.07	5,083.07	.....
Pocahontas	352.00	21.0	.92	7,878.15	22.4	8,917.17	16,795.32	47.8
Polk	175.00	18.0	.77	9,045.42	50.8	2,941.43	11,986.85	68.5
Ringgold	500.00	20.0	...	.....	.....	.....	.....	.....
Sac	700.00	15.0	.71	5,565.80	7.95	8,095.52	13,661.32	19.40
Scott	278.00	20.0	.90	4,998.34	17.9	7,984.60	12,982.94	46.60
Shelby	767.00	18.0	.68	9,220.00	12.0	22,954.75	32,174.75	42.20
Sioux	686.00	17.8	.75	12,051.95	17.4	33,425.35	45,477.30	60.5
Tama	385.00	16.3	.86	10,735.37	12.10	24,694.77	35,430.14	80.00
Van Buren	405.00	14.5	.53	2,685.17	6.70	13,405.49	16,090.66	39.70
Wapello	550.00	2.0	.35	5,725.61	10.40	12,641.33	18,366.94	33.50
Warren	864.00	16.0	.70	9,028.30	10.6	17,488.88	26,517.18	30.60
Wayne	.....	.....	...	5,018.92	.....	19,153.54	24,172.46	.....
Webster	797.00	17.5	.84	11,479.77	14.40	16,840.80	28,320.57	35.50
Winnebago	370.00	19.0	.75	5,272.50	.....	16,795.93	22,068.45	59.50
Winneshiek	326.00	14.0	.785	4,128.48	13.30	5,025.77	9,154.25	28.00
Woodbury	832.00	17.8	.71	10,494.12	12.60	26,769.36	37,263.48	44.50
Worth	341.00	18.0	.75	4,604.54	13.50	5,811.93	10,416.47	30.50
Wright	354.00	23.1	.75	6,110.20	17.3	7,883.60	13,993.80	39.50
Average for state	.....	17.81	$ .69½	.....	13.71	.....	.....	$34.30
Totals	.....	.....	.....	$416,396.38	.....	$951,759.78	$1,368,156.16	.....

ROAD EQUIPMENT AND MATERIAL ON HAND JANUARY 1, 1918.

County.	Value of county road material.	Gravel pits owned by county.		Value of road machinery and tools owned by county.	Value of township road tools and machinery.
		Number	Value		
Adair	.....	....	.....	$ 3,278.00	$ 2,184.32
Adams	.....	1	$ 1,500.00	545.00	7,200.00
Allamakee	.....	....	.....	2,330.00	.....
Appanoose	.....	....	.....	1,600.00	.....
Audubon	.....	....	.....	1,580.00	3,630.00
Benton	.....	2	150.00	7,306.00	8,675.00
Black Hawk	.....	....	.....	7,034.50	8,749.50
Boone	.....	....	.....	6,757.00	.....
Bremer	.....	2	.....	3,427.38	4,500.00
Buchanan	.....	5	1,500.00	6,684.00	6,762.25
Buena Vista	.....	4	500.00	3,080.00	.....
Butler	.....	7	3,125.00	7,241.00	2,807.00
Calhoun	.....	....	.....	10,002.00	3,359.27
Carroll	.....	....	.....	750.00	2,367.00
Cass	.....	....	.....	3,913.95	.....
Cedar	.....	....	.....	1,325.00	.....
Cerro Gordo	$ 5.00	1	1,000.00	1,775.00	.....
Cherokee	.....	....	.....	2,624.00	.....
Chickasaw	.....	4	459.00	5,970.00	.....
Clarke	.....	....	.....	1,550.50	.....
Clay	.....	9	4,700.00	4,140.00	.....
Clayton	.....	....	.....	10,160.00	4,635.65
Clinton	.....	....	.....	.....	.....
Crawford	.....	....	.....	400.00	1,000.00
Dallas	.....	1	350.00	8,576.11	2,900.00
Davis	.....	....	.....	1,700.00	.....
Decatur	.....	....	.....	1,500.00	1,200.00
Delaware	.....	6	1,250.00	1,845.00	.....
Des Moines	580.00	1	304.75	1,458.07	1,874.75
Dickinson	.....	1	500.00	2,133.00	1,009.65
Dubuque	.....	5	2,000.60	1,531.30	.....
Emmet	.....	....	.....	3,245.00	.....
Fayette	.....	2	250.00	5,640.00	7,300.00
Floyd	.....	2	775.00	3,150.00	4,800.00
Franklin	.....	....	.....	5,015.00	.....
Fremont	.....	....	.....	800.00	.....
Greene	.....	....	.....	700.00	3,120.00
Grundy	100.00	....	.....	1,725.00	4,142.50
Guthrie	.....	....	.....	9,280.00	.....
Hamilton	.....	6	1,625.00	8,886.00	1,551.00
Hancock	.....	5	2,000.00	2,959.00	1,368.40
Hardin	782.00	....	.....	4,345.06	.....
Harrison	.....	....	.....	1,639.00	2,025.75
Henry	.....	1	10.00	1,145.00	2,044.00
Howard	.....	....	.....	3,078.00	6,131.30
Humboldt	.....	....	.....	2,378.00	3,140.00
Ida	.....	....	.....	4,205.00	3,704.00
Iowa	.....	....	.....	5,256.00	6,509.45
Jackson	.....	....	.....	4,175.00	.....
Jasper	.....	....	.....	5,480.00	9,000.00
Jefferson	.....	....	.....	4,365.00	4,327.25
Johnson	.....	....	.....	1,580.00	.....
Jones	.....	....	.....	1,660.60	.....
Keokuk	.....	....	.....	3,191.00	1,811.71
Kossuth	.....	2	500.00	5,363.00	.....
Lee	.....	....	.....	2,455.00	.....
Linn	.....	4	2,300.00	4,670.00	.....
Louisa	.....	....	.....	2,843.75	.....
Lucas	.....	....	.....	1,524.00	2,873.00
Lyon	.....	1	125.00	2,000.00	4,256.00
Madison	.....	....	.....	10,220.00	.....
Mahaska	.....	....	.....	.....	.....

ROAD EQUIPMENT AND MATERIAL—Continued.

County.	Value of county road material.	Gravel pits owned by county.		Value of road machinery and tools owned by county.	Value of township road tools and machinery.
		Number	Value		
Marion	.....	1	1,060.00	3,650.00	3,000.00
Marshall	.....	....	.....	8,890.00	.....
Mills	.....	1	200.00	1,375.00	4,500.00
Mitchell	4,500.50	....	.....	66.40	.....
Monona	300.00	....	.....	.....	2,187.00
Monroe	.....	....	.....	4,301.62	4,000.00
Montgomery	.....	....	.....	1,080.00	.....
Muscatine	200.00	....	.....	3,518.00	5,365.00
O'Brien	27.20	....	.....	11,282.05	14,080.87
Osceola	.....	....	.....	2,910.00	.....
Page	.....	....	.....	3,645.00	.....
Palo Alto	.....	1	206.80	3,220.00	9,452.00
Plymouth	.....	....	.....	.....	.....
Pocahontas	124.00	12	3,500.00	12,560.00	6,008.00
Polk	.....	....	.....	7,691.00	1,295.00
Pottawattamie	2,143.29	....	.....	6,089.19	.....
Poweshiek	.....	....	.....	.....	.....
Ringgold	.....	....	.....	2,820.00	.....
Sac	.....	1	50.00	1,601.00	4,446.00
Scott	.....	1	1,400.00	2,865.00	.....
Shelby	.....	....	.....	1,057.25	4,413.00
Sioux	.....	....	.....	3,115.00	.....
Story	.....	3	2,000.00	6,360.00	.....
Tama	.....	....	.....	3,075.00	12,921.75
Taylor	.....	....	.....	1,815.00	.....
Union	.....	....	.....	2,210.00	.....
Van Buren	.....	....	.....	3,280.00	2,400.00
Wapello	.....	....	.....	3,005.00	6,834.00
Warren	.....	....	.....	1,091.35	4,800.00
Washington	.....	....	.....	4,750.00	.....
Wayne	.....	....	.....	3,030.00	.....
Webster	.....	2	1,200.00	12,540.00	21,387.00
Winnebago	.....	....	.....	3,525.00	.....
Winneshiek	.....	....	.....	3,647.50	2,663.00
Woodbury	.....	....	.....	3,295.00	7,690.28
Worth	150.00	2	1,150.00	.....	8,568.00
Wright	.....	....	.....	5,267.00	.....
Totals	$ 8,906.90	96	$ 35,890.55	$365,122.58	$268,177.65

ROAD CONSTRUCTION.

TOWNSHIP EXPENDITURES.

(TABLE NO. 1)

County.	Number of townships in county	Number of townships reporting	Built to finished grade.		Built to temporary grade.		Built to natural grade.	
			Miles	Cost	Miles	Cost	Miles	Cost
Adair	20	....	....	.....	1.25	$ 1,275.50	18	$ 5,800.00
Adams	12	*12	....	.....	....	.....	264	11,584.90
Allamakee	18	....	....	.....	....	.....	....	.....
Appanoose	18	*18	....	.....	....	.....	....	.....
Audubon	12	10	....	.....	....	.....	200	7,783.50
Benton	20	13	....	.....	....	3,550.00	....	1,650.50
Black Hawk	18	12	1	$ 333.60	....	.....	....	907.68
Boone	17	....	....	.....	....	.....	....	.....
Bremer	14	9	....	.....	....	.....	3	6,389.51
Buchanan	18	*16	....	.....	....	1,871.66	....	5,041.75
Buena Vista	18	*8	....	2,392.60	....	.....	....	2,572.86
Butler	16	8	....	573.53	....	1,082.47	....	2,557.66
Calhoun	17	16	3.5	1,818.00	....	3,842.90	....	4,025.10
Carroll	16	10	.5	219.59	....	3,010.09	....	3,790.39
Cass	18	*16	....	.....	....	.....	....	865.36
Cedar	18	*18	....	.....	....	.....	65	7,131.76
Cerro Gordo	16	16	....	.....	....	.....	10	1,261.55
Cherokee	12	(?)	....	.....	....	.....	....	.....
Chickasaw	12	....	....	†	....	.....	....	.....
Clarke	16	8	....	.....	....	.....	....	2,701.00
Clay	22	*17	....	.....	....	335.00	....	2,164.73
Clayton	20	....	....	.....	....	.....	....	.....
Clinton	21	*21	....	.....	....	.....	....	.....
Crawford	16	15	....	.....	.25	78.95	4.75	1,121.50
Dallas	15	....	....	.....	....	.....	....	.....
Davis	16	....	....	.....	....	.....	....	.....
Decatur	16	....	....	.....	....	.....	....	.....
Delaware	14	*13	....	1,328.70	....	2,851.67	....	1,209.45
Des Moines	12	(?)	....	.....	....	.....	47	(?)
Dickinson	18	....	....	.....	....	.....	....	.....
Dubuque	12	....	....	.....	....	.....	....	.....
Emmet	20	....	....	.....	....	.....	....	.....
Fayette	13	*8	....	.....	.5	8	43	3,333.00
Floyd	16	....	....	.....	....	.....	....	.....
Franklin	13	(?)	....	.....	....	.....	....	.....
Fremont	16	9	11.75	11,039.01	....	.....	2.5	297.38
Greene	14	*14	....	.....	....	.....	....	.....
Grundy	17	....	....	.....	....	.....	....	.....
Guthrie	16	4	.5	725.00	....	475.94	....	1,749.65
Hamilton	16	*11	....	1,868.75	....	2,634.85	....	2,000.00
Hancock	17	....	....	.....	....	.....	....	.....
Hardin	20	*6	....	.....	....	.....	....	.....
Harrison	12	....	....	.....	....	.....	....	.....
Henry	12	*12	....	.....	....	.....	....	4,369.89
Howard	14	*9	4.25	3,500.00	....	.....	50	7,500.00
Humboldt	12	*12	....	.....	....	.....	....	.....
Ida	18	*18	....	.....	....	306.74	....	6,142.05
Iowa	18	4	....	.....	....	.....	....	.....
Jackson	19	....	....	.....	....	.....	....	.....
Jasper	12	*12	....	.....	....	.....	....	6,747.12
Jefferson	21	7	....	.....	....	.....	28.5	2,200.00
Johnson	12	(?)	....	4,329.54	....	7,189.43	....	.....
Jones	17	*7	....	.....	....	.....	....	.....
Keokuk	28	....	....	.....	....	.....	....	.....
Kossuth	17	*15	.*	762.90	....	.....	....	1,662.78

TOWNSHIP EXPENDITURES—Continued.

County.	Number of townships in county.	Number of townships reporting.	Built to finished grade.		Built to temporary grade.		natural grade. Built to	
			Miles	Cost	Miles	Cost	Miles	Cost
Linn	20	....	....	.....	....	.....	....	.....
Louisa	12	....	....	.....	....	.....	....	.....
Lucas	12	*9	....	.....	....	.....	....	.....
Lyon	18	....	....	.....	....	.....	....	.....
Madison	16	12	....	.....	....	.....	....	2,602.05
Mahaska	19	10	....	.....	....	6,115.24	....	303.44
Marion	15	11	....	.....	....	.....	....	.....
Marshall	18	....	....	.....	....	.....	....	.....
Mills	13	*13	....	.....	....	.....	47	5,122.36
Mitchell	16	(?)	....	.....	....	.....	....	12,418.35
Monona	19	6	....	.....	....	.....	....	1,962.48
Monroe	12	....	....	.....	....	.....	....	.....
Montgomery	12	*4	....	.....	....	.....	....	.....
Muscatine	15	*15	....	.....	....	264.45	....	4,722.46
O'Brien	17	16	.25	122.50	....	127.75	141.25	10,704.36
Osceola	12	....	....	.....	....	.....	....	.....
Page	16	....	....	102.70	....	697.15	....	894.55
Palo Alto	16	*16	2.25	2,085.81	....	180.05	....	1,094.43
Plymouth	24	....	....	.....	....	.....	....	4,560.63
Pocahontas	19	17	....	.....	....	2,292.00	57	8,913.35
Polk	22	14	.25	216.00	....	.....	....	.....
Pottawattamie	28	....	....	.....	....	.....	....	.....
Poweshiek	16	....	....	.....	....	.....	....	.....
Ringgold	16	....	....	.....	....	.....	....	.....
Sac	16	12	3.12	2,445.38	....	.....	14	8,682.61
Scott	16	8	2.25	2,249.56	....	.....	....	793.45
Shelby	16	15	....	.....	....	.....	....	.....
Sioux	23	(?)	....	.....	....	.....	50.7	4,415.57
Story	16	....	....	.....	....	.....	....	.....
Tama	21	21	....	.....	....	2,083.16	4	2,432.18
Taylor	11	....	....	.....	....	.....	....	.....
Union	14	(?)	....	.....	....	.....	....	.....
Van Buren	14	(?)	....	.....	....	.....	....	.....
Wapello	14	*14	....	.....	....	2,323.91	....	2,082.86
Warren	17	*16	....	.....	....	.....	....	.....
‡Washington	15	....	....	.....	....	.....	....	.....
Wayne	16	....	....	.....	....	.....	....	.....
Webster	24	*23	....	.....	1.25	666.50	61.25	3,873.40
Winnebago	12	(?)	....	.....	....	.....	....	2,579.04
Winneshiek	20	*11	....	.....	....	.....	....	8,171.48
Woodbury	24	11	....	.....	....	.....	....	899.83
Worth	13	*12	1	537.43	26	2,729.24	13	4,258.17
Wright	18	12	....	.....	....	500.00	....	2,430.88
Totals	1,646	(?)	.....	$36,452.00	.....	$ 46,484.65	.....	$198,480.02

†Not reported.
‡Information not available.
*Doubtful information.

ROAD CONSTRUCTION.

TOWNSHIP EXPENDITURES.

(TABLE NO. 2)

County.	Permanently surfaced. Miles	Permanently surfaced. Cost	Filling bridges and culverts.	Tile drainage.	Hauling and placing temporary culverts.	Total township expenditure for road construction
Adair	....	.....	$ 340.72	.....	.....	$ 6,145.72
Adams	....	.....	2,142.00	.....	$ 1,205.97	16,208.27
Allamakee	....	.....	.....	.....	.....	.....
Appanoose	....	.....	3,564.65	.....	2,845.52	6,210.17
Audubon	....	.....	1,852.80	.....	699.57	10,295.87
Benton	....	$ 216.00	1,190.00	.....	554.00	7,360.00
Black Hawk	4.0	1,124.02	210.93	42.91	188.58	2,807.72
Boone	....	.....	.....	.....	.....	.....
Bremer	....	.....	2,512.76	.....	874.94	9,777.23
Buchanan	....	1,188.62	1,871.55	77.11	1,014.60	13,067.71
Buena Vista	....	125.00	2,400.44	2,085.21	1,110.40	10,686.31
Butler	....	766.86	801.35	83.21	591.57	6,457.05
Calhoun	....	53.00	2,133.97	1,482.79	590.95	11,936.71
Carroll	....	1,179.92	1,418.29	557.30	160.90	10,535.67
Cass	....	.....	1,222.25	.....	158.75	2,246.86
Cedar	....	.....	.....	.....	130.65	130.65
Cerro Gordo	....	1,155.64	922.60	4,756.16	413.50	14,219.66
Cherokee	....	.....	1,729.17	.....	1,066.85	4,057.57
Chickasaw	....	.....	.....	193.57	.....	193.57
‡Clarke	....	.....	.....	.....	.....	.....
Clay	....	155.00	1,234.00	2,875.00	398.00	7,208.00
Clayton	....	.....	1,902.39	.....	3,396.83	7,953.95
Clinton	....	.....	.....	.....	.....	.....
Crawford	....	.....	8,000.00	.....	2,500.00	10,500.00
Dallas	....	.....	3,837.25	2,089.72	1,010.13	8,107.35
Davis	....	.....	.....	.....	.....	.....
Decatur	....	.....	.....	.....	.....	.....
Delaware	....	.....	.....	.....	.....	.....
Des Moines	....	197.90	1,311.98	.....	486.19	7,385.89
Dickinson	2.0	.....	.....	4,606.91	.....	4,606.91
Dubuque	....	.....	.....	.....	.....	.....
Emmet	....	.....	.....	.....	.....	.....
Fayette	....	.....	.....	.....	.....	.....
Floyd	....	.....	627.50	?	615.42	4,571.92
Franklin	....	.....	.....	.....	.....	.....
Fremont	....	.....	.....	64.90	.....	64.90
Greene	1.75	210.00	516.46	2,941.25	177.07	15,181.20
Grundy	....	.....	3,123.87	720.60	796.97	4,641.44
Guthrie	....	.....	.....	.....	.....	.....
Hamilton	....	800.00	295.90	4,926.08	27.00	9,049.57
Hancock	....	640.50	983.62	2,444.88	648.00	10,820.60
Hardin	....	.....	.....	.....	.....	.....
Harrison	....	.....	1,397.87	.....	.....	1,397.87
Henry	....	.....	.....	.....	.....	.....
Howard	....	.....	2,560.65	403.52	481.98	7,716.05
Humboldt	....	.....	.....	.....	.....	11,000.00
Ida	....	.....	1,274.50	.....	1,184.31	2,458.81
Iowa	....	.....	2,830.78	400.61	2,342.93	12,023.11
Jackson	....	.....	176.40	.....	8.00	184.40
Jasper	....	.....	.....	.....	.....	.....
Jefferson	....	.....	5,658.17	70.86	1,612.46	14,088.61
Johnson	....	.....	967.25	.....	454.15	3,621.40
Jones	....	.....	2,280.98	.....	.....	13,599.95
Keokuk	....	.....	1,038.37	.....	421.04	1,459.41
Kossuth	....	.....	.....	.....	.....	.....

TOWNSHIP EXPENDITURES—Continued.

County.	Permanently surfaced. Miles	Permanently surfaced. Cost	Filling bridges and culverts.	Tile drainage.	Hauling and placing temporary culverts.	Total township expenditure for road construction
Lee	....	1,275.58	1,229.95	.....	941.83	5,874.04
Linn	....	.....	.....	.....	.....	.....
Louisa	....	.....	2,696.49	.....	.....	2,696.49
Lucas	....	.....	.....	.....	.....	.....
Lyon	....	.....	4,268.43	88.63	895.89	7,855.00
Madison	....	.....	5,068.36	.....	1,388.48	12,775.52
Mahaska	....	.....	5,500.00	800.00	1,000.00	14,300.00
Marion	....	.....	.....	.....	.....	.....
Marshall	....	.....	3,063.95	14.00	1,114.14	9,334.45
Mills	....	.....	.....	.....	.....	12,416.35
Mitchell	....	.....	436.25	111.54	.....	2,510.27
Monona	....	.....	.....	.....	.....	.....
Monroe	....	.....	.....	.....	815.24	815.24
Montgomery	....	432.52	1,243.36	.....	947.55	7,610.34
Muscatine	....	.....	3,423.07	398.50	423.60	15,200.78
O'Brien	....	.....	.....	.....	.....	.....
Osceola	....	.....	1,527.15	137.56	337.40	3,696.51
Page	....	61.61	923.60	4,048.99	232.96	8,627.45
Palo Alto	....	.....	534.10	.....	400.40	3,495.13
Plymouth	....	.....	2,004.25	3,883.46	402.20	17,495.26
Pocahontas	....	123.00	1,826.28	856.31	400.10	3,419.69
Polk	....	.....	.....	.....	.....	.....
Pottawattamie	....	.....	.....	.....	.....	.....
Poweshiek	....	.....	.....	.....	.....	.....
Ringgold	6.0	1,337.32	1,626.12	2,529.06	214.34	16,834.83
Sac	2.0	4,288.42	468.65	.....	3,547.27	11,347.35
Scott	....	.....	1,715.10	113.90	1,041.57	2,870.57
Shelby	....	.....	.....	.....	.....	4,415.57
Sioux	....	.....	.....	.....	.....	.....
Story	....	.....	3,328.73	3,371.97	2,414.01	13,630.05
Tama	....	.....	.....	.....	.....	.....
Taylor	....	.....	.....	.....	.....	.....
Union	....	.....	1,637.36	.....	1,783.82	3,421.18
Van Buren	....	.....	3,264.18	183.17	1,632.42	9,468.54
Wapello	....	.....	2,522.82	265.64	1,835.38	4,623.84
Warren	....	.....	.....	.....	.....	.....
Washington	....	.....	.....	.....	.....	.....
Wayne	....	.....	730.00	12,737.44	1,401.37	19,408.71
Webster	....	.....	.....	.....	.....	2,579.04
Winnebago	....	.....	1,858.27	.....	125.25	10,155.00
Winneshiek	....	.....	4,383.48	1,671.80	677.69	7,542.80
Woodbury	....	.....	912.80	3,122.41	279.40	12,583.75
Worth	3.0	742.30	642.00	349.14	610.68	4,732.79
Wright	....	.....	.....	.....	.....	.....
Totals	....	$ 18,471.23	$122,417.17	$ 65,118.15	$ 60,277.62	$547,360.42

‡Information not available.

BONDED INDEBTEDNESS FOR HIGHWAY WORK.

County.	Bonded indebtedness Nov. 1, 1914.			Bonded indebtedness Jan. 1, 1916.			Increase from Nov. 1, 1914 to Jan. 1, 1916.	Decrease from Nov. 1, 1914 to Jan. 1, 1916.
	Bridges	Roads	Total	Bridges	Roads	Total		
Adams	$ 12,000.00		$ 12,000.00	$ 7,500.00		$ 7,500.00		$ 4,500.00
Allamakee	22,000.00		22,000.00	1,900.00		1,900.00		3,000.00
Audubon	42,000.00		42,000.00	42,000.00		42,000.00		
Benton				25,000.00		25,000.00	$ 25,000.00	
Black Hawk				13,000.00		13,000.00	13,000.00	
Boone	60,450.00		60,450.00	49,450.00		49,450.00		11,000.00
Buena Vista	18,500.00		18,500.00	40,000.00		40,000.00	21,500.00	
Calhoun	35,000.00		35,000.00	25,000.00		25,000.00		10,000.00
Carroll	40,000.00		40,000.00	95,000.00		95,000.00	55,000.00	
Cass	94,000.00		94,000.00	81,000.00		81,000.00		13,000.00
Cedar	20,000.00		20,000.00	10,000.00		10,000.00		10,000.00
Cherokee	13,000.00		13,000.00	13,000.00		13,000.00		
Chickasaw				28,000.00		28,000.00	28,000.00	
Clarke				22,000.00		22,000.00	22,000.00	
Clay				102,000.00	$ 7,000.00	109,000.00	109,000.00	
Clayton	35,000.00	$ 15,000.00	50,000.00	35,000.00	15,000.00	50,000.00		
Clinton	57,000.00		57,000.00	52,000.00		52,000.00		5,000.00
Crawford	50,000.00		50,000.00	50,000.00		50,000.00		
Davis	37,500.00		37,500.00	31,500.00		31,500.00		6,000.00
Decatur				13,550.63		13,550.63	13,550.63	
Des Moines	30,000.00	26,000.00	56,000.00	29,500.00	19,500.00	49,000.00		7,000.00
Dickinson				18,000.00	3,506.81	21,506.81	21,506.81	
Floyd				66,234.14	17,486.49	83,720.63	83,720.63	
Fremont	120,000.00		120,000.00	182,000.00		182,000.00	62,000.00	
Guthrie				31,900.00		31,900.00	31,900.00	
Howard				39,000.00		39,000.00	39,000.00	
Iowa	50,500.00		50,500.00	50,500.00		50,500.00		
Jackson	134,000.00		134,000.00	130,000.00		130,000.00		4,000.00
Johnson	4,500.00		4,500.00	50,000.00		50,000.00	45,500.00	
Kossuth	142,000.00		142,000.00	142,000.00		142,000.00		
Lee	32,000.00		32,000.00	25,000.00		25,000.00		7,000.00
Madison	41,068.38		41,068.38	41,068.38		41,068.38		
Mahaska	37,000.00		37,000.00	71,131.00	19,406.16	90,537.16	53,537.16	
Marion	65,000.00		65,000.00	176,000.00		176,000.00	111,000.00	
Mills	10,000.00		10,000.00	35,000.00	5,000.00	40,000.00	30,000.00	
Page				48,260.00		48,260.00	48,260.00	
Plymouth				2,839.14		2,839.14	2,839.14	
Pocahontas	60,000.00		60,000.00	51,000.00		51,000.00		9,000.00
Polk	155,000.00		155,000.00	285,000.00		285,000.00	130,000.00	
Pottawattamie				75,000.00	65,000.00	140,000.00	140,000.00	
Union	119,000.00		119,000.00	114,000.00				5,000.00
Wapello	77,000.00		77,000.00	119,000.00	23,000.00	142,000.00	65,000.00	
Warren	45,000.00		45,000.00	45,000.00		45,000.00		
Winneshiek	162,000.00		162,000.00	162,000.00		162,000.00		
Woodbury	54,000.00		54,000.00	59,000.00		59,000.00	5,000.00	
Wright	110,000.00		110,000.00	106,000.00		106,000.00		4,000.00
Totals	$1,984,518.38	$ 41,000.00	$2,025,518.38	$2,891,333.29	$ 174,899.46	$3,066,232.75	$1,156,314.37	$ 98,500.00
Total increase							$1,057,814.37	

ACTUAL EXPENDITURES FOR ROAD AND BRIDGE WORK.

County.	County Expenditures.		Township Expenditures.			
	Roads.	Bridges and culverts.	Number in county.	Number reporting.	Amount reported.	Estimated total expenditure.
Adair	$ 36,268.93	$ 39,096.14	20	20	$ 27,316.51	$ 27,316.51
Adams	25,539.93	53,552.83	12	12	23,784.17	23,784.17
Allamakee	34,923.48	51,217.30	18	16	25,447.18	28,800.10
Appanoose	24,027.14	54,716.88	18	*18	27,618.28	27,618.28
Audubon	18,436.04	56,144.39	12	10	22,562.11	26,400.00
Benton	28,184.24	88,849.13	20	13	24,500.00	37,700.00
Black Hawk	21,210.92	92,947.74	18	12	20,072.61	30,000.00
Boone	30,763.83	40,571.78	17	8	.....	.....
Bremer	27,533.16	55,361.97	14	9	20,828.53	44,000.00
Buchanan	41,130.57	49,999.32	16	*16	36,123.25	36,123.25
Buena Vista	71,976.10	124,653.17	18	.....	.....	.....
Butler	38,779.55	81,513.02	16	8	16,186.19	32,300.00
Calhoun	63,406.43	83,374.81	17	17	39,919.36	39,919.36
Carroll	32,684.59	87,714.91	16	10	22,754.29	35,200.00
Cass	28,289.49	76,951.69	16	6	12,382.39	32,800.00
Cedar	32,480.57	77,111.87	18	.....	.....	.....
Cerro Gordo	65,452.64	65,516.72	18	*16	41,490.64	41,490.64
Cherokee	33,449.08	66,060.47	16	16	29,463.06	29,463.06
Chickasaw	24,472.49	52,920.81	12	*12	24,182.53	24,182.53
Clarke	24,563.45	44,103.29	12	.....	.....	.....
Clay	32,789.64	131,817.25	16	16	37,000.00	37,000.00
Clayton	36,976.60	111,145.30	22	17	29,872.56	38,600.00
Clinton	47,241.72	87,997.61	20	.....	.....	.....
Crawford	48,598.94	115,916.09	21	*21	53,000.00	53,000.00
Dallas	36,654.36	92,437.62	16	15	43,315.85	46,100.00
Davis	29,391.15	55,570.40	15	.....	.....	.....
Decatur	36,720.96	56,752.91	16	8	13,950.00	27,800.00
Delaware	35,283.88	55,066.74	16	.....	.....	.....
Des Moines	33,391.45	25,734.99	14	*14	24,128.05	24,128.05
Dickinson	31,726.26	51,576.00	12	*12	24,284.73	24,284.73
Dubuque	31,290.41	103,270.04	18	.....	.....	.....
Emmet	23,021.53	51,437.96	12	.....	.....	.....
Fayette	33,961.24	84,965.71	20	*20	35,349.94	35,349.94
Floyd	39,025.84	70,296.01	13	13	29,234.55	29,234.55
Franklin	34,149.79	39,480.34	16	11	25,830.39	37,600.00
Fremont	27,267.43	66,797.27	13	.....	.....	.....
Greene	32,936.00	36,797.73	16	8	14,981.24	37,900.00
Grundy	22,195.24	81,425.23	14	12	26,200.00	31,560.00
Guthrie	38,054.29	81,394.76	17	6	14,049.10	39,805.00
Hamilton	65,079.07	69,466.53	16	7	19,645.50	46,000.00
Hancock	47,507.92	32,163.33	16	11	22,305.81	32,400.00
Hardin	37,686.45	57,207.76	17	17	38,148.50	38,148.50
Harrison	32,716.10	92,112.77	20	6	21,566.01	71,600.00
Henry	17,389.11	34,473.50	12	*12	26,740.59	26,740.59
Howard	17,105.36	72,556.75	12	12	13,333.19	13,333.19
Humboldt	22,938.62	38,704.20	14	12	29,836.60	29,836.60
Ida	18,125.54	56,133.32	12	*12	29,069.81	29,069.81
Iowa	37,731.63	78,260.32	18	*18	48,028.85	48,028.85
Jackson	21,348.65	63,354.96	18	15	21,872.11	28,600.00
Jasper	31,260.63	98,544.00	19	19	55,069.42	55,069.42
Jefferson	25,236.92	54,987.17	12	12	32,823.37	32,823.37
Johnson	43,358.58	130,349.91	21	*21	36,215.06	36,215.06
Jones	36,104.18	32,501.52	17	*17	24,635.42	24,635.42
Keokuk	24,437.01	42,701.53	17	10	18,078.29	31,240.00
Kossuth	49,893.46	98,080.79	28	.....	.....	.....

ACTUAL EXPENDITURES—Continued.

County.	County Expenditures.		Township Expenditures.			
	Roads.	Bridges and culverts.	Number in county.	Number reporting.	Amount reported.	Estimated total expenditure.
Lee	19,574.13	63,180.30	17	*17	28,770.87	28,770.87
Linn	26,134.44	74,525.27	20	.....	.....	.....
Louisa	15,716.90	41,511.89	12	.....	.....	.....
Lucas	24,430.32	45,078.34	12	11	18,453.61	20,100.00
Lyon	32,376.00	86,842.08	18	.....	.....	.....
Madison	25,873.54	52,250.00	16	12	29,146.91	38,800.00
Mahaska	41,346.51	73,116.24	19	*19	19,351.10	19,351.10
Marion	63,830.96	141,161.84	15	15	38,702.50	38,702.50
Marshall	26,258.14	51,230.65	18	.....	.....	.....
Mills	26,985.06	59,492.36	13	13	30,403.50	30,403.50
Mitchell	23,863.42	55,916.07	16	10	15,911.18	25,400.00
Monona	41,308.62	57,636.89	19	*6	11,426.00	36,100.00
Monroe	18,773.65	47,641.77	12	.....	.....	.....
Montgomery	14,712.41	53,199.30	12	8	9,500.11	22,800.00
Muscatine	25,852.21	35,197.56	15	15	28,754.30	28,754.30
O'Brien	30,834.95	72,451.83	17	16	40,736.04	43,456.04
Osceola	13,527.09	29,662.58	12	10	19,737.57	25,630.00
Page	56,038.46	80,710.29	16	16	36,962.94	36,962.94
Palo Alto	25,871.83	43,287.51	16	*16	32,542.10	32,542.10
Plymouth	24,880.44	94,597.82	24	24	44,474.04	44,474.04
Pocahontas	63,745.64	83,732.87	19	17	49,700.77	55,000.00
Polk	48,589.29	138,122.22	22	18	38,100.62	46,500.00
Pottawattamie	89,709.45	137,626.65	28	.....	.....	.....
Poweshiek	38,513.44	81,454.42	16	.....	.....	.....
Ringgold	23,144.60	42,287.71	16	.....	.....	.....
Sac	51,592.69	62,812.45	16	12	37,549.77	50,000.00
Scott	39,393.50	34,948.20	16	*9	24,330.29	42,000.00
Shelby	16,603.25	64,630.30	16	15	27,962.94	29,800.00
Sioux	19,066.78	73,300.27	23	23	46,892.87	46,892.87
Story	32,735.84	58,046.11	16	.....	.....	.....
Tama	48,676.98	76,789.64	21	21	59,243.68	59,243.68
Taylor	25,930.56	45,210.52	17	.....	.....	.....
Union	19,185.27	56,612.67	14	.....	.....	.....
Van Buren	11,137.65	54,325.09	14	*14	21,436.57	21,436.57
Wapello	43,595.58	74,907.78	14	*14	31,221.47	31,221.47
Warren	27,265.60	72,910.42	17	*17	33,326.27	33,326.27
Washington	47,997.03	58,545.21	15	15	35,995.18	35,995.18
Wayne	30,311.01	33,643.96	16	16	24,172.42	24,172.42
Webster	53,494.24	63,127.26	24	24	56,612.29	56,612.29
Winnebago	38,104.25	25,430.58	12	.....	.....	.....
Winneshiek	26,891.13	80,548.31	20	11	21,231.71	38,600.00
Woodbury	55,007.83	66,453.19	24	11	20,500.00	44,806.35
Worth	22,938.00	16,229.76	13	13	22,998.92	22,998.92
Wright	43,976.17	55,437.58	18	*18	21,151.85	21,151.85
Totals	$3,396,364.95	$6,629,252.24	1646	1063	$2,216,600.20	$2,676,736.05

*Information not authentic.

NOTE: 1,063 townships reported $2,216,600.20, or $2,086.00 per township. Estimating entire state of 1,646 townships on this basis gives $3,424,280.00.

ILLUSTRATIONS

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PART ONE.

PART TWO.

PART THREE.

PART FOUR.