

SECOND ANNUAL REPORT

OF THE

# Iowa State Highway Commission

MADE TO

THE GOVERNOR OF IOWA

For the Year Ending July 1, 1906

A. MARSTON, C. F. CURTISS, DIRECTORS.

THOS. H. MACDONALD,  
Highway Engineer to the Commission.

DES MOINES  
EMORY H. ENGLISH, STATE PRINTER  
1907

SECOND ANNUAL REPORT  
OF  
IOWA STATE HIGHWAY COMMISSION

For the Year Ending July 1, 1906

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LETTER OF TRANSMITTAL

AMES, IOWA, December 11, 1906.

*To the Honorable A. B. Cummins,  
Governor of the State of Iowa:*

In accordance with the provision of the law creating the Iowa State Highway Commission, we herewith submit to you the Second Annual Report. This report has been prepared by Thos. H. MacDonald, Highway Engineer to the Commission. It will be found to contain a detailed report of the work of the commission and of its expenditures during the fiscal year.

ORGANIZATION OF THE COMMISSION.

The organization of the commission during the year has been as follows: A. Marston, C. F. Curtiss, Directors; T. H. MacDonald, Highway Engineer; J. B. Davidson, Engineer of Road Machinery.

The only change in the personnel has been the appointment of J. B. Davidson to succeed C. J. Zintheo, resigned, in charge of road machinery.

APPROPRIATIONS.

A study of the detailed report will show that the urgent demands from the road officers of Iowa upon the commission for the assistance in their work far exceed what is in the power of the Commission to afford with the funds at present available.

A study of the table on page 53 of the First Annual report, and also the one included in this report, showing the sums appropriated by other states for the work of their highway commission, will show that Iowa is at the foot of the list.

We therefore ask that the annual appropriation for our work be increased to \$10,000 per year.

#### LEGISLATION RECOMMENDED.

*County Road Fund.*—Fully convinced that a better, more centralized and better systematized administration of our present road funds would give vastly more in the way of permanent road improvement without additional cost, we recommend the passage by this legislature of a law transferring to the county road fund one additional mill of the present road taxes, making the county road fund two mills instead of one as heretofore, and decreasing the township funds by a like amount.

It is a matter of common remark in many places that more real improvement of the roads is now being made with the present one mill county tax than with the other four mills.

*County Engineer.*—We further recommend the passage of a law substituting a county engineer elected by the people or appointed by the board of supervisors, to hold office as long as competent and satisfactory service is rendered, for the present county surveyors.

Not until the \$4,000,000 and more raised in Iowa each year for roads and bridges is spent under trained road and bridge experts, will we get adequate returns for the money.

The county engineers should be by law required to report annually to the State Highway Commission, and co-operate with it in the adoption of standard plans and specifications for the work.

Respectfully submitted,

A. MARSTON,  
C. F. CURTISS.



CONCRETE CULVERT DEMONSTRATION—ROAD SCHOOL—AUGUST, 1906.

IOWA HIGHWAY COMMISSION.



## SECTION ONE.

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## A GENERAL REVIEW OF THE FIELD OF HIGHWAY IMPROVEMENT IN IOWA.

The suspicion with which anything bearing the name of "good roads" or "hard roads" has been regarded in many quarters is largely disappearing, and it has come to be known that much improvement can be made in our traveled ways with the methods and resources which we now have. The Iowa Highway Commission is not a good roads commission nor a hard roads commission, but simply a highway commission, implying only that its purposes are to help the counties and townships do the best they can with the available means at hand. Our experience during the past two years has shown that very much must be done in the way of preliminary study and education before we can make any marked permanent improvement in the highways of the State. The whole question is one of men rather than of means.

### ROAD IMPROVEMENT A QUESTION OF MEN RATHER THAN OF MEANS.

Increased taxation, bonds or any of the other spectres which have loomed so largely for some who oppose any movement for better roads would hardly be advisable at this time. Men must be trained to take up the work before any scheme contemplated by those who would increase the available means could be made real or effective. The whole work of the commission since its organization has been directed toward this end. The issuing of publications, the detailed study of the topographical and geological features of the State in reference to road building and maintenance, the holding of the school of road instruction, and the conducting of demonstrations in road work have all been planned and directed toward the one end of developing men to take up the work in various parts of the State.

### ROAD ENGINEERING A PROFESSION.

The most encouraging feature of the work during the past year has been the entrance of young men into the field of highway improvement. This is absolutely the essential factor and the more

encouragement and headway we can make in this direction, the sooner will we obtain better results generally in the work. The field is a large one, so large in fact that we fail to realize its real significance. Road building as a profession has as yet to be recognized in these Mississippi Valley states, although it has attained high rank in the East where are to be found now the highest examples of permanent roads. To bring these men in from the East would simply be a backward step, for the man who would be a successful road builder in Iowa must be willing and able to build good earth roads. It is an encouraging sign of the times that during the past year many young men have taken up seriously the study of road building.

#### THE MONEY TAX SYSTEM IS A SUCCESS.

That we are not making any improvement under the money tax system, as has been inferred or charged by some of the opponents of this system is simply not true. We are making an improvement and a marked improvement in almost every section of the State, but the greatest factor which is hindering the development is the personal equation—the personal equation of the old-time road builder whose knowledge and methods have come down to him through a long line of predecessors, and the personal equation of the community that scoffs at the man who attempts to introduce new methods and new ideas into the road or bridge work. When these can be eliminated, if such is possible, a long step will have been made toward the end sought.

#### THE DEVELOPMENT OF THE HIGHWAY COMMISSION.

It is the aim and desire of the commission to build up an engineering bureau of practical men who can go into any part of the State at the call of the proper authorities and help them in whatever work they have in hand. In this way the movement for improved roads in the State will have a head, gathering and disseminating information to all the counties, introducing new ideas and new methods which give promise of helpfulness, and helping to put the whole expenditure of money, whether for road or bridge purposes, on a more business-like basis. Some means must be provided to give all movements a head. Our governmental policies, involving the control or regulation of large interests, private or public, must have champions who believe in them and who have the ability to see and do before they can be made operative

and effective. The same is true of any movement involving the betterment of a state, county or community. The vitalizing effort of individual interest and individual activity must set in motion the force of public interest and effort which only in a large sense can accomplish. It is the thought and desire of the highway commission to stand as the head of a conservative, yet progressive, movement toward highway betterment. There is no thought of holding out for this or that policy in opposition to every other form or method that might be employed, but rather a desire of aiding the counties to employ the means and resources available in the best manner possible and to urge such reforms and improvements as seem reasonable and timely.



CONCRETE CULVERT DEMONSTRATION—ROAD SCHOOL—AUGUST, 1906.  
IOWA HIGHWAY COMMISSION.



## SECTION I.

## LAWS RELATING TO THE HIGHWAY COMMISSION.

## LAW ESTABLISHING THE COMMISSION.

House File 371, Acts of the Thirtieth General Assembly was approved April 13, 1904, and reads as follows:

AN ACT to create a highway commission for the State of Iowa and defining the duties of same (additional to Chapter four (4) of Title Thirteen (XIII) of the Code, relating to the State College of Agriculture and Mechanic Arts).

*Be It Enacted by the General Assembly of the State of Iowa:*

Section 1. *Highway Commission—Duties.* That the Iowa State College of Agriculture and Mechanic Arts, at Ames, shall act as a highway commission for Iowa, whose duties shall be:

1. To devise and adopt plans and systems of construction and maintenance suited to the needs of different counties of the State, and conduct demonstrations in such highway construction at least once each year at some suitable place for the instruction of county supervisors, township trustees, superintendents, students of the college, and others.

2. To disseminate information and instruction to county supervisors and other highway officers who make request, to answer inquiries and to advise such supervisors and officers on questions pertaining to highway improvements, construction and maintenance, and when the board of supervisors of a county adjudge that the public necessity requires a public demonstration of improved highway construction, or maintenance in said county, and so request and agree to furnish necessary tools, help and motor power for same, the commission shall furnish as soon as practicable thereafter a trained and competent highway builder for such demonstration free to the county.

3. To formulate reasonable conditions and regulations for public demonstrations, and to promulgate advisory rules and regulations for the repair and maintenance of highways.

4. To keep a record of all the important operations of the highway commission and report same to the governor at the close of each fiscal year.

Sec. 2. *In Effect.* This act, being deemed of immediate importance, shall take effect and be in force on and after its publication in the Register and Leader and Des Moines Capital, newspapers published at Des Moines, Iowa.

Approved April 13, A. D. 1904.

## APPROPRIATIONS.

A second act appropriated \$7,000.00 for the biennial period 1904-1906 for developing the work of the commission. The Thirty-first General Assembly increased this amount to \$5,000.00 annually, this act becoming operative April 13, 1906.

## SECTION II.

## WORK OF THE HIGHWAY COMMISSION.

In this report no attempt has been made to conform strictly to the fiscal year ending July 1, 1906, except in the financial report. The school of instruction for road officers, although held in August has been included rather than to hold it over for next year's report.

The work of the commission will be taken up under the following heads:

1. Investigation.
2. Experiments.
3. School of Instruction for Road Officers.
4. Plans and Publications.
5. Demonstration Work.
6. Road Meetings.

## I. INVESTIGATIONS.

*Road Census.* In undertaking a work so large as the compilation of the Agricultural Road Schedules taken during the last census, the Commission was fully aware of the large amount of work involved and the time it would take to complete it with the limited means at hand. Only a small amount of money, as shown in the financial report, has been used for this work, but so far the results from about ten counties have been compiled. Preliminary results have already been published previously and if the actual results from the cards show the totals that the averages for the counties already taken up would indicate, the results for the entire State will show an astonishingly large amount of traffic carried on over the roads. Contrary to general thought, it is not the belief of the Commission that the hauling, such as is done in full loads or what may be called heavy traffic, is the important part of the traffic. From the results which we have so far compiled it is fully

shown that the really important use of the roads is made by the light traffic, the trips to and from market with light loads, and by the people in their social, educational or religious activities. The justification of the expenditure of public money in the improvement of the highways must always be found in the traffic itself. Not only the present amount of travel on the road, but also the amount it would be increased by improved conditions should be taken into account. The importance of accurate and reliable information in this connection can be readily understood and the almost entire lack of it has been a handicap in developing the work. Due to this lack the cause has been prejudiced in the minds of many conservative people by falacious statistics gathered in a variety of ways concerning the amount of traffic over our public highways. Attempts have been made to gather the amount of traffic over the public roads at various times but no detailed, systematic effort like the road census taken up by the highway commission has ever been instituted. Results heretofore have been mainly gathered through correspondence and blanks sent out, but the number of replies received in proportion to the area covered has been insufficient to give results that are at all usable. The Illinois Highway Commission has instituted a method of gathering statistics as to the traffic over improved and unimproved roads by actually counting the number of vehicles passing over particular stretches of roads during certain days. These will be of value in showing the development of the amount of light traffic by improved roads. As soon as the census cards are all compiled the results will be published in a bulletin together with other information which has been gathered pertaining to the traffic over public roads. It is highly desirable that this work should be completed during the coming year.

*Photographic Work.* The commission is collecting from all the sources possible photographs showing the conditions of road and bridge work in various parts of the State. These views are used to illustrate the various bulletins published, and are valuable in showing the actual development of the work over the State.

## II. EXPERIMENTS.

The experimental work of the commission has been curtailed by the rush of other matters of a more practical nature. It is the intention, however, to carry on extensive experiments in the use of concrete for bridges and culverts and in the testing of road ma-



terials. In developing the work the commission has tried to do both scientific research and practical work, and while it is believed that all the help possible should be given along practical lines to township and county officers in designing bridges and culverts or surveying roads or any work of a practical nature, it is also believed that experimental work should be regarded as one of the chief duties of such a commission. With this in mind the commission is gradually building up a testing laboratory for road materials and concrete, and in addition has access to the testing apparatus of the engineering department of the college.

*Testing Laboratory.* There have already been installed in the road materials laboratory a 4-cylinder Deval abrasion machine, a biquette machine and a Page-Johnson cementation machine. A number of tests of limestone and gravel for road material have been made and the results published in the latest edition of the Manual for Highway Officers. The installing of this laboratory has taken a considerable amount of the funds for the year, and is one of the most important parts of the year's work. Road material will be tested free of all cost for public road officers.

*Concrete Experiments.* During the past two years a number of concrete beams both plain and reinforced have been constructed, but up to this time the commission has not been able to test them. Now, however, a 100,000-pound beam testing machine has been purchased and will be installed temporarily in a shed built for this purpose. The beams which have been made will be tested, and it is planned to conduct a large number of experiments this winter.

### III. SCHOOL OF INSTRUCTION FOR ROAD OFFICERS.

As was said before, the school of instruction for road officers was not held until August this year as it was thought that possibly this would be a better time than in June, at which time the school was held last year. This time was not at all satisfactory, however, and it is quite possible that next year it will be changed again, the idea being to select such a time that the greatest possible attendance can be secured from practical road men over the State. This year, although hindered considerably by unfavorable weather, the demonstrations were much more satisfactory and the instruction much more practical than last year. The attendance, also, while not large, was on the whole better than that of last year, being composed mainly of road men who are engaged in the road work in their respective counties. It is becoming easier each

year to get practical road men to assist in conducting the school, and next year it is believed that a thoroughly successful school can be held. It is planned to teach the work by demonstration rather than by talks or lectures; yet each evening during the week of the school talks and lectures, some of them illustrated with lantern slides, are given by men who are experts in the subject assigned. The need of such work can hardly be exaggerated as new methods can best be learned by actual demonstration. It is the idea to conduct a school of instruction to which communities, either towns, townships or counties, may send their road men, knowing that they will get full benefit for the time and money expended.



EARTH ROAD BUILDING—ROAD SCHOOL—AUGUST, 1906.  
IOWA HIGHWAY COMMISSION.



The following is the daily program as it was carried out:

Course of Instruction.  
SCHOOL FOR ROAD OFFICERS.  
August 13-18, 1906.

*Monday, August 13th.*

- A.M. Registration of students and assignment to boarding places.  
1:00 P.M. Outline of Course of Instruction.  
Dean Marston, Ames.  
8:00 P.M. Concrete Culverts—Explaining theory and methods of designing. (Illustrated with lantern views.)  
Thos. H. MacDonald.

*Tuesday, August 14th.*

- A.M. Grading Demonstration. (For operating the various road machines, etc., six trained teams of mules owned and driven by H. P. Courtright and son of Onawa were used. These teams were under the supervision of Mr. Henry Harlow, President of the Good Roads' Association.)  
1:00 P.M. Use of Split Log Drag in Cedar County. (Illustrated with lantern views.)  
Mr. F. L. Reeder, Tipton, Iowa.  
Work of the Illinois Highway Commission.  
Mr. A. N. Johnson,  
State Highway Engineer, Springfield, Ill.  
Demonstration with reversible grader on North Road.  
8:00 P.M. Foundations and Abutments for Bridges.  
Mr. M. E. Bannon,  
Engineer of Lee county, Fort Madison, Iowa.  
Association of County and Township Road Officers.  
Mr. H. E. Oldaker, County Auditor,  
Marengo, Iowa.

*Wednesday, August 15th.*

- A.M. Elevating grader demonstration in charge of Henry Harlow.  
8:00 A.M. Bridge Superstructures.  
Mr. M. E. Bannon.  
1:00 P.M. Concrete culvert demonstration with collapsible forms under direction of C. W. Overturf of Dumont, Iowa.  
8:00 P.M. Manufacture of Cement.  
Chief Inspector Boynton,  
Illinois Steel Co., Springfield, Ill.

*Thursday, August 16th.*

- A.M. Concrete culvert demonstration. A 2 by 3 feet concrete culvert, 20 feet long, was constructed to show the method of reinforcing small culverts and constructing collapsible wooden centers.  
1:00 P.M. The Dallas County Grading Gang. Methods of work and organization.  
Mr. B. Stanton, Perry, Iowa.  
County Superintendent of Roads.  
Plans and Specifications for County Work.  
Mr. Geo. W. Miller,  
Assistant City Engineer, Des Moines, Iowa.  
8:00 P.M. Stone and Gravel Roads.  
Mr. A. N. Johnson.  
The Rural Carrier and the Public Roads.  
Mr. C. M. Adams, Davenport, Iowa.  
President Iowa Association of Rural Carriers.

*Friday, August 17th.*

- A.M. Demonstration with elevating grader drawn by traction engine loading dirt into dump wagons.  
P.M. Stone road demonstration. A short piece of stone road was constructed, the stone being crushed in the crusher plant and hauled to place in dump wagon pulled by a traction engine. The rolling was done with a steam roller.

This is the program in brief outline as carried on, but there were a number of demonstrations and informal discussions not mentioned here.

IV. PLANS AND PUBLICATIONS.

*Plans.* During the past year a very large number of plans, both standard and special, have been prepared upon request of township and county road officers. Many culverts and bridges have been constructed according to these plans, and in some cases the commission has sent a representative to meet with the board of supervisors when contracts were let for bridge or culvert construction. In some cases the commission has been called upon to draw plans for completing work which has already been undertaken by contractors, but which had not been properly finished. In the past few months the commission has drawn plans of concrete wingwalls for two different counties for structures which had already been built, but on which the wingwalls had been so placed that they failed completely. The number of structures

actually built from plans issued by the commission would be hard to estimate as in many cases several structures of the same size have been built from a single set. For instance, in Calhoun county four culverts were built from one set of plans; in Benton county five culverts from the same set; in O'Brien county two or three culverts from the same plans, and in Iowa county there have been completed two bridges of twenty-foot spans each designed by the commission for the supervisors. During the coming year it is thought that the call for plans will be so large that we will keep at least one draftsman busy all of the time, and possibly more during the summer season. As many copies of these plans as are wished are furnished free to the road officers calling for them, and detailed specifications together with contract blanks complete are included so that the work may be let by contract if it is so desired.

*Publications.* Up to the present time the commission has written and distributed the following publications:

"Good Roads Problem in Iowa." A 24-page pamphlet dealing in a general way with the conditions which pertain to the improvement of Iowa's roads. Fifteen thousand of these were published, but the edition is now practically exhausted.

"Manual for Highway Officers." A 104-page pamphlet containing detailed instructions for the road officers of the State, published in June, 1905. Three thousand copies of this were soon exhausted.

"First Annual Report of the Commission." Published by order of the General Assembly, in 1906. This is a 74-page pamphlet containing the detailed report of the work of the commission for the year ending July 1, 1905, together with a financial report for that period and legislative recommendations. Fifteen thousand copies of this pamphlet were published, but the edition is now exhausted.

"1906 Revision of the Manual for Highway Officers." This pamphlet of 140 pages is an enlarged and revised edition of the first manual published. Three thousand copies were published in July and the edition is not yet exhausted.

It is planned to publish, as soon as money becomes available, bulletins upon the drag method of road maintenance, and also upon concrete culvert construction. The number of requests from out of the State for the publications of the commission has been quite large.

#### V. DEMONSTRATIONS.

One of the most important lines of work that has been taken up is that of conducting demonstrations in road and culvert building in various parts of the State. It has been impossible to answer all of the calls for this kind of work, but many counties have been visited and demonstrations conducted, among them being Cedar, Iowa, O'Brien, Benton, Story, Dickinson and Calhoun. Several trips have been made to some of these counties and considerable work done. The idea of this kind of instruction is not only to complete the one culvert or whatever piece of work it is, but to instruct the local men by actually completing at least one piece of work, in the proper methods of handling materials. This will be taken up in greater detail under another heading. The call for such work has only just begun and we expect it to develop largely during the coming year. The townships and counties are eager and willing to begin the work of building culverts and all they need is some help or instruction to start them in this form of construction. Much practical work has also been done in preparing plans and specifications and aiding the counties in letting contracts on the same. In a few cases work has been taken charge of by the commission for the counties and pushed to successful termination.

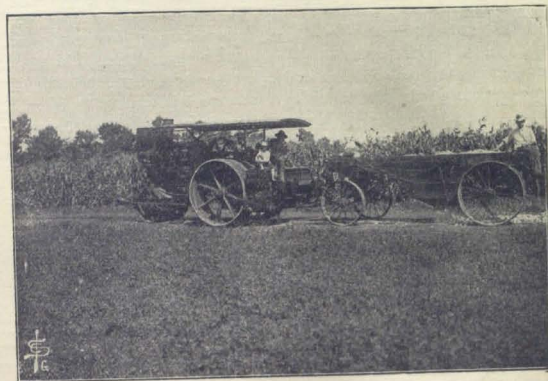
#### VI. ROAD MEETINGS.

The commission has made every effort to take part in as many road meetings as possible which have been called for discussing the ways and means of bettering the road situation. Representatives of the commission were with the Northwestern on the first good road special car which was sent out for advocating the use of the "split log" drag in April, 1905. In October, 1905, the Chicago, Burlington & Quincy Railroad started a hard dirt roads car at Council bluffs, continuing the meetings at various towns across the State. In February the commission was invited to send a representative with the good roads special of the Chicago & Alton Railroad, which was run from Chicago through Illinois and into Missouri. Later in the year the Santa Fe asked the commission to send a representative for a short time with the car which they ran over their lines in eastern Kansas.

In addition to these series of meetings, many road meetings have been held in various counties of the State, numbering among them Cedar, Clinton, Pottawattamie, Butler, Carroll, Hamilton, Polk,



Guthrie, Winneshiek, Jasper and Adair. The commission was also represented on the program of the Interstate Good Roads Convention which was held at Chillicothe, Missouri, in September. In addition to attending these meetings a number of papers and talks have been presented before conventions and the meetings of the Iowa Good Roads Association which were held in co-operation with the commission.



DISTRIBUTING STONE FOR ROAD—ROAD SCHOOL—AUGUST, 1906.

## FINANCIAL REPORT OF IOWA HIGHWAY COMMISSION.

July 1, 1905, to July 1, 1906.

Appropriation for biennial period July 1, 1904, to July 1, 1906.....	\$7,000.00
Amount expended July 1, 1905.....	5,492.87
Unexpended balance July 1, 1905.....	\$3,507.13
Amount of new appropriation available.....	1,083.33
Total .....	\$4,590.46

### Disbursements.

#### I. SALARIES.

Thos. H. MacDonald,* 1 year @ \$1,200.00.....	\$1,200.00
H. M. Bainer, 10 4-5 months @ 18.51.....	199.91
J. T. Hover, 12 months @ 10.00.....	120.00
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	\$1,519.91

\*Mr. McDonald gave his full time to the work of the commission, Messrs. Hoover and Bainer only part time.

#### II. EQUIPMENT.

6 Arch levels @ \$ 35.00.....	\$ 210.00
Queen & Co., Philadelphia.	
6 Phila. level rods @ \$ 12.60.....	75.60
W. and L. E. Gurley, Troy, N. Y.	
(Used during Road School for field work in surveying.)	
A laboratory for tests of road materials is being installed by the commission in Engineering Hall.	
1 4-cylinder abrasion machine.....	106.47
International Inst. Co., Cambridge.	
1 Cementation testing machine.....	250.00
F. L. Nichols, Washington, D. C.	
Copy of new road laws.....	1.50
Briquette machine for road material laboratory	255.30
International Inst. Co., Cambridge, Mass.	

## SECOND ANNUAL REPORT OF THE

Burroughs adding mach., 38-75 share @ \$375.00.	190.00
Burroughs Adding Machine Co.	
This adding machine is owned partly by the Civil, Mechanical and Mining Departments and the Commission. It is used chiefly in the work of tabulating the Road Census cards.	
Freight on equipment.....	93.40
Express on equipment.....	41.35
Belting .....	6.74
Repairs, bolts, screws, pipe.....	3.82
Repairs, screws, bolts, etc.....	4.19
Labor, repairing and installing machinery.....	5.20

1,243.57

## III. PLANS AND PUBLICATIONS.

104 Pages "Manual for Iowa Road Officers"....\$	156.00
Republican Ptg. Co., Cedar Rapids.	
Half-tones used in bulletins.....	46.85
Manz Engr. Co., Chicago.	
17½M. Bulletin envelopes.....	28.68
Butler Paper Co., Chicago.	
Tracing and blueprinting.....	2.75
15,000 Bulletins Vol. III, No. 3, Announcement of 1905, Good Road School, with reply cards and envelopes .....	35.25
Ames Times.	
A. Magsaysay, drafting plans, 153 house @ 20c	30.60

300.15

## IV. INVESTIGATIONS.

Printing and developing views of road and bridge work .....	\$ 24.38
Photographic supplies, films, etc.....	12.80

37.18

Keeping road record—	
Udlike Gr. Co., Missouri Valley.....\$	3.00
Traveling expenses, Thos. H. MacDonald—	
Trip to Council Bluffs, Aug. 21-23.....	12.34
Trip to Butler county, Aug. 15-17.....	8.93
Trip to Jefferson, May 18-19.....	12.30
Trip to Coon Rapids, May 23-24.....	4.25
Trip to Cedar Rapids, June 7-8.....	9.40
Trip to Blairsburg, May 20-21.....	2.03
Trip to Des Moines, May 22.....	1.10
Trip to Guthrie Center, March 28.....	3.97
Trip to Tipton, May 5-9.....	11.84
Trip to Adel, May 23-24.....	7.07
Trip to Sioux County, June 11-16.....	16.67

Traveling expenses, C. F. Curtiss—	
Trip to Des Moines .....	2.97

All traveling expenses are itemized and allowed by the Board of Trustees of the College. The itemized list of ex-

## IOWA STATE HIGHWAY COMMISSION

penses are included in the books of the commission and the treasurer of the College.

Photographic prints .....	5.05
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138.10

## V. EXPERIMENTAL WORK.

Lumber for concrete forms for experimental culverts and bridges.....\$	51.34
Shed for storing cement and concrete materials.....	62.43
Laboratory help on road material tests.....	2.75
Road dragging .....	3.04
Miscellaneous .....	.55

120.11

## VI. OFFICE EXPENSES.

Stamps and envelopes.....\$	47.21
Assistants mailing bulletins @ 15c per hour....	35.78
Freight and drayage on road machinery, concrete materials, etc.....	40.21
Telephone, telegraph and express.....	15.99
Stenographic help @ 25c per hour.....	119.58
Letter heads .....	7.00
F. L. Nichols, stenographer, 1 month @ \$65.00..	65.00
Express and freight.....	.45
Miscellaneous .....	9.92

341.14

## VII. CENSUS.

Labor tabulating Road Census cards—	
R. L. Cooper @ 20c per hour.....\$	28.20
C. W. Okey @ 20c per hour.....	18.00
A. B. Chattin @ \$60.00 per month.....	104.51
R. D. Cooper, 16-30 months @ \$60.00.....	32.00
Seamen Knapp, 144 hours @ 20c.....	28.80

211.51

## VIII. ROAD SCHOOL.

Operating road machinery during Road School, June 13-18—	
C. D. Corbin, Coon Rapids, 3 men and 4 teams.\$	121.21
O. M. Briley, Ames, 2 men and 2 teams.....	36.47
H. M. Hoover, Englemann.....	16.50
Coal for engines.....	14.55
Feed for teams.....	11.50
Freight on road machinery.....	41.07
Repairs on road machinery.....	2.40
Miscellaneous .....	11.95

255.65

Total .....	\$4,130.12
Balance of new appropriation July 1, 1906....	460.34

\$4,590.46





EARTH ROAD BUILDING—ROAD SCHOOL—AUGUST, 1906.  
IOWA HIGHWAY COMMISSION.

#### SECTION IV.

#### THE BRIDGING AND GRADING PROBLEMS.

##### NEW, AND CHANGES IN, LEGISLATION SUGGESTED.

In reviewing the general situation in the State to plan such changes or additions to the laws governing road and bridge work as may seem beneficial, it is highly desirable that we have in mind the governing features of bridge building and road construction and maintenance. These are the parts of the work of road officers, but they are quite distinct from each other. While it is not believed that the mere passing of a law will in itself materially alter conditions, there are undoubtedly some changes in the present status that would render them more effective if they were administered with some degree of accuracy. We have, particularly in the statutes governing townships, much more law on the subject of roads and bridges than we have practical applications of the same. While most boards of supervisors follow quite closely the sections of the code, the same is not nearly so true of township officers. We find in many townships the same local distortion of the provisions that exists not only in the road laws, but in the school laws and others for which the knowledge and application have descended by tradition through previous predecessors rather than from any adequate interpretation of the laws by competent advisors.

##### 1. THE BRIDGE PROBLEM IN HIGHWAY IMPROVEMENT.

The general status is this: The forms of construction may be classed as wooden, steel or masonry, or a combination of two or more of these materials. The various forms of construction that are made possible by their use have caused each county and township throughout the State to have a heterogeneous combination of structures designed and constructed without system and in many cases without the thought of the traffic that they are compelled to carry.

*Heavy Rural Traffic is Increasing.* This lack in strength is particularly true of the wooden or pile bridges, a large number of which are entirely inadequate for the kind of traffic that is gradually increasing over the roads, such as heavy hauling, traction engines, and heavy types of other machinery. Particularly is this true of traction engines, the larger types of which are now coming into general use, many of them now being built with large water tanks and being arranged to carry their own supply of coal. The movement of these over the public roads under the conditions now existing is filled with danger for those who have them in charge. While the states were new the eager growth and rapid settlement made necessary the sacrifice of strength and durability in providing quickly some method of crossing our waterways, but the time is now long past when any form of construction which has loss and waste written large upon it should be so closely fostered and followed by our road officers. The lines of travel are continually becoming better established and it is probable that no matter how thickly the State is settled eventually, many of the traveled ways will remain unchanged. These are being continually improved, heavy grades are being cut down and low spots are being filled so that the loads it is possible to move over them are continually becoming heavier. These conditions lead to the logical need of heavier construction in bridge and culvert building.

*The Increased Cost of Timber Construction.* The demands of trade have diverted such grades of lumber as white oak to other purposes, and the prices of even inferior grades is continually becoming higher, and when the rapid deterioration is considered it makes the cost of such construction a serious one. Not only is this deterioration due to the decay, but also to the wear under traffic, the breaking down due to heavy loads, and the undermining and washing out due to high water. Leading into one of our small towns in Iowa county is a 300-foot bridge on which the floor of three-inch bridge plank has recently been renewed after only two years of service. This instance, though perhaps somewhat extreme, is not unusual.

*Large Expenditure for Bridge Building During 1906.* The actual amount spent by the counties for bridge building during the past year is \$1,923,431.81. This is only the amount in the bridge fund proper and does not include a certain proportion of the township tax which is used for culverts, or of the county road

fund which in some counties is used for actual bridge construction and in others to repair damage done by defective bridges or in grading around new bridges.

*Other Forms of Construction.* Due to the call for other materials to take the place of lumber for bridge or culvert building, a large number of companies have come into existence within the past few years that are manufacturing and placing on the market a heterogeneous collection of steel, cement, clay and iron culverts, patented culvert moulds or forms of construction whose best claim to recognition is the clear profit netted their sellers. The manufacture of many of these forms requires absolutely no skill and very small investment in machinery, and yet the product is sold at prices that would, in most cases, be charged if concrete culverts of the same sizes were built. This practice applies more to culverts than to bridges but there are various forms of steel bridges or concrete and steel bridges being built that have no claim as engineering designs. For instance, the so-called steel piling bridge, although capable of being satisfactorily designed, has been so constructed in some counties that it merits the severest condemnation. Local road officers should investigate very carefully the real merits of the new and patented types of culverts and bridges that are sold through agents before buying.

*Local Officers Should Not Be Held Responsible.* These statements should not be construed as a reflection upon the township and county officers, for we believe from our observation and study that they have done fairly well with the means and knowledge which have been within their command. They are not the ones who have failed to do their part, and the reason for the present status, and even more the solution of the difficulty lies only within the power of the commonwealth itself. Local opinion can be made almost stronger than the strongest of State laws, and the man who expends public money contrary to the traditions or the methods that have been in vogue in the communities for a long period subjects himself not only to personal criticism but, as has been shown during the past year, to political oblivion. More than one county supervisor was defeated for re-election this year because as a county official he dared to put through drainage projects benefiting thousands of acres of land, or to begin the construction of permanent bridges and culverts of concrete, or to use the drag upon the public highways, or to adopt any one of the newer and better methods that it is perfectly obvious must come into general use. Consider the bridge problems that confront a road officer in



one of the average counties where the roads must necessarily be carried across a number of streams. To accomplish his work economically and well he should be a trained engineer, having a knowledge of materials of construction, methods of building as well as the methods of keeping accounts, letting contracts and the supervision of bridge work in general. A study of foundations and the best methods of sub-construction are in themselves monumental tasks. Together with this consider the opportunity that has been offered the average road officer to learn these things. Knowledge in almost every community is almost purely traditional. Even the duties required and the limitations put upon the road officers, handed down from year to year and growing always less valuable and less practical are founded upon hearsay rather than upon actual study of the statutes and the laws defining the same. One of the best things one county auditor did during a very efficient term of office was to call the township and county boards together once each year and read over the sections of the State code relating to their duties and powers. The local officer is not only limited by his opportunities and by his knowledge, but also by the attitude taken toward road improvement by the community in which he lives. Here and there are men who have broken away from the time-honored customs and brought into bridge building something new and worthy, but the end of the year often has meant the end of their administration and the office has been handed over to some one who would do the work as it has been done during all of the preceding years. It is not the purpose or the desire to bring out in this report the many instances that have come under the observation of the commission during the past two years of what is apparently a mishandling of public funds, or to charge anything more than incompetency on the part of some of the men who have been elected to public offices. There are many refreshing instances of men who have made a success of their own business who have accepted these public offices and are doing splendid work and attaining permanent and satisfactory results. The more encouragement the State brings to these men the less reluctantly will they consent to give of their time and ability to the public services.

*The Field Open to the Highway Commission.* It is because of these things that State authority must come in to raise to a higher standard local methods and plans of bridge construction and main-

tenance. The cry is raised against giving any new State department more power, and against the interference of the State in matters that are more or less purely local, and yet the conditions will only be slowly improved, if improved at all, until such supervision does come in. Such a department is welcome to the companies who are doing legitimate work in road and bridge construction and who employ good engineers in their designing and contracting departments, but is viewed with some consternation by those local companies or contractors who design their bridges on the ground or by the officers who have elected themselves road or bridge superintendents. Each great railroad system has its bridge engineer, and why should not each State build up a department whose duty is to provide for the State the same information, together with plans and specifications, that could be sent to the local officers in charge of the work. It does not seem to be a question of the assumption of authority or the shouldering of local problems by the State, but rather a taking up of work that can best be done by a department established and supported by the commonwealth.

The American Bridge Company, the largest bridge company in the United States, has general specifications which apply to all the work which comes from its shops, and the bridges which it builds are divided into a number of classes, based on the loads which they are to carry. The type of bridge built will depend upon the class under which it comes, and the span. This is directly applicable to all the highway bridges in any commonwealth. There is no justification for the wide variation in design, construction and material that is found, not only within the borders of each State, but within each county and even each township. This leads naturally to the pointing out of some of the matters in bridge construction that should be adjusted by legislative action.

*Bridges Should Be Designed to Carry Standard Loads.* After the preliminary study during the past two years of traffic over our highways, the commission is in a position to formulate standard loadings to carry which all bridges shall be designed, and these standard loadings should be incorporated in statute form. Any officer or board of officers should be held criminally liable for the injury and loss occasioned by not observing such statutes, rather than the county or township which they represent. Year by year the traffic which must be carried by the bridges is growing heavier and losses and accidents due to light construction or poor material

are constantly becoming greater. With the requirements of the loading to be provided for fixed by statute the commission should be given the power to prepare standard plans and specifications covering the different types and classes of bridges, and the observations of these specifications in future construction should be enforced within the State. In no other way can so much saving be accomplished and so much real improvement be made. The reasons for this are self-apparent. A state highway commission with sufficient support from the State can employ engineers of experience and ability far beyond the reach of the ordinary local road district, and yet the employment of such men would be a very small expense compared with the service they could render. There is one other step which is co-ordinate with these recommendations, and that is the creation of the office of a county engineer.

*A County Engineer Should Be Appointed.* In each county there is now sufficient engineering work to make it a good business policy to have a county engineer and to make this position sufficiently remunerative to make possible the employment of a thoroughly competent man. This position could be provided for by simply enlarging the duties of the county surveyor, but it would be much better to take the office out of politics entirely and to make it an appointive office to be held during proper administration of the business connected therewith. The sums of money spent each year are sufficient to justify this expenditure for trained supervision; or it might better be stated, the sums are so large that from an economic standpoint they demand some such system. During the past year there was spent for road and bridge purposes in the State \$4,215,271.60, or an average of over \$42,600 per county. In an interview recently with a county supervisor who has done splendid work both on road and bridge construction in his county, and whose experience has lasted over a long period of years, he expressed the opinion that the whole business of road and bridge construction would not be placed upon a satisfactory basis until it was put under the supervision of a trained engineer. It is perhaps not necessary to amplify on this point as the weight of argument is all in its favor.

There is included with this report a report from Greene county for the past year of the bridge building in that county. The work there was placed in charge of Mr. D. E. Donovan under direction of the board of supervisors, Mr. Henry Haag of Jefferson, chairman. Mr. Donovan is a civil engineer and has had considerable experience in the use of concrete.

# REPORT OF BRIDGE AND CULVERT WORK IN GREENE COUNTY FOR 1906.

HENRY HAAG, CHAIRMAN OF THE BOARD OF SUPERVISORS, JEFFERSON, IOWA.

Enclosed I submit to you the number, size and estimated cost of twenty (20) concrete bridges and culverts constructed by our own bridge gang this season, under the supervision of D. E. Donovan. I have inspected during the course of construction each and every job, and know the work has been done well; in fact we have added more than the required amount of steel, and the foundations, walls, and slab floor were made heavier than the required thickness. All the twenty jobs were slab top bridges.

No. 1. Concrete bridge, waterway 8 feet wide, roadway 20 feet in clear. Three handrails on each side, each 6 feet 2 inches long and 2 feet 10 inches high. Fine gravel and broken or crushed stone used in this job. Cost, \$275.00.

No. 2. Concrete bridge, 14-foot waterway, 20-foot clear roadway, four handrails on each side. River gravel and crushed stone used on this job. We had to go five feet deep to secure good foundation. Cost, \$450.00.

No. 3. Concrete bridge, 4-foot waterway, 20-foot roadway in clear. Bank gravel used in this job. Cost, \$130.00.

No. 4. Concrete bridge, 8-foot waterway, 20-foot clear roadway. Three handrails on each side. Bank gravel used in this job. Cost, \$265.00.

No. 5. Same as No. 4. Built two miles east of Paton. No. 4. was built in the town of Paton. Cost, \$275.00.

No. 6. Concrete bridge, 4-foot waterway, 20-foot clear roadway. Built in Dawson township. Bank gravel used. Cost, \$135.00.

No. 7. Concrete bridge, 16-foot waterway, 20-foot clear roadway. Six handrails on each side. River gravel used. Built one mile south of Rippey, Iowa. Wing walls, straight back, 8 feet long on each side. Cost, \$435.

No. 8. Concrete bridge, same as No. 7. Built in Jackson township. River gravel used. Cost, \$420.00.

No. 9. Concrete bridge, same as No. 7. Built in Franklin township. River gravel used. Cost, \$425.00.

No. 10. Concrete culvert, 4-foot wide waterway, 20-foot clear roadway. Built with river gravel in Jackson township. Cost, \$125.00.

No. 11. Concrete bridge, 6-foot waterway, 20-foot clear roadway. Bank gravel used. Built in Greenbrier township. Cost, \$200.00.

No. 12. Concrete bridge, same as No. 11. Bank gravel used. Built in Willow township. Cost, \$220.00.

No. 13. Same as No. 11. Bank gravel used. Built in Willow township. Cost, \$210.00.

No. 14. Concrete bridge, same as No. 10. Bank gravel used. Built in Scranton township. Cost, \$125.00.

No. 15. Concrete bridge, same as No. 11. River gravel used. Built in Kendrick township. Cost, \$200.00.

No. 16. Concrete bridge, same as No. 11. River gravel used. Built in Kendrick township. Cost, \$190.00.

No. 17. Concrete bridge, same as No. 11. River gravel used. Built in Cedar township. Cost, \$220.00.



No. 18. Concrete bridge, 8-foot waterway, 20-foot clear roadway. River gravel used. Built in Cedar township. Cost, \$245.00.

No. 19. Concrete bridge, same as No. 18. Bank gravel used. Built in Junction township. Cost, \$265.00.

No. 20. Concrete bridge, same as No. 11. Bank gravel used. Built in Junction township. Cost, \$195.00.

I trust the above data will enable you to make the required report. In each and every one of these bridges we used junk rods, bars and buggy axles for the walls, and 60lb. railroad rails on the longer bridges, 20 pieces of such steel rails in each job. We paid \$1.15 per hundred for the steel rails laid down out here, and for all the other rods, bars, etc., we paid 60 cents per hundred. On the smaller bridges we used 50lb. rails, and in the 4-foot waterway culverts we used buggy axles. The season has been a good one for this kind of work and we were only once interrupted by high water and that was on bridge No. 1. A heavy rain drove us from the work for three days. We had the foundation in, however, and incurred no loss excepting the delay.

The Board of Supervisors has passed a resolution ordering the construction of sixteen concrete bridges next year varying from 8 to 16 feet clear waterway.

Yours very respectfully,

(Signed) HENRY HAAG.

The results that Greene county has obtained in the past year from the system they have employed show for themselves. No county in the State can compare with it in its progress in road and bridge improvement. In a previous report we brought out the splendid results that Lee county had obtained through placing the bridge construction under direction of a competent engineer. If such an office were created it would seem almost an ideal method of getting at the troublesome problems that have so long confronted us in bridging our waterways. The State Highway Commission would constitute a central bureau from which the county engineers could obtain consultation and advice together with plans and specifications for work free of cost to the counties. Materials of construction would be tested in the laboratory which is now being organized. Then, too, the employment of a competent engineer by each county who would be able to obtain such information as this would do away with much poor work that is being done by local contractors who have had little or no experience in bridge designing or construction. The engineer who designs a first-class structure must always be brought into conflict with the so-called practical man who designs his bridges with so-called practical sense. We believe, however, that the real must approach the ideal before it is the best possible design, and we believe further that the design

of any type or style of bridge by a competent engineer will approach more nearly this condition of construction than the so-called practical design.

## II. THE GRADING PROBLEM.

The same general condition in the bridging problems in highway construction applies also to the grading. There is the same local opinion with which to contend and the same lack of men trained for the work, besides a number of serious practical difficulties, among the greatest of which is the scarcity of labor. This last item practically puts a stop to the road work at the times when it should be carried forward with the most vigor, and the only counties that are solving this problem satisfactorily are those that have a regular outfit which is kept in the field during the entire season. A report is included with this of the operations of the Dallas county grading gang during the past year, together with some little account of the way this county has developed this method of doing its work. The report is written by Mr. B. Stanton, who is county superintendent of roads and works under the direction of the board of supervisors and who has made the system used in that county the practical success that it is.

### REPORT OF ROADWORK IN DALLAS COUNTY FROM 1890 TO 1906.

We find that under the road law in the early 90's each taxpayer was permitted to work his road and poll tax under a supervisor of the road district, the size of which varied from one-fourth to one-ninth of a township. The results were not satisfactory owing to lack of competent overseers, organization of working crews, systems employed, and only a fair start has been made with the thousands of dollars already paid in road taxes. As more than two-thirds of this county lies in the Wisconsin drift area and the remaining one-third in the Kansas drift area, we find a great variety of soil and other conditions confronting the road builders. Many townships were not financially able to keep more than a few of the main roads open to travel. They were handicapped and the county board of supervisors was swamped with appeals for help from all over the county. Partial relief was secured by the passing of the act by the legislature allowing a one mill county levy for grading and tiling. The board decided to organize and equip a grading camp to be owned by the county and to be operated under the direction of the board of supervisors. It was also agreed that the oldest or retiring member of the board should have the entire use of the outfit and control of the work in his district for that year. This overcome the objection of long and expensive moving of the outfit to other parts of the county. The road work was thus made continuous and well graded roads were secured on mail routes and the leading roads connecting the towns.

*First Outfit.* In the purchase of machinery, they moved cautiously and bought sparingly of only such things as necessity required. The county owned a road plow, two wheelers and four drag scrapers which were all well worn and rusty. After some investigation, it was decided to add an elevating grader and a five-ton road roller. With these the work started in August, 1898. Four men and teams were first hired and the townships in which we worked furnished two men and teams. The men secured board at nearby farm-houses as no camp had been established. Much time was lost in getting to work as all could not board at the same place. The following spring a stable tent, a tent for the men to sleep in, and a well-built storm proof boarding house 10 feet by 20 feet (mounted), well painted inside and out, were added as camp outfit. New No. 2 contractor's wheeled scrapers and a blade grader were also added. By this time the board was convinced that the right plan had been adopted and that it was working to the entire satisfaction of the taxpayers in the townships where the work was being done.

*Work to 1906.* About 170 miles of road had been worked under this plan up to 1906. With better and more complete equipment and more experience in meeting the varied conditions, better results were shown than in the first years of the working of this plan.

*Work of 1906.* Conditions for road making in this county this year were "ideal" and the amount and character of the work was a record breaker. Thirty miles of roads were built, providing for good drainage. The grades in low ground were well covered with dirt and gravel from the higher ground, giving a top soil that produces a more substantial surface and is more easily kept in good repair. Drainage and top dressing were especially well cared for when conditions would permit. We obtained better results for the money than in any previous year.

*Prospects for 1907.* The prospects for next year are very bright and we hope to see even more accomplished. A number of the townships have requested the board to work out a part of the township funds. This may call for another outfit. A concrete gang may also be added to the outfit for building the smaller culverts and bridges, as would seem to be very advisable.

*Financial.* The available amount of money from the county for this work is about \$8,000.00. There are eleven incorporated towns, each getting its proportion, which leaves but about \$6,000.00 in the county grading fund. All expenses for help, repairs on machinery, camp equipment, etc., are paid from this fund.

*Accounts.* The superintendent keeps all the accounts. He is authorized by the board to hire a sufficient number of men and teams to fully "man" the work. The board makes the price for men and man and team per day of ten hours. The superintendent keeps the time and sends a duplicate time sheet to the auditor for each two weeks. This sheet shows the amount due each man for this period. The county treasurer deposits the aggregate amount in a convenient bank to the credit of the superintendent to cover this expense. The superintendent keeps ledger account with each man, paying all board and feed bills for the two weeks and gives him bank check for his time for the two weeks, less the above expenses.

Merchandise accounts, blacksmith bills and all other expenses are shown by itemized statements receipted by them. These bills are also paid by the superintendent and the statement of same sent to the county auditor with the time sheets. The superintendent keeps ledger account with the auditor and with the treasurer and settles with them and the board of supervisors at the close of the season, at which time plans are discussed and under consideration for the next year's work.

*Average Cost.* The average cost per mile of road work in 1906 was \$220.00. This includes all expenses, viz.:

Running elevator grader.....	\$ 65.00
Running blade grader.....	15.00
Running roller.....	12.00
Wheeler work.....	80.00
Clearing stone, brush, stumps, etc., per mile....	15.00
Repairs on machinery and equipment, oil, dynamite, wear and deterioration, interest on investment, etc., per mile of work.....	15.00
Superintendence .....	18.00

\$ 220.00

*Method of Work.* Road work begins early in April and continues to December. Working force of from ten to twelve teams and twelve to fifteen men makes the best number we have tried for steady and profitable work. Camp ground located and "camp" set up, clearing gang started, elevating grader following, harrow following grader after the machine has made its round. Team from clearing gang is used for harrowing, and subsequent clearing during the building of the grade. Wheeler gang is also started on some short work preparing for long hauls when elevator has completed its work. Wheeler teams are also used on blade machine and roller during the building of the grades with the elevator. When the elevator has completed its work, all teams join the wheeler gang until that work is completed. The elevator is then started on another section of the work, leaving the first to be finished with the regular wheeler teams, using the blade machine and thoroughly rolling the grade. The crowning top is made smooth and hard, which takes the wear of travel without forming ruts, and turns the storm water quickly to the side ditches without softening the grades. From three to five miles of road are thus worked from one camp. Camp is moved and the work continued.

The equipment is all kept in good repair and but little time is lost in moving where the work is carried on in this manner. With a part of the force, we will take down, move and set up at the next location in one-half day. Active, sober and industrious men with good, heavy, well-harnessed teams, are selected for the season's work, and a mutual and friendly interest among the men is maintained. Good board at \$3.00 per week is furnished by the man and wife who prepare and serve meals in the boarding house. No rent is charged for this building. The occupants furnish everything and make all they can out of it, boarding from twelve to fifteen men.

Daily papers are delivered each day and the telephone has its place in the boarding house ready for service at all times. All telephone com-



panies give us free use of their wires and connecting lines and also remove their poles to the fence line when requested to do so.

The results of this work are very satisfactory. Rural mail routes and main traveled roads are the only ones that are being worked. Some graveling has been done; a fair start has been made by some of the townships. The interest is extending along all lines—grading, cement work, tiling and graveling. We have good reason to think the next five years will show greater progress on all these than the past ten years now show us.

"Progress and Good Roads" are our watchwords.

Respectfully yours,

Perry, Iowa, January 10, 1906.

(Signed) B. S. STANTON.  
County Road Superintendent.

This report brings out very clearly the success with which such methods can be used for county road work when it is placed under the direction of a competent man. It has been shown, however, in this county that the one mill county fund is insufficient to run the gang through the entire season and some help is necessary from the townships.

*The Transfer of One Mill of the Township Road Fund to the County Road Fund.* This brings out the point that has been urged for several years that one mill of the township road fund should be transferred to the county road fund, making the latter two mills and leaving the maximum levy in the township road fund three mills. This would help to concentrate the funds and would enable the county to do work that will never be done by the townships. While here and there are individual townships that are really making some progress, it is not true in general, nor is there any hope that conditions will improve as time goes on. The trustees are always farmers who are very busy at the time when the public work should be attended to, and there is no hope that this condition will change. The average township does not have sufficient funds to enable a road supervisor to own and operate a regular crew for a sufficient length of time to make it profitable for any one to go into the work. It seems almost impossible that any marked improvement will be made over the State as a whole in earth road building methods until some such plan is adopted generally by other counties as has been adopted in Dallas county.

*The Use of the King Drag.* The law which was passed by the last General Assembly providing payment for the use of the drag has resulted in its general use in almost every section of the State. Two years ago it is doubtful if there were ten drags in the State, but the recent agitation has made it almost a household word and

its presence in front of the farmers' gates very common. The resulting benefits to the roads have been very great.

*Wide Tires.* The Wide Tire Act which was passed at the same time as the drag bill, has resulted in a more common use of wide tired wagons on the roads, and the sale of these has increased considerably the past year. This law should be allowed to stand for a number of years and then the use of wide tires for hauling heavy loads over the roads should be made compulsory.



STONE CRUSHER PLANT—ROAD SCHOOL—AUGUST, 1906.

IOWA HIGHWAY COMMISSION.

## PROGRESS OF STATE AID AND SUPERVISION FOR 1905.

TABLE SHOWING THE PROVISIONS MADE BY VARIOUS STATES UNDER A REGULAR STATE AID SYSTEM FOR ROAD BUILDING.

State.	Kind of Supervision.	Amount of State Aid.
Connecticut ...	State Highway Commission (Engineers are employed to make surveys and plans).	Increased from \$225,000.00 to \$229,000.00 and for special cases where towns fail to act not to exceed an additional \$25,000.00. State pays 95 per cent of cost.
Michigan .....	State Highway Commissioner.	Townships and counties receive State rewards for gravel and macadam roads amounting to \$250.00, \$500.00, \$750.00 and \$1,000.00 per mile, according to kind of road built, when same have been passed by the commissioner.
Massachusetts .	State Highway Commission.	\$549,450.00 for 1905. State pays 75 per cent of total cost.
New Hampshire	State Engineer	\$125,000.00 annually for 6 years. State pays from 25 per cent to 75 per cent of cost.
New Jersey....	State Highway Commissioner.	Not to exceed \$400,000.00 annually. State pays 33 1-3 per cent of cost.
New York.....	State Surveyor and Engineer.	\$5,000,000.00 annually for 10 years, or a total of \$50,000,000.00. State pays 50 per cent of cost.
Washington ...	State Highway Board	State shall pay 50 per cent of all roads built by State Highway Commissioner.
Pennsylvania .	State Highway Department.	\$6,356,232.00 appropriated as follows: 1905 ..... \$ 856,232.00 1906 ..... 1,250,000.00 1907 ..... 1,250,000.00 1908 ..... 1,500,000.00 1909 ..... 1,500,000.00 State pays 75 per cent of cost.

TABLE SHOWING THE PROVISIONS MADE BY VARIOUS STATES UNDER IRREGULAR STATE AID SYSTEMS.

State.	Kind of Supervision.	Amount of State Aid.
California .....	Commissioner of Highways.	\$20,000.00 to put into effect act regulating motor vehicles. \$25,000.00 for highway from General Grant Park to Kings River Canon. \$5,000.00 Desert Guide Posts.
Idaho .....	Wagon Road Commissioner.	An act passed in March, 1905, provides for a system of mountain roads and trails.
Illinois .....	State Highway Commissioner. (Work to be done under State Highway Engineer.)	\$25,000.00 annually for commission expenses, experimental work in road building, distribution of information to local road officers, etc.
Ohio .....	State Highway Commission.	Work of investigation, expenses of commission \$7,400.00, and State aid \$10,000.00.
Maine .....	Commissioner of Highways.	\$2,500.00 for commissioner plus a sufficient sum to provide assistants, clerks, traveling expenses, etc. Each town may receive 50 per cent of cost of permanent improvements up to \$300.00 per year.
Minnesota .....	State Highway Commissioner. (Work to be done by State Engineer.)	\$1,800.00 for engineer and an additional amount for other expenses.
Vermont .....	State Highway Commissioner.	State road tax 1904, \$91,795.00.
Washington ...	State Highway Commissioner. Two acts were passed, this one providing for a commissioner; the second for State aid.	\$10,000.00 for expenses, salary, etc. of commissioner. \$10,000.00 for building roads. See act under preceding table.
Iowa .....	State Highway Commission.	The duties of the commission shall be, "The devising and adopting of plans for highway construction and maintenance; the education of road officers; the carrying on of practical demonstrations and the supervision of road construction." Total appropriation for two years \$1,000.00 or \$3,500.00 per year for the biennial period 1904-1906. Increased in 1905 to \$5,900.00 annually.



REPORT

OF THE

# Inspectors of Steamboats

TO THE

GOVERNOR OF IOWA

1906

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GEO. B. FREEMAN	}	BOAT INSPECTORS
J. W. CHAPEL		
ALONZO A. JENKS		
J. B. THOMPSON		

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1907

## Report of Inspectors of Steamboats

MASON CITY, IOWA, December 14, 1906.

HON. A. B. CUMMINS, *Governor State of Iowa:*

DEAR SIR—I enclose to you my annual report as Boat Inspector for 1906.

Respectfully submitted,  
GEO. B. FREEMAN,  
Mason City.

### LICENSES GRANTED FOR BOATS.

CHAS. BRIER, GREEN, ON ROCK RIVER.

Date	Kind of Vessel	Name	Passengers	Fee
April 20. ....	Gasboat .....	Princess Bonnie.....	30	\$10

J. F. YOUNGLOVE, CLEAR LAKE.

April 17. ....	Gasboat .....	Ideal .....	30	\$10
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OSCAR STEVENS, CLEAR LAKE.

April 17. ....	Sailboat .....	Featherstone.....	35	\$ 1
	Sailboat .....	Swan .....	25	1
	Sailboat .....	Gull .....	25	1
	Sailboat .....	Duck .....	15	1
	Sailboat .....	Goldie .....	15	1
	Steamboat (80 lbs. steam)	Island Queb. ....	70	10
	Steamboat (80 lbs. steam)	Iowa .....	70	10

GREEN AND YOUNG, CLEAR LAKE.

April 18. ....	Sailboat .....	Puritan .....	20	\$ 1
	Sailboat .....	Vincen .....	40	1
	Sailboat .....	Lib .....	35	1
	Sailboat .....	Challenge .....	20	1
	Sailboat .....	Hope .....	20	1
	Sailboat .....	Speed .....	20	1
	Sailboat .....	Winnibe .....	12	1
	Sailboat .....	Iro .....	12	1
	Sailboat .....	Whitewing .....	20	1
	Steamboat (80 lbs. steam)	Birt .....	100	10
	Steamboat (80 lbs. steam)	Lady Franklin .....	100	10



## REPORT OF BOAT INSPECTORS.

E. J. CHAPMAN, WATERLOO, CEDAR RIVER.

April 21.....	Gasboat.....	Princess.....	10	\$ 5
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LLOYD WILKINS, WATERLOO, CEDAR RIVER.

April 21.....	Gasboat.....	Waukeena.....	50	\$10
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RAPID TRANSIT CO., WATERLOO, CEDAR RIVER.

April 21.....	Gasboat.....	Florence.....	12	\$ 5
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H. F. KELLNAR, CEDAR RAPIDS, CEDAR RIVER.

April 21.....	Gasboat.....	Fontenella.....	25	\$10
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STUART HENRY, CHARLES CITY, CEDAR RIVER.

April 23.....	Gasboat.....	Marion.....	12	\$ 5
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HENRY WOODRING, WAVERLY, CEDAR RIVER.

April 23.....	Gasboat.....	Nannie.....	12	\$ 5
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C. C. BARTLETT, IOWA FALLS, IOWA RIVER.

April 25.....	Gasboat.....	No. 40.....	30	\$10
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L. J. STOUT, ELDBORA, IOWA RIVER.

April 25.....	Gasboat.....	Eldora.....	19	\$ 5
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JOHN ERICKSON, LAKE VIEW, WALL LAKE.

April 27.....	Steamboat (115 lbs. steam)	Defiance.....	75	\$10
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LARSON BROS., LAKE VIEW, WALL LAKE.

April 27.....	Steamboat (125 lbs. steam)	Lakewood.....	200	\$10
	Steamboat (115 lbs. steam)	Dispatch.....	30	10
	Steamboat (120 lbs. steam)	Eclipse.....	75	10

## REPORT OF BOAT INSPECTORS.

## LICENSES GRANTED TO ENGINEERS AND PILOTS.

ROCK RIVER.

Date	Name	Engineer or Pilot	Fees
April 20.....	Chas. Brier.....	Engineer.....	\$ 3
	Chas. Brier.....	Pilot.....	3

WAVERLY.

April 23.....	Henry Woodring.....	Engineer (gas).....	\$ 3
	Henry Woodring.....	Pilot.....	3

ELDBORA.

April 25.....	L. J. Stout.....	Engineer (gas).....	\$ 3
	L. J. Stout.....	Pilot.....	3

LAKE VIEW.

April 27.....	L. L. Larance.....	Pilot.....	\$ 3
April 17.....	Frank Phelps.....	Pilot.....	3
	Clyde Younglove.....	Pilot.....	3

Total receipts.....\$196

Respectfully submitted,  
 GEO. B. FREEMAN,  
 Inspector of Boats.

LEON IOWA, December 27, 1906.

HON. A. B. CUMMINS, *Governor State of Iowa:*

DEAR SIR—I have the honor to report the amount of fees for this year ending January 1, 1907.

BOATS.

Name	Date of Issuance	Fees
Yacht Defender.....	March 25, 1906.....	\$ 5.00

ENGINEERS.

Cyrus R. Horney.....	February 6, 1906.....	\$ 3.00
Arthur F. Westfal.....	February 6, 1906.....	3.00
Harry Ochen.....	February 7, 1906.....	3.00
George E. Ochern.....	August 18, 1906.....	3.00
William M. Kirk (Renewal).....	August 29, 1906.....	3.00
Walter Baker.....	September 15, 1906.....	3.00
Total fees.....		\$ 23.00

Your most obedient servant,

ALONZO A. JENKS,  
Inspector of Boats.