185. Hereafter when any portion of the organized militia of any State, Territory or the District of Columbia participates in the encampment, maneuvers, and field instruction of any part of the Regular Army, under the provisions of section 15 of the act of January 21, 1903, they may, after being duly mustered by an officer of the Regular Army, be paid at any time after such muster for the period from the date of leaving the home rendezvous to date of return thereto as determined in advance, both dates inclusive, and such payments, if otherwise correct, shall pass to the credit of the paymaster making the same.

AMENDMENT.

The officer of the Regular Army who makes the muster prescribed herein will, in connection therewith, make a careful inspection of the personnel and report specifically as to whether the troops are, by training, discipline, armament, uniform and equipment, prepared for active duty in the field, and, if not, in what respects they are deficient. The muster rolls will have entered opposite the name of each enlisted man the date of his enlistment, and no enlisted man will be mustered for pay who has not been a *bona fide* member of the organization for at least six months prior to the date of the encampment, maneuvers or exercises, or has not had equivalent service in the Army, Marine Corps or organized militia of the United States, and who has not received the elementary instruction of recruits prescribed as requisite by the War Department.

The muster and inspection prescribed herein will be made as near as practicable at the close of the joint encampment, maneuvers or exercises, and at a time that will interfere as little as possible with the execution of the program of instruction.

This will be published at an early date as a Division Circular.

Very respectfully,

E. M. WEAVER,
Lieutenant-Colonel Coast Artillery Corps,
Chief of Division.

By order of the Governor:

W. H. THRIFT,
Adjutant General.

THIRD ANNUAL REPORT

OF THE

IOWA STATE
Highway Commission

MADE TO

THE GOVERNOR OF IOWA

For the Years 1907 and 1908

A. MARSTON, C. F. CURTISS, DIRECTORS
THOS. H. MACDONALD,
Highway Engineer to the Commission

PRINTED BY ORDER OF THE GENERAL ASSEMBLY

DES MOINES:
EMORY H. ENGLISH, STATE PRINTER
1909

LETTER OF TRANSMITTAL

To Beryl F. Carroll,
Governor.

SIR: In accordance with the law establishing the Highway Commission, we submit this, our third report, covering the years 1907 and 1908.

We wish to urge the necessity of an adequate appropriation to carry on the work and develop the field of usefulness of the commission as outlined herein. There are now demands for speakers for road meetings; for bridge and culvert plans, and road surveys accumulated that the commission cannot meet unless the appropriation is very materially increased. We ask that not less than twenty thousand dollars per annum be made available for carrying on and developing the work.

Reviewing the legislation suggested, it will be noted that no radical measures are proposed, but rather a conservative adjustment here and there of the present road laws, and the introduction of such factors as will put the road and bridge work on a business basis.

Respectfully submitted,

THE IOWA HIGHWAY COMMISSION,
A. MARSTON,
C. F. CURTIS,
Directors.

Ames, Iowa, January 1st, 1909.

REPORT OF IOWA HIGHWAY COMMISSION

FOR THE YEARS 1907 AND 1908

REVIEW OF WORK UNDERTAKEN. PRESENT TENDENCIES IN ROAD IMPROVEMENT.

Four years ago when the first appropriation was made, the commission entered upon its work without perconceived notions or theories of what should be done to encourage road improvement in the state, and without very definite ideas as to the methods and means necessary to bring about the desired results. At that time none of the adjoining states had established highway departments and the precedents established by New Jersey, Massachusetts, Connecticut, and other eastern states were not applicable except on a broadly comparative basis with the difference in total mileage, land values, density of population, and such factors entering to differentiate.

The appropriations available have been small, the sum total for the four years being considerably less than the first annual appropriation given the Illinois Highway Commission, and this fact made it very necessary to work with local road officers rather than independently, but even with this handicap a broad field for continuing the work has become apparent.

The commission has endeavored to get an accurate knowledge of the features of the state's geology and topography generally and locally as they effect road improvement; of the amount and kinds of traffic over the roads; of the material and means available for use; of the sentiment existing in country and town, and of the possibilities of co-operation between them in improving their avenues of intercourse. A considerable amount of data has been secured and tabulated, including the road census, reports from county officers, reports from the rural carriers, records of price variations at different markets, and correspondence with individual farmers, road men and city officers, but most accurate and useful information has been obtained by many trips into and through various counties and townships, considerable time being spent studying local problems that are typical of the various localities.

A road laboratory has been installed comprising a Deval machine, briquette machine and a Page-Johnson cementation tester for test-

ing road materials, and a 100,000 pound Reihle beam testing apparatus for testing concrete, steel or wood for use in bridges and culverts. These things are necessary and fundamental before the commission could make its influence felt or its work of service to the state.

The facts and experience of four years has opened up the possibilities of a very wide field of usefulness, with the embarrassing obstacle of an empty treasury. The necessity of a more adequate appropriation is felt all the more keenly in the face of the present and evident scope of useful activity. For the same reason it is also true that very few of the different activities undertaken have been carried out as fully or as satisfactorily as we had hoped, a good example being the publication of bulletins. There is now material worked up and practically ready for the printer, bulletins on the use of the drag, concrete culverts, standard I-beam bridges, and reports from the rural carriers on road and bridge conditions over the state, which cannot be published and distributed until the means are provided.

FARMERS' INSTITUTES AND ROAD MEETINGS.

The road improvement has in a large measure passed the agitation period and reached the stage of education, as a very uniform and convincing sentiment exists and the demand is growing constantly for information as to the best methods and means to employ. During the past two years the commission has been represented on the programs of either Farmers' Institutes or special road meetings in the following counties, fourteen in all, or about fourteen per cent of all the counties:

Madison County Farmers' Institute, January, 1908.
Annual Meeting of Supervisors, Clinton, August, 1908.
Scott County Farmers' Institute, January, 1908.
Decatur County Road Meeting, Leon, January, 1908.
Johnson County Farmers' Institute, North Liberty, February, 1908.
Mahaska County Farmers' Institute, March, 1908.
Jefferson County Rural Carriers Association, May, 1908.
Meeting of Supervisors and Trustees of Green County, February, 1908.
Osceola County Farmers' Institute, Sibley, January, 1908.
Polk County Farmers' Institute, Ankeney, February, 1908.
Cedar County Farmers' Institute, Tipton, January, 1907-8.
Rural Carriers' Association, Ames, August, 1908.
Marshall County Farmers' Institute, March, 1908.
Emmet County Road Meeting, Estherville, March, 1908.
Rural Carriers' Association, Nevada, February, 1907.
Madison County Good Roads Association Winterset, February, 1907.

As noted, in some of the counties there have been several such meetings. During the past four years the Commission has preached road improvement in fifty-six counties in the state.

So far, no strictly uniform policy has been adopted as to paying the traveling expenses of the speakers at these meetings, but in general where the organization has sufficient money provided, as is the case with Farmers' Institutes, to pay the expenses of speakers, the commision has required at least a portion of the expenses be paid, and where the meeting is called without a permanent organization, the expenses have been paid by the commission.

BULLETINS.

The distribution of road and bridge information through bulletins, is popular, efficient and economical, and the demand is constant. The average road man has neither the time nor inclination to read bulky volumes or figure involved formulae, but a short, concise bulletin treating of one subject that can be read through in an hour or two will often almost exactly fit some problem over which he is studying, or give some information of value in his daily work. Compared with the number it is possible to reach and influence in this way, the cost is very small. For instance, the sixteen-page bulletin, Vol. III, No. 1, "Road and Bridge Improvement in Iowa for 1908," was sent to ten thousand road men, farmers and others interested at a total cost for printing, envelops, postage (at second class rate), half tones and zinc cuts, and mailing, of about $180.00, or about 1.8 cents per copy. By the use of the addressograph this cost would have been reduced to about 1.6 cents per copy. Such bulletins should be issued by the commission not less frequently than quarterly, and preferably bi-monthly. The list published to date is as follows:

Manual for Highway Road Officers, 104 p., 3,000 copies.
1905 Proceedings, Iowa Good Roads Association, 64 p., 2,000 copies.
1906 Proceedings, Iowa Good Roads Association, 54 p., 2,000 copies

(Paid for by Iowa Good Roads Association.)

The Good Roads Problem in Iowa, 24-p., 15,000 copies.
Announcement of 1905 Road School, 15,000 copies.
1906 Revision of Manual, 148 p., 3,000 copies.
First Annual Report, 74 p., 10,000 copies.
Second Annual Report, 40 p., 10,000 copies.
Announcement of 1907 Road School, 8 p., 15,000 copies.
Road and Bridge Improvement for 1908, 16 p., 10,000 copies.

With the exception of the 1906 Revision of the Manual and the last Report, the editions have been exhausted.

Material has been collected and partially prepared for the printer for the following bulletins:

"Standard I-Beam Bridges."
"The Use of the Road Drag."
"Oil and Tar as Used in Road Building."
"Small Culverts—Concrete, Steel and Cast Iron."
"Bridge Specifications—Concrete and Steel."

All of these subjects are timely and there is much demand for information along these lines, not rehashed and out-of-date information, but facts based on present and prospective practice in this state.

BRIDGES AND CULVERTS.

We have prepared or have in process of preparation special and detailed plans for structures ranging from small concrete culverts to the Des Moines river bridge at Kilbourn, Van Buren county, for the following counties:

Tama	Grundy	Montgomery
Cedar	Woodbury	Dickinson
Dallas	Story	O'Brien
Pottawattamie	Marshall	Hamilton
Wapello	Benton	Calhoun
Decatur	Iowa	Greene
Cerro Gordo	Crawford	Hardin
Wright	Jefferson	Van Buren

In a number of these counties we have built demonstration culverts and in others have procured foremen of construction to aid the county supervisors in carrying on their work. In concrete culverts perhaps the most valuable results have been attained in Woodbury county where in one case a 12 ft. by 12ft. concrete culvert was built to replace a 120-ft. wooden bridge, 25 ft. high, and in another place a 12 ft. by 12ft. concrete culvert was built to take the place of a 150-ft. wooden bridge, 35 ft. high. In both these cases the wooden structure had washed out continually and these culverts have both stood through the floods of one and two years respectively in good shape. We regard that these two examples have proven that the western and southern section of the state in which these small, deep ravines abound can save thousands of dollars annually by pursuing this form of construction to take the

place of the numerous wooden structures that are expensive to build and more expensive to maintain.

The largest bridge for which we have prepared plans is the Des Moines river bridge which is a 6-135 ft. span steel bridge with 20 ft. approach spans on 30 ft. concrete piers and abutments.

Plans have also been prepared for a second bridge across the Des Moines river at Cliffland for the board of supervisors of Wapello county, the contract for which has been let for the sum of $23,500.00.

In addition to these special plans there have been a large number of standard plans prepared and very widely distributed for all sizes of concrete culverts, and we believe the commission has been quite instrumental in introducing this form of construction generally over the state.

ROAD SCHOOLS.

The 1907 Road School of the commission was held in Council Bluffs. During this time several culverts of different kinds were built and a mile of earth road. Concerning this road we have recently had the following letter from the Mayor of Council Bluffs.

I have gone over the road built under your supervision during the road school meeting here. I want to say that we are very well pleased with it, and it is in very fine condition up to the present time. I would be very glad to recommend that kind of work to anyone that saw fit to try it.

This particular road was built over a flat stretch along the Missouri river with very poor natural drainage, and the well known Gumbo soil.

The 1908 Road School was held in Waterloo. At this meeting a mile of sand-clay road was built, concerning which we have received the following letters from two prominent business men of that city:

"The work which you did on the Newell Avenue road leading out of this city this fall has been a source of much comment, and has proven very satisfactory indeed to Waterloo citizens and the farmers who are obliged to make Waterloo over this road. It was one of the worst, if not the worst, leading into Waterloo, and it is now one of the best."

"The Newell Avenue road was subjected to very heavy use in the month of September; there was over 1,500 tons of sweet corn alone hauled on it and most of the teams took back either husks or cobs from the factory. The loads of corn were quite heavy for farm loads, running from 3,000 to 5,000 pounds exclusive of wagon and rack, and as this road immediately took all of the travel from that direction as soon as the improvement

was made, I think it safe to say there was as much if not more of other hauling over this road.

Soon after it was completed on August 28th, we had a very heavy rain. We went twice around with the King drag; the road was then in constant use with heavy traffic for just thirty days without a drop of rain. It ground and cut some in spots. We had a good rain September 27th, and used the drag again and once since. It should have been used a little longer after the rain when the dirt was in plastic condition to fill in and even up when it would pack.

The road, with the exception of slight unevenness, is in good shape, the grade being practically the same as you left it, and a few more scrapings will make it fine as silk. I think the travel over this road is fully five times as much as before the improvement, and all are well pleased."

Early in the season we attempted building a demonstration earth road in Greene county, but were delayed by wet weather, and the results were not at all satisfactory, so during the Farmers' Institute in October we helped build a stretch three-fourths of a mile long in conjunction with the Greene county board of supervisors, and while not as good an example of a properly graded earth road as the other roads we have built, it is still a very fair road, and the people seemed well pleased with it. This road will be completed by a gravel dressing this fall or next spring.

Compared with the permanent roads, many, if not all, of the other state highway departments are building, the earth roads or the sand-clay road seem simple and of doubtful value perhaps, but it must be remembered that practically all road building in Iowa at present is earth road building, that there are many whole townships without a continuous mile of well graded road, that men who can do this work properly are few and hard to find, that the earth road is fundamental and the basis of all other road improvement. On this basis we can well afford to put some engineering knowledge and technical skill into the spending of the three millions of dollars that annually goes into road building—most of which is earth road building.

SURFACED ROADS.

Without doubt Iowa in certain districts is ready for permanent roads and a number of miles of road have already been built, but the methods of construction have not in many cases conformed to the best practice. The idea that so often has been advanced that permanent roads will be opposed by the farmers who are most benefited is apparently not to be relied upon if the letters

which have been received from Scott county, where more miles of stone road have been built than in any other county, express the general feeling regarding them. The commission has letters from a number of men who were recommended as substantial and progressive by one of the county officers who did not, however, know their personal opinions of the value of some roads. One or two of these letters are quoted briefly to show the general sentiment expressed:

1. The greatest value of these roads to the farmer is his ability to haul any kind of a load to town over them in any kind of weather.
2. I know of no drawbacks to these roads; but I might suggest an improvement that could be made in this connection, and that is, that instead of making new roads every year, the county take a year every few years and repair those roads already laid, instead of pushing ahead to make new roads. Of course the man who lives on a "mud" road opposes this by saying that it is easier for those living along the gravel road to pull over a rough road than it is for him to pull through mud.
3. The value of land in this county is constantly rising and I believe that it is only fair to attribute some part of this to our improved roads. If farms on improved roads do not rent for a higher price, they at least rent easier than those on dirt roads.
4. I believe the money so invested is a paying investment.
5. I believe the county should build as much of such roads each year as it is able to take care of."

The following extracts are from a letter from a man who has spent all his life on the farm and is now well advanced in age, and whose judgment is matured:

1. You want to know whether stone roads are practical. I say they are a God's blessing.
2. I see no drawbacks with these roads if they are properly tended to by the township officials.
3. As far as increased value of land is concerned, I would say that it does increase.
4. I would say money so invested is paying.
5. I should say the county should build such roads as fast as possible all over the county.

It must be particularly noted in reference to these letters that they are from successful men living in the wealthiest community in the state, and must only be construed from this standpoint.

Many of the counties where surfaced roads have been built derive considerable revenue from their mulct tax in addition to regular county taxes and this money has been quite generally used for road purposes. In such places it is right and proper that surfaced roads should be built as fast as possible.

The type of road which has been used in Scott county has a heavy broken stone base covered with a wearing coat of gravel. The average cost per mile of the four and one-half miles of work completed during 1907 was $7,670.00.

Des Moines county is building this year about three miles of surfaced roads which will be used as a basis for estimating the cost of an adequate system of roads and also as a means of comparing the adequacy of the different types of road. Two and one-half miles will consist of an 8-inch limestone base laid in large pieces resembling the Telford type of construction. One-half mile will consist of a 7-inch base of crushed limestone. About one and one-half miles has a second course of three inches of crushed limestone with a top coating of screenings, and the remainder is covered with gravel. This plan of using different types of construction will give the county an opportunity of observing the results obtained with each, and the comparative costs. Two miles is being built by the county and one mile by contract. The estimated cost does not exceed $5,000.00 per mile. It might be noted in this connection that a considerable sum is subscribed by farmers along the roads to aid in their construction.

In and around Keokuk broken stone roads have been built for years and there are examples there of stone roads on streets which have had very little maintenance if any for perhaps twenty or thirty years that are still in usable shape. Had these roads been given a little care they would now be in as good or better shape than when first built.

This same thing holds true at Fort Madison, and in the supplement to this report are a number of views showing the macadam construction in this city.

There is now considerable discussion which has resulted from the destructive effects of automobiles on stone roads as to the best methods of preserving the surface under such traffic. This detrimental effect has given the opponents of stone surfaced road construction an added argument to support their position, but the facts and figures given are hardly applicable to the situation in this state, and the question is deemed of sufficient importance just now that a special chapter is devoted to the subject.

The city of Des Moines has recently built two stretches of so-called petrolithic pavement which give promise of good results, and which, if successful, will place a new form of road construction on a practical footing in the state. This pavement is a mixture of asphaltic oil with earth, gravel, or broken stone screenings, thoroughly tamped and rolled to a hard surface covering.

The whole question of improved roads is a live one in the state, and one to which a good deal of attention is being given by those in charge of road work. The building of roads and pavements is as natural and inevitable as the establishment of educational systems or any of the other activities which are common to a fixed civilization, and it must be considered a duty of the state to provide information and instruction concerning the best methods and means to use to obtain the highest results and to do the work which is more or less experimental. Such duties legitimately belong to the state highway department. It is not to be expected that where counties or cities experiment with new forms of surface coverings that very many of the other counties or cities of the state will profit by their experience unless the information is gathered and distributed by the state, and neither is it to be expected that all the experiments should be successful, and the state is far better able to spend money in experimenting and developing types of road construction than individual counties. Not only should the experimental work be done but as much as possible of the practical work in the counties of building roads should be under state supervision and state encouragement. Illinois builds object-lesson roads in various parts of the state which are being extended by the local communities. Michigan has a state reward law which pays certain amounts for the different types of roads built under specifications issued by their state highway department, and accepted by this department. Wisconsin has also built some object-lesson roads. The Iowa Commission can increase their duties and influence legitimately by building other and more expensive types of road than they have so far been able to do—not, however, neglecting the earth road.

PROGRAM OF 1907 ROAD SCHOOL.

COUNCIL BLUFFS, IOWA.

Monday, September 2nd.

8:00 A.M.—The Pottawattamie County Road Gang will commence building one-half mile of earth road with blade grader and roller on Twenty-ninth Avenue.
The Monona County Road Gang will commence building one-half mile of earth road with elevating grader and roller on Twenty-ninth Avenue.

1:15 P.M.—Band Concert in Bayliss Park...Covalt's Band, Council Bluffs

7:00 P.M.—Evening Concert.

Tuesday, September 3d.

10:00 A.M.—Meeting called to order by Pres. Henry Harlow, introducing Hon. Walter I. Smith, Chairman of the day.
Address of Welcome, outlining of objects to be obtained during the week along the line of discussions, practical demonstrations and legislative enactment.....
Hon. Walter I. Smith, Council Bluffs, Iowa
"Iowa's Rank as Regards Measures Taken and Work Done for Road Improvement by the States".....
Director Logan Waller Page,
Office of Public Roads, Washington, D. C.
Appointment of Committees.
Special Announcements.

1:15 P.M.—Concert in Park.

2:00 P.M.—"The City's Responsibility in Road Improvement".....
Hon. Lafe Young, Des Moines, Iowa
"The State's Responsibility in Road Improvement"....
Director A. Marston, Iowa Highway Commission
Demonstration building of concrete culverts. Placing of steel and other patented forms of culverts will begin Tuesday morning and continue throughout the week. Places of demonstration will be announced daily.

7:00 P.M.—Evening Concert.

Wednesday, September 4th.

8:30 A.M.—"The Work of the Illinois Highway Commission".....
Mr. A. N. Johnson,
State Highway Engineer, Springfield, Illinois
"Extermination of Weeds Along the Highways".....
Hon. S. B. Packard,
State Board of Agriculture, Marshalltown, Iowa

10:15 A.M.—Inspection trip over the roads around Council Bluffs. Some of these earth roads and earth-cinder roads are subjected to very heavy traffic but are kept in good repair by the use of the drag.

2:00 P.M.—Afternoon meeting in the Park.

"The Necessity for the Use of Wide Tires and a Law to Regulate the Same"...Col. W. F. Baker, Council Bluffs, Iowa
"The R. F. D. Service, the Connecting Link Between the Old and the New".....
Mr. C. M. Adams,
President Iowa Rural Carriers, Davenport, Iowa
Introducing the Subject.
"The Road Problems as Affecting the Extension and Continuance of the R. F. D. Service".....
Mr. W. R. Spilman,
Supt., Div. of R. F. D., U. S. Postoffice Dept.

Thursday, September 5th.

8:30 A.M.—Bridge and Culvert Problems".....Mr. A. N. Johnson
"Foundation Problems".....
Mr. M. E. Bannon,
Civil Engineer, Ft. Madison, Iowa
"Necessity of Trained Supervision in Bridge and Culvert Work".....Mr. Seth Dean, Civil Engineer, Glenwood, Iowa
Question Box.

1:15 P.M.—Concert in Park.

As soon as the earth road demonstrations are completed a stretch of earth-cinder road will be built.
All manufacturers of patented forms of culverts have been invited to make a demonstration of their particular forms of culverts.

7:00 P.M.—Evening Concert.

Friday, September 6th.

8:30 A.M.—"Road Dragging—What One Township Has Accomplished".....Mr. F. L. Reeder, Tipton, Iowa
"The County Grading Gangs of Dallas County".....
Mr. B. Stanton, Supt. of Roads, Dallas County
Question Box.

1:15 P.M.—Concert in Park.
Continuance of demonstrations.

7:00 P.M.—Evening Concert.

Saturday, September 7th.

Finishing of demonstrations, etc.

PROGRAM OF 1908 ROAD SCHOOL.

WATERLOO, IOWA.

Monday, August 10—Tuesday, August 11.

The improvement of a bad stretch of sandy road running northeast out of Waterloo will be begun on Monday and continued until completed.

The construction work will be under the supervision of Mr. W. L. Spoon, Road Expert, Office of Public Roads, U. S. Department of Agriculture.

Exhibits of culverts, culvert forms and road machinery will be placed near the court house where the most of the sessions will be held.

Wednesday, August 12th.

"Farmers' Good Roads Picnic" meeting at Chautauqua Park Pavilion.

10:00 A.M.—Opening Concert.....Cedar Falls Band
Session called to order by President Henry Harlow, Iowa Good Roads Association.
"The Split Log Drag"....Hon. D. Ward King, Maitland, Mo.
Discussion of results obtained with drag, led by County Supervisor Wm. F. Dawson, Butler County.

12:00 M—Farmers' Basket Picnic.
The City of Waterloo, through its Commercial Organizations and County Officers, will serve coffee and lemonade.
Noon-day Concert.....Cedar Falls Band

1:30 P.M.—"Iowa's Roads and Agriculture".....
Hon. James Wilson,
Secretary of Agriculture, Washington, D. C.

"Road Improvement With the Material and Means Available."
Flat Roads..Supervisor W. F. Baker, Pottawattamie County
Hill Roads.....Hon. C. C. Dye, Decatur County

4:00 P.M.—Cars will start from the Park gates, run through the city and out to the road building demonstrations.
Free train accommodations provided by courtesy of Chicago Great Western Ry. Co.

7:30 P.M.—Evening Concert in East Side City Park....Cedar Falls Band

Thursday, August 13th.

Joint session with Supervisors.

8:30 A.M.—Sessions called to order by Pres. F. T. Morris, State Association of Supervisors.
"Sand and Clay Road Constructions".....
W. L. Spoon, Road Expert,
Office of Public Roads, Washington, D. C.

Gravel and Stone Road Construction".....
Curtis Hill, State Highway Engineer, Missouri

Discussion—Supervisor J. G. Dutcher and Supervisor Theodore Gasseling, Scott Conuty, on stone roads of Scott County.
Supervisor C. P. Walker, Greene County, on gravel roads of Greene County.
"Defective Bridges and Resulting Damage Claims".....
Supervisor E. C. Copeland, Woodbury County
"Permanent Bridges and Culverts".....
Director A. Marston, Iowa Highway Commission
Discussion—John L. Cooney, Dubuque County; John Young, Tama County; L. S. Fisher, Clayton County; I. H. Saunders, Poweshiek County; J. H. Mathis, Polk County; H. D. Howe, Boone County; Allan McDuff, Linn County.

3:00 P.M.—All visiting associations and delegates will take 3:00 o'clock interurban car for Ce lar Falls, visit the Normal School and return to Cedar Falls where luncheon will be served by the citizens.

7:00 P.M.—Return to Electric Park and spend the evening there. The road men and delegates are invited to accompany the County Officers and to share the entertainment above outlined.

Friday, August 14th.

The day will be devoted to visitisg the road work which will be carried on during the school, having road machinery on exhibition with attendants to answer any questions raised by the visitors, visiting the concrete bridges already built or in course of construction wthin the city, etc. Launch rides and automobile trips around the city will be arranged for, and many pieces of interesting work will be inspected.

TABLE SHOWING ROAD AND BRIDGE FUND RAISED, 1903 TO 1907.

Years.	County Road.	County Bridge.	Township Road.
1903	$547,309.92	$1,628,720.88	$2,283,129.65
1904	559,409.42	1,947,423.53	1,749,395.23
1905	518,535.71	1,773,304.08	1,923,431.81
1906	520,779.54	1,967,546.00	1,804,483.83
1907	556,173.16	2,178,028.09	1,909,988.03
Totals for five years	$2,702,207.75	$9,495,032.58	$9,670,428.55

Total in all funds for five years $21,867,668.88.

The sums here given are from the State Auditor's records and can be verified.

In view of these figures we do not believe any more convincing proof is necessary that without increasing the present taxes far better results can be obtained by a business-like administration of the funds. This has been the contention of the Commission from the first.

It should be particularly noted in this connection that these amounts do not include the poll tax and the mulct tax that is spent on the roads.

ROAD DRAINAGE.

In the consideration of new methods or new legislation relative to the highways of the state, the first and possibly the last test that should be applied is their probable effectiveness in providing road drainage. Drainage is essential and fundamental. Any system that does not contemplate the removal of all water from the surface of the roads, from the sides of the roads, and from under the roads (where the ground water level is high) is incomplete and can at best be only partially successful.

No matter if the ultimate end of road building is a gravel or broken stone surface, the foundation will always be the earth road and the life of the finished whole will depend upon the thoroughness with which the foundation is drained and then kept drained.

Surface drainage is secured by—	Rounding cross section, smooth surface, weeds and grass cut on shoulders of the road.	This in a large measure constitutes Road Maintenance.
Side drainage is secured by—	Side ditches constructed with a true grade to the outlet, free from long grass, weeds, or other obstructions.	Which constitute Road Building.
Subdrainage is secured by—	Tile Drains.	

This diagram shows, perhaps, the distinction which we make between road maintenance and road building, although the two overlap to some extent. With this distinction in mind, we believe that the results obtained in various counties warrant the assertion that the road maintenance should be delegated to the townships and the road building to the counties.

ROAD MAINTENANCE WITH THE ROAD DRAG.

The considerable advance that has been made along the line of road improvement in the state is more directly due to the agitation for, and the results obtained by, the use of the drag than to any other factors. The road drag is an educator. More than this, it

is a practical and efficient road implement and the recognition given its use by Iowa through her General Assembly has been followed by similar action in many other states. The law now in force has been partially applied in some communities but to such a limited extent that it cannot be regarded as an effective measure. It is probable that at least seventy-five per cent of all dragging done since the agitation was first begun has been by the farmers voluntarily or through the efforts of commercial clubs and similar organizations. Here and there are communities, townships, or even considerable portions of counties where the drag has been put into persistent and consistent use by the road officers in charge, on the basis of payment for work done.

This is the proper attitude to take relative to road dragging. The most willing volunteers tire eventually and the roads suffer until the next revival of interest unless a system put into effective operation by the road officers responsible is developed around each trade center, covering the main traveled roads and the rural routes. This statement is fully justified by the results obtained around Council Bluffs in Pottawattamie county, in Cedar county, Decatur county, Butler county and Hardin county. These are only a few of the prominent instances where the possibilities of the road drag have been clairly shown but are selected for the wide variation in soil and topography which they represent. The roads of the Missouri river bottom are noted for their lack of drainage, gumbo soil, and heavy traffic; those of Decatur county for steep grades and clay soil, where every wheel track is a deep, dangerous ditch in embryo unless the rounding cross section is well maintained to force the water to the side ditches.

The amount of money necessary to drag the main roads of a township is not large. In an ordinary township with about seventy miles of roads not more than twenty-five to thirty-three per cent can be considered main roads, which means a total of eighteen to twenty-five miles. This mileage could be kept in splendid condition by an expenditure of not to exceed two hundred and fifty dollars per year. This has been proven by actual results in Hardin county where last year it cost about two hundred dollars to care for the roads of one township with the drag. The road tax of the average township with the four-mill levy amounts now to about twelve hundred dollars per year, that is, each mill levy brings in about three hundred dollars. A levy of three mills would amount to nine hundred dollars which could be well used as follows:

Dragging main roads	$250.00
Wages of superintendent and extra labor for culvert building	650.00
Total	$900.00

This would leave the poll tax to be used in dragging the secondary roads and supplying some of the labor for building culverts and such purposes.

This scheme contemplates the furnishing of a good team by the superintendent two or three months of the year to be used for hauling culvert material, discing the roads and cleaning and opening water courses; the remainder of the payment to be made for superintending poll tax labor; inspection trips over the roads dragged by contract, and the building of culverts.

For small culverts the cost of the material is not a large item and could be furnished from the county bridge fund. This would tend to equalize the cost of culverts between the townships requiring many and those needing but few.

With this division of the fund, townships having not to exceed this amount could keep the superintendent employed for six to eight months and townships having a larger sum could employ their superintendent for the full twelve months.

Based on this system of road work a calendar for the year could be prepared about as follows:

March	Main roads outlined, divided into sections and contracts made with farmers for dragging each station.
April	Systematic road dragging. A careful inspection of all roads and culverts in the townships, replacing bad planks, opening side ditches and cleaning water courses.
May June July	Hauling culvert material, road dragging and culvert building, and such road grading as is possible with the limited funds.
August	Enforcing weed laws.
September October November	Cleaning waterways of weeds, etc., complete culvert building, careful inspection and repair of wooden structures; road dragging.
December January February	Occasional inspection of culverts for small repairs, and road dragging when roads are in condition to warrant.

The best results are obtainable with the drag during the winter and spring months.

DEFECTS IN PRESENT ROAD DRAG LAW.

It is a serious defect in our present drag law to limit the expenditure for dragging to five dollars per mile per annum. This limit allows but ten times over any single mile, which is not sufficient for main traveled roads with the dragging continued throughout the twelve months. This limit should be raised on all main roads and rural routes and perhaps left at five dollars per mile for the secondary roads with the stipulation that on these the poll tax labor should be used so far as possible.

The road superintendent in place of the township trustees should be charged with the duty of contracting for systematic dragging as he is in direct charge of the expenditure of all the road money and if held responsible for results should be allowed to dictate who shall drag and how and when. With these changes the law should be made mandatory to insure its more general enforcement. There should be no hesitation in making a road law mandatory that has in so many districts proven an effective and economical method of road maintenance.

It can be asserted without fear of successful contradiction that by carefully following the outline here given, the townships will receive far greater value for the money used than by adhering to the old methods and practices now generally in use.

ROAD BUILDING.

It must be recognized that the township funds are not sufficient to do much road grading as the handling of road machinery implies not only trained men but trained horses and adequate tools and machinery. As a rule the townships have an investment in machinery that represents the entire tax of one, two, or even more years and it is equally as certain that not much of this machinery is used more than a few days during any one year, or adequately housed and cared for the remainder of the time. This machinery has formed a supply which is drawn on by all who need a slip, a wheeler, or a blade grader to use for a few days and as a result the supply is scattered all over the township and is usually in serious disrepair when needed for actual road work. It is clearly impossible to drag the roads, build culverts and do much road work with a fund totaling between $1,000.00 and $1,500.00 per year and the logical step is to make the county road fund sufficiently large to enable the board of supervisors to keep at least one well equipped road building crew at work from April to November. By decreasing the

township road fund one mill and adding this to the one mill county road levy, a fund of about $12,000.00 would result in the average county. The cost per mile to build earth roads in Dallas county, where this plan has had the best trial for several years, was in 1906, $220.00. This is a fair average to use in estimating the results we might expect to get after competent men were developed to superintend such a crew. The following is a rough estimate:

Machinery (new and repairs), tents, etc. for crew..	$ 2,000.00
45½ miles earth road at $220.00.....	10,000 00
Total	$12,000.00

Estimating road mileage of each county at 1,000 miles, thirty-three per cent main traveled roads would be 330 miles.

330 miles main traveled roads.... } 7½ years to complete system.
45.5 miles constructed per year.. }

It is quite obvious that these figures would not hold for every county in the state, and it is also true that in every county part of the roads are now well graded. In no township have results been obtained consistent with those resulting from a policy well formulated and persistently carried on year after year, and it is only logical to develop the future work along these lines.

OTHER FACTORS AFFECTING ROAD BUILDING.

Placed in their order of importance, the different considerations affecting road building would be about as follows:

Road Drainage,—
  Surface, side and sub-drainage.
Elimination of steep grades.
Surfacing with gravel, broken stone or some other wearing coat.

The relocation of roads to avoid steep grades is a serious question in much of the territory south of the main line of the Rock Island and also in some of the river counties on the east and west borders. While there will be from many sources much objection to such a plan, it must come before the roads can be carried to any reasonable degree of usefulness. The cost, even if a liberal amount is paid for the land, where roads are re-located, will be less than to make the heavy cuts and fills otherwise required. A good instance of this is taken from Carroll county where it cost $1,000.00 to go over one hill and only $70.00 to go around the next hill with a level grade.

Road surfacing has found more and more favor where material is available, and as these supplies are developed it will be found possible to ship this material to localities which have no supply for road use. Greene county has built about 175 miles of good gravel roads at a very reasonable cost and both stone and gravel has been used in other counties for years, so that we have many more miles of hard roads in the state than is commonly supposed. These roads have been built out of the funds at hand and proven that the next ten years will see much of this kind of work.

These phases of the road question are merely touched upon to show their importance and the need of trained supervision and the concentration of road funds used for such purposes. The county road fund with a competent engineer in charge of the expenditure will produce splendid results. For the money spent each year we should obtain far greater returns.

A DIGEST OF THE ROAD WORK IN THE VARIOUS STATES.

CALIFORNIA.

In California the road work is under the supervision of a State Highway Commission which recommends appropriations for particular roads upon petition of the counties.

CONNECTICUT.

Supervision under State Highway Commission.

1907 legislature appropriated $4,000,000 for road improvement, which provides for over $1,000,000 annually.

The state pays from 75 per cent to 95 per cent cost of construction.

DELAWARE.

Road work is let under contract, and paid for by the state on statements approved by the Highway Commissioner. About $180,000.00 was paid by the state during 1908.

ILLINOIS.

Supervision under State Highway Commission. Crushed rock for road purposes furnished free from the penitentiaries, and 57,970 ft. of macadam road was built during 1907. The state has seven fully equipped outfits at work during the entire season.

Annual appropriation by the state is $50,000.

MAINE.

Supervision under State Highway Commission.

Appropriation is $70,000 annually, and state pays one-half expense of construction.

MARYLAND.

Supervision under State Highway Commissioner.

An annual appropriation of $200,000 is made for this work and the State Commissioner certifies to the Auditor the amount which should be expended in each county of the state. An additional appropriation of $5,000,000 was made in 1908 for the construction of a complete system of state roads.

State pays one-half cost of construction.

MASSACHUSETTS.

Supervision under State Highway Commission.

In 1907 the state approriated $666,950 for this work, to which was added about $35,000 derived from an automobile tax.

State pays 75% cost of construction.

MICHIGAN.

Supervision under State Highway Commissioner.

1907 legislature appropriated $250,000 for two years' work, $100,000 of which was available for 1907. Additional amounts are paid in rewards for certain classes of roads on certified statements from the highway department to the Auditor.

MINNESOTA.

Supervision under State Highway Commission.

About $75,000 is raised annually for the road work by a one-twelfth mill tax on all taxable property. $6,000 is provided annually for the maintenance of the Commission.

State pays one-third costs of construction.

MISSOURI.

Supervision under State Board of Agriculture—State Highway Commissioner.

An appropriation of $200,000 has been voted upon, but was referred to the Supreme Court for decision as to its constitutionality, in view of the existing laws. $12,000 is provided annually for the maintenance of the Commissioner's office.

Law passed provides for County Engineer in each county.

NEW HAMPSHIRE.

The state placed at the disposal of the State Engineer $320,000 for use during 1908 in the construction of roads.

NEW JERSEY.

Supervision under State Highway Commission.

Appropriation $400,000 annually to be apportioned to the different counties by the Commission.

State pays one-third construction costs.

NEW YORK.

Supervision under State Engineer and Surveyor. Highway Commission soon to be established.

$5,000,000 appropriated for period of ten years, or a total of $50,000,000, to be used entirely for the construction of permanent roads. In addition to this the state pays one-third the cost of building and working other forms of roads in the state, which amounts to about $500,000 annually.

OHIO.

Supervision under State Highway Commissioner.

The 1907 appropriation by the state for this work was $158,000, and the appropriation asked for 1908 was $458,000. $10,000 is provided for running erpenses of the Commission.

State pays one-fourth construction costs.

PENNSYLVANIA.

Supervision under State Highway Commissioner.

$6,500,000 appropriated in 1903 for a period of six years, but in 1907 $1,000,000 additional was appropriated, making the money available for the two years ending May 31, 1909, $4,000,000, or $2,000,000 for each year.

State pays 75% of construction costs.

RHODE ISLAND.

Supervision under State Highway Commission.

State appropriates $125,000 or more each year according to requests filed for work to be done, with estimates of cost.

State pays one-half construction costs.

VERMONT.

In 1907 $190,000 was spent under the direction of the State Highway Commission in the building of permanent roads, $50,000 of which was paid by the counties, and $140,000 by the state.

VIRGINIA.

The 1908 legislature appropriated $430,000 for the highway work, of which $15,000 annually is for maintenance of the Highway Commission, $150,000 to maintain the convict force for two years, and in addition $250,000 is appropriated annually for half payment of road construction.

WASHINGTON.

Supervision under State Highway Commisrioner.

Appropriation of $225,000 made in 1907, to be apportioned to the counties on recommendation of State Highway Commissioner.

State pays one-half construction costs of roads.

WISCONSIN.

The road movement is carried on in Wisconsin under the State Geological Department, an appropriation of $10,000 being made for its use along educational lines. Due to some technicality, the laws now existing make an appropriation for state aid unconstitutional, but the agitation has reached such a stage that the people were recently given a chance to vote on a constitutional amendment which will vest the legislature with power to appropriate money for his purpose. It is expected that a liberal appropriation will be made.

STATE APPROPRIATIONS FOR ROAD IMPROVEMENT.

Taken from 1907 and 1908 Reports.

State.	For.	Total State Appropriation for Roads.
California	Construction of earth, oil and surfaced roads.	Appropriations made for particular roads as requested.
Connecticut	Highway construction and maintenance.	$1,000,000 continuously per annum.
Delaware	Highway construction.	Work let by contract and paid for by state. In 1908 about $180,000 paid.
Illinois	Highway construction.	$50,000 annually.
Maine	Highway construction.	$70,000 annually.
Maryland	$200,000 annually for general road construction. $5,000,000 for construction of state roads.	$5,200,000.
Massachusetts	$500,000 for road construction. $100,000 for maintenance. $66,950 for office expenses and salaries.	$666,950.
Michigan	$100,000 for road construction in 1907. $150,000 for road construction in 1908.	$250,000 for two years. Additional provision for rewards.
Minnesota	About $75,000 annually from 1-12 mill tax. $6,000 annually for office expenses.	About $1,000 annually.
Missouri	Educational.	$12,000 annually.
New Hampshire	$320,000 for construction of roads in 1908.	$320,000 in 1908.
New Jersey	Highway construction.	$400,000 annually.
New York	$5,000,000 per year for ten years for permanent roads. About $500,000 annually for other roads.	$55,000,000 for ten years.
Ohio	$148,000 for state aid. $10,000 office expenditures $458,000 asked for 1908.	$158,000 in 1907.
Pennsylvania	$2,000,000 annually for 1908 and 1909 for work of commission and state aid.	$4,000,000 for two years.
Rhode Island	Highway construction.	$125,000 in 1907.
Vermont	Highway construction.	$140,000 in 1907.
Virginia	$15,000 annually for maintenance of commission. $150,000 for maintenance of convict force. $250,000 annually for half payment of road construction	$130,000 in 1908. $250,000 annually additional.
Washington	Highway construction as requested by counties	$225,000 in 1907.
Wisconsin	Educational.	$10,000 annually.
Iowa	Educational.	$5,000 annually.

SUGGESTED ADMINISTRATION OUTLINE FOR IOWA.

Legislature .....
1. State Legislature.....State
2. County Supervisors.....County
3. Township Trustees .....Township

Executive .....
1. State Highway Commission.
2. County Engineer.
3. Road Superintendent.

LEGISLATIVE.

1. *State Legislature.*
   1. General regulations.
   2. Standard loadings for bridges.
   3. Authorize tax levies by local boards.
   4. Appropriate funds for use of State Highway Commission.
   5. Appropriate funds for state aid.
2. *County Supervisors.*
   1. Classify roads.
      a. Primary.
      b. Secondary.
   2. Adopt types of road improvement, cross sections of road surfaces.
      a. Primary.
      b. Secondary.
   3. Adopt types of bridges and culverts.
   4. Raise and administer road funds with especial reference to primary roads.
   5. Appoint County Engineer.
3. *Township Trustees.*
   1. Raise and administer road funds with especial reference to secondary roads.
   2. Adopt types of roads and bridges suitable to local needs.
   3. Appoint road superintendent.

EXECUTIVE.

1. *State Highway Commission.*
   1. Devise standard cross sections and plans for road improvement.
   2. Design standard plans and specifications for bridges and culverts.
   3. Promulgate information relative to road improvement by bulletins, public meetings, correspondence.
   4. Approve all plans of county engineers for work costing for bridges to exceed $1,000.00 and road work $1,000.00.
   5. Appoint County Engineer where supervisors fail to act.
   6. Publish report of each year's work, incorporating report from county engineers.
   8. Build object-lesson roads.

2. *County Engineer.*
   1. Prepare plans for all road and bridge work ordered by Board of Supervisors.
   2. Supervise all contract work.
   3. Appoint road superintendents when trustees fail to act, and shall have the power to remove incompetent superintendents.
   4. Supervise the maintenance of all primary roads.
   5. Report to State Highway Commission all work done each year, incorporating the reports from township superintendents and trustees.

3. *Road Superintendents.*
   1. Work the roads under joint direction of County Engineer and Trustees.
   2. Report amount and cost of work done to County Engineer.

CHANGES IN LAWS AND NEW LEGISLATION SUGGESTED.

INCREASE THE POWERS AND DUTIES OF THE STATE HIGHWAY COMMISSION.

For almost five years the present Commission has been gathering data and information concerning road work in the state, locating concrete and road material, preparing standard plans and specifications, publishing bulletins and talking road improvement before many farmers' institutes, road meetings and on special road trains, and acting as consulting and supervising engineers on many pieces of work. The scope of the work possible has broadened beyond any first conceptions into a state work with a fruitful field of usefulness. The amount of work done has been very materially hindered by an inadequate appropriation, which, as will be seen in the accompanying table, is the smallest made by any state for such work.

The calls now made upon the Commission are sufficient to develop it into a very important state department if a reasonable appropriation is set aside for its use.

The powers and duties of the Commission should be increased to include the following different lines of action:

1. To collect and distribute reports and information from and to county and township road officers and street commissioners.
2. To apportion and distribute any state or national aid appropriated for road improvement.
3. To furnish plans and supervision for roads, bridges and culverts and aid the local road authorities in letting contracts for such work.
4. To hold meetings for the instruction of road officers and so far as possible furnish competent road builders and inspectors on request of the local boards.
5. To carry on experiments with which to determine the best and most economical forms of construction and maintenance, and the materials best fitted therefor.
6. To make annual or biennial reports to the Governor giving the work accomplished and expenditure of money in detail.

For carrying on work of this nature in any adequate manner there should be appropriated not less than twenty thousand dollars per annum.

COUNTY ENGINEER.

It has been apparent from the first that there is a very marked need for more technical knowledge in the administration of the money spent each year for road and bridge improvement. It is no reflection to say that not one supervisor in ten over the state has the requisite technical knowledge to spend this money economically and well and this is largely the reason that with the large sums spent, more progress is not made, coupled with the fact that practically the only advice that is made available to the counties at any time and without cost is from the bridge company salesmen.

One of the most important laws that, as far as bridge and road work is concerned, could be passed would be an act establishing the office of county engineer, carrying with it a sufficient salary to obtain a graduate engineer, and placing him directly in charge of all construction work.

ADVERTISEMENT OF BRIDGE LETTINGS.

Following the establishment of the office of county engineer as a logical sequence would be a law providing for the advertisement and public letting of all county work that it is possible to let by contract, with the provision that plans and specifications be on file and for a sufficient length of time before the letting to give all the companies who wished, a chance to bid on the work.

CONCENTRATION OF ROAD FUNDS HINDER COUNTY SUPERVISORS.

The best results will be obtained from the expenditure of road and bridge funds when the authority is centralized in a small body of men, and these men held for results. We will never get full results from the money that is spent by the townships for the amount in the hands of each board is so divided up into minute fragments as to lose all possibility for any considerable improvement.

A division should be made of the present township road fund, putting one or two mills of this fund into the county road fund and decreasing the township road fund by a like amount. This would result in differentiating the work of road building and road maintenance; the one belongs properly to the county, the second to the township.

ROADSIDE TREE PLANTING.

Some provision should be made at an early date for systematic tree planting and for maintaining the native trees along the main traveled highways. While this may seem premature in view of our present imperfect system of road construction and maintenance, it must be remembered that tree development is a slow process and that we must plant now for results which will reach fruition many years in the future.

The Massachusetts Highway Commission has established a nursery from which large numbers of shrubs and trees are taken annually to improve and beautify the highways of the state. The work is in charge of a competent forester who works under the general supervision of the Commission. The cost of planting new trees in 1907 was $0.85 each, which was assessed against the abutting property.

THE DESTRUCTION OF ROADSIDE WEEDS.

The idea of roadside tree planting naturally associates itself with roadside weed destruction. Our present road and weed laws have not operated with any degree of certainty or thoroughness and the need for a more effective system has become very seriously apparent. Some state-wide action is necessary to awaken into activity sufficient forces to accomplish results. There is no need to dwell on the value of weed destruction from an agricultural standpoint but their disastrous effect upon roads is perhaps not so well understood. On the other hand the benefit of a reasonable amount of shade is considerable to all classes of roads from the drag maintained earth roads to the highest class of macadam surfaced roads—and the desirability of well shaded highways free from weeds from the standpoint of the user is value received in itself.

An auxiliary department working in conjunction with the State Board of Agriculture and the Highway Commission would have a broad field of activity and permanent usefulness to the state.

SUMMARY OF SUGGESTED LEGISLATION.

Taking the present laws as a basis, by some additions and changes a very comprehensive system of administration can be effected. Iowa now has fairly good laws governing road work, and the present system has been built up by long and careful legislation. It is not wise or possible to put into effect radical

measures, nor can the results already accomplished be overlooked or nullified.

The best results will undoubtedly come from strengthening our present laws with a view to unifying the whole and making the system adequate to our present needs. The different legislation here suggested is based on the actual workings of these laws and there is no single measure proposed that can be said to be freakish or radical. Each suggestion is made with the idea of strenghtening and putting into active efficiency the statutes now existent. With this in view, the following brief summary is given:

The increase of the duties and powers of the Highway Commission, consistent with the evident need and field of usefulness in the state of such a department.

The establishment of the office of county engineer who shall be qualified to take charge of all county road and bridge construction and maintenance.

An adequate bridge law that will provide real competition for county contracts and protect both the county and the contractor.

The concentration of more of the road funds under the county supervisors to provide an adequate building fund.

A mandatory road drag law providing for the consistent dragging of all main roads and rural routes.

An act based somewhat on the Michigan law providing for a state reward which shall be paid to counties or townships for road construction under plans and specifications prepared by the Highway Commission. The reward should aggregate one-third to one-half the cost of the improvement.

A provision inaugurating tree planting and the destruction of roadside weeds.

An act collecting an annual tax from automobile owners, this tax to be set aside for use by the Highway Commission in encouraging road improvement, and for offering rewards for improved road construction.

FINANCIAL REPORT OF IOWA HIGHWAY COMMISSION.

July 1, 1906, to July 1, 1907.

Balance on hand (pro rata) July 1, 1906	$ 460.34
Annual appropriation	5,000.00
Fund derived from fees at 1906 road school	44.00
Amount available July 1, 1906	$5,504.34

DISBURSEMENTS.

1.	*Salaries.*		
	Thos. H. MacDonald, Highway Engineer—		
	6 mos. at $100.00 per month	$600.00	
	6 mos. at 133.33 1-3 "	800.00	
	A. E. Miller, assistant, 10 mo. at $20	200.00	
	J. T. Hoover, assistant, 12 mo. at 10	120.00	$1,720.00
2.	*Equipment.*		
	100,000 No. Reihle Bros. testing machine	1,025.00	
	Freight on Reihle Bros testing machine	115.34	
	S. Hanson, labor building concrete foundation for testing machine	25.00	
	Drayage and unloading machine	14.80	
	S. Hanson, labor setting up machine	24.63	
	C. & J. Dept., labor and materials for installing pump on testing machine	36.95	
	Starting rheostat	9.00	
	Engine belt	8.66	
	Lumber for cement shed	32.41	
	Labor on cement shed	24.80	
	Lumber for sample boxes for sand and gravel	16.25	
	Carpentry work on boxes	1.92	
	Laboratory repairs	7.10	
	Repairs on road roller	6.65	
	Freight on machinery	3.15	
	Reference book, "Reinforced Concrete" by Taylor & Thompson	4.00	
	Lantern	.60	$1,356.26
3.	*Plans and Publications.*		
	3,000 copies, 1906 revision of manual	$ 245.20	
	T. H. MacDonald, trip to Cedar Rapids to read proof on manual	9.40	
	15,000 envelopes at $1.37, J. W. Butler & Co.	20.55	
	Assistants mailing bulletins at 15c hr.	40.65	
	Half tones, Star Engraving Co.	18.35	

Blueprint paper	4.60	
Drafting on plans at 25c per hr.	138.88	
H. K. Dodge, designing	36.00	
Tracing cloth	6.46	$ 520.09

4. *Gathering and Tabulating Road Data.*

Tabulating road census reports—		
S. A. Knapp, 256 hrs. at 20c	$ 51.20	
D. R. Lewis, 135 hrs. at 20c	27.00	
H. W. Jones, 109 hrs. at 20c	21.80	
D. V. Whitehead, 180 hrs. at 20c	36.00	
R. L. Cooper, 9 days at $60. per mo.	17.42	
F. O. Jones, 12 hrs. at 20c	2.40	
Photographing negatives and prints	13.05	
Films and photographic materials	4.20	
Ames Times, record sheets	4.50	177.57

5. *Experimental and Demonstration Work.*

S. Hanson, labor on concrete culvert, demonstration on college grounds on excursion day	$ 20.90	
H. L. Munn, lumber for culvert forms	19.05	
Road dragging	5.25	
Laboratory labor	2.76	47.96

6. *Field Work.*

Traveling exepenses of T. H. MacDonald—		
July 21, trip to Calhoun county to secure measurements and data for bridge plans	$ 4.32	
July 25, trip to Iowa county, to secure measurements and data for bridge plans	8.84	
Sept. 10, trip to Iowa county, to secure measurements and data for bridge plans	6.81	
Sept. 25, trip to Dickinson county, to secure measurements and data for bridge plans	8.15	
Oct. 3., trip to Iowa county, to secure measurements and data for bridge plans	6.61	
Dec. 14, trip to Cedar county, on concrete culvert demonstration	11.51	
Jan. 9, trip to Dickinson county, on bridge inspection	5.72	
Jan. 21, trip to Iowa county, on bridge inspection	4.72	
Feb. 16, trip to Dallas county, to secure measurements and data for bridge plans	7.24	
April 4, trip to Iowa county, to secure measurements and data for bridge plans	3.97	
May 19, trip to Dickinson county, on bridge inspection	5.76	

D. V. Whitehead, trip to Benton county, on culvert demonstration, July 17	7.84	
D. V. Whitehead, concrete culvert demonstration Story county, Sept. 27	7.50	
60 lantern slides at 25c	15.00	103.99

7. *Road School.*

Instructors at $20.00 per week	$ 90.50	
Helpers at 15c to 25c per hr.	40.75	
Librarian	2.50	
Traveling expenses of speakers—		
G. W. Miller, Des Moines	2.57	
B. Stanton, Perry	5.13	
C. M. Adams, Davenport	12.36	
M. E. Bannon, Ft. Madison	19.88	
F. L. Reeder, Tipton	12.37	
H. E. Oldaker, Marengo	11.89	
Ames Times, 15,000 circulars and announcements of road school	13.63	
Ames Times, bulletin for road school	73.75	
H. H. Harlow, three men and six teams, seven days, for operating road machinery	87.00	
H. H. Harlow, expenses enroute from Onawa	18.52	
Board for teamsters	8.75	
Freight on teams for operating road machinery	61.00	
Extra teams for road machinery	4.72	
Feed for teams	20.53	
Freight on road machinery	15.58	
Coal for engine	7.95	
S. Hanson, concrete culvert demonstration	26.85	
S. Hanson, concrete culvert demonstration	18.30	
Section of stone road—		
Teams hauling stone	10.95	
Stone, 45 cu. yds. at 30c	13.50	
Freight on stone	38.73	
Labor on stone bin	15.03	
Sprinkling road	3.40	
D. V. Whitehead, labor at 20c 105 hrs.	21.00	
Carpentry work	25.16	
Engineman	5.00	
Livery	8.00	
Miscellaneous	6.03	701.33

8. *Office Expenses and Equipment.*

Underwood typewriter	$ 70.00	
Repairs on typewriter	7.50	

Office help—		
C. S. Nichols, stenographic work	178.00	
F. O. Jones, stenographic work	115.00	
C. H. Schemann, stenographic work	101.70	
Florence Tunis, stenographic work	11.75	
Office assistants	16.11	
Office supplies	60.71	
Telephone, rental and tolls	35.22	
Freight	13.38	
Express	14.51	
Drayage	11.00	
Telegrams	6.66	
Postage and stamped envelopes	85.96	727.50
Total expenditures		$5,354.70
Balance on hand, July 1, 1907		149.64
Total		$5,504.34

FINANCIAL REPORT OF IOWA HIGHWAY COMMISSION.

July 1, 1907, to July 1, 1908.

Balance on hand July 1, 1907	$ 149.64
Annual appropriations	5,000.00
Total amount available	$5,149.64

DISBURSEMENTS.

1. *Salaries.*			
T. H. MacDonald, Highway Engineer, 12 mos. at $150.00 per mo.	$1 800.00		
E. W. Hamilton, assistant, 10 mo at $20	200.00		
J. T. Hoover, assistant, 12 mo. at $10	120.00		$2,120.00
2. *Equipment.*			
Three portfolios, Carroll Blank Book Co.	$ 4.50		
Frames and glass, Adams Furn. Co.	2.90		
Blueprint frame, L. E. Ashbaugh	11.00		
Repairs on testing machine	3.60		
Lumber for repairs on cement shed	4.10		26.10
3. *Plans and Publications.*			
10,000 16-page bulletins, Ames Times	$ 100.00		
Star Engraving Co., half tones	20.00		
J. W. Butler Paper Co., envelopes	29.75		
Drafting on plans	294.35		
W. K. Dodge, designing	9.60		
Tracing cloth	7.50		
Blueprint paper	8.34		469.54

4. *Gathering and Tabulating Road Data.*			
Trip to Jefferson, to obtain report of road and bridge work, T. H. MacDonald, Jan. 16	$ 7.42		
Photographic work, prints, films, etc.	32.03		
Circular letters to R. F. D. carriers for road data, Ames Times	11.80		
Report blanks for R. F. D. carriers	4.75		
Katherine McLean, tabulating road data, 2 mos. at $50	100.00		156.00
5. *Experimental and Demonstration Work.*			
Briley & Tripp, hauling gravel for road, Ames, 239 cu. yds. at 30c	$ 71.70		
C. W. Overturf, culvert demonstration	4.50		
B. Stanton, Perry, expenses of trip to Grand Junction on demonstration	18.50		
Royce Heath, expenses to Des Moines on demonstration, State Fair	7.10		
Reinforcing steel	2.60		
Labor testing concrete beams	18.50		122.90
6. *Field Work.*			
C. & N.-W. Ry., 2 mileage books at $40	$ 80.00		
J. E. Kirkham, trip to Eldora, Sept. 28, to visit site of proposed bridge across Iowa river	4.60		
J. E. Kirkham, trip to Iowa Falls, Sept. 30, to visit site of proposed bridge across Iowa river	4.41		
J. E. Kirkham, trip to Keosauqua to Kilbourn bridge letting. Also to Burlington to inspect macadam roads	14.54		
Traveling expenses of T. H. MacDonald—			
Trip to Madison county, to attend Institute, Jan. 25-6-7	7.74		
Trip to Hamilton county, to secure data and measurements for bridge plans, March 25	3.20		
Trip to Des Moines, Institute, Jan. 24	3.02		
Trip to Des Moines, Institute, Feb. 26	3.02		
Trip to Woodbury county, to secure data and measurements for bridge plans, June 16-20.	12.60		
Trip to Des Moines, July 17	3.25		
Trip to Farnhamville, to secure data and measurements for culvert plans	3.04		
Trip to Adair, Institute, Aug. 2	15.34		
Trip to Clinton to attend Supervisors Association, and to Davenport for road inspection, Aug. 15	16.97		
Trip to Des Moines, Aug. 9	2.73		
Trip to Des Moines to arrange for State Fair demonstration, Aug. 10	1.45		

Telephone, rental and tolls	25.13	
Stamps and stamped envelopes	159.23	
Express	5.54	
Telegrams	7.16	
Drayage	8.05	
Freight	7.45	$ 741.05
Total expenditures		$4,985.55
Balance on hand July 1, 1908		164.09
Total		$5,149.64