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# Better Roads Commission

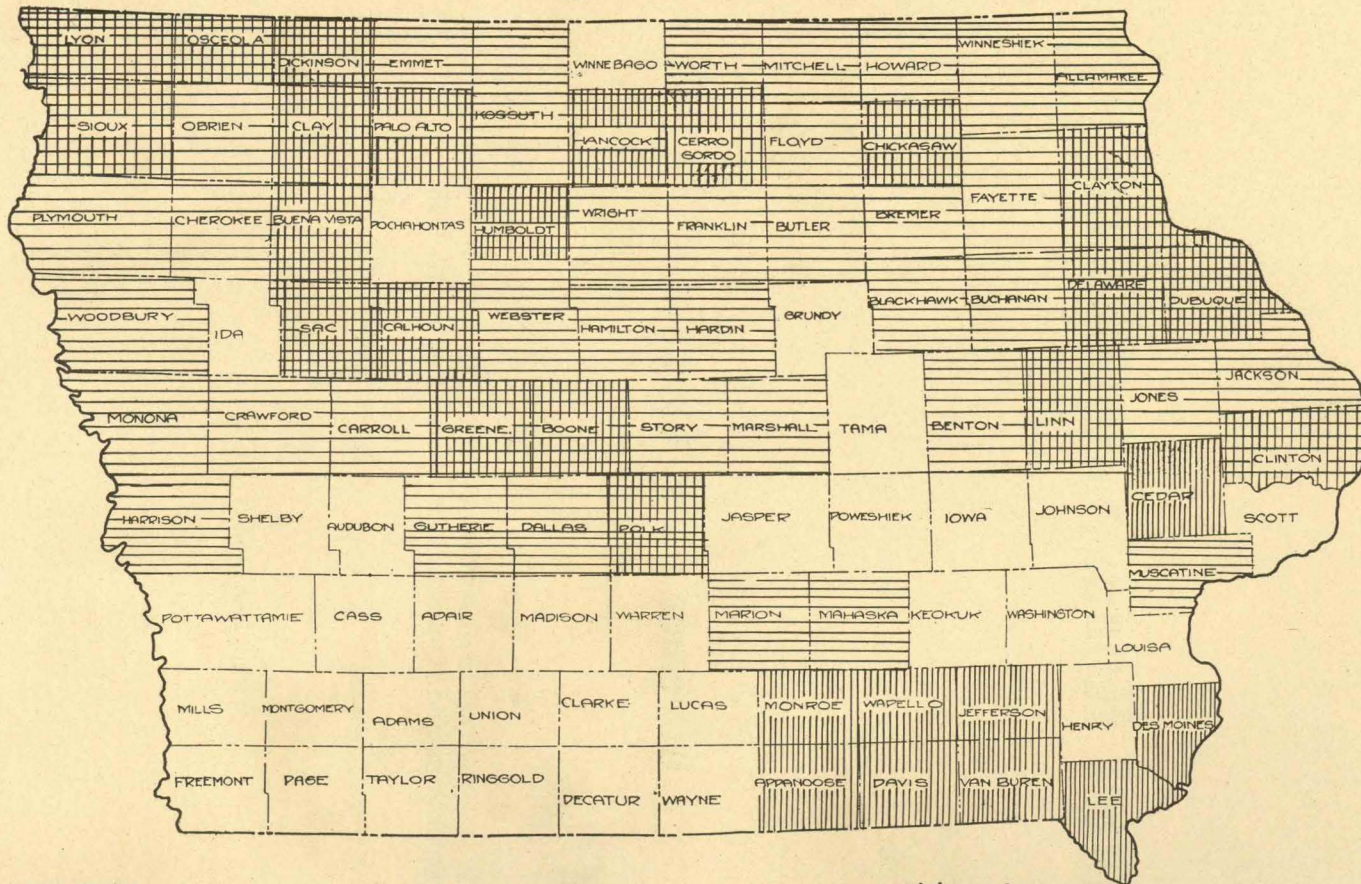
Report to

Governor G. W. Clarke





In accordance with  
Instructions and Appointment issued August 17, 1915

Filed December 30, 1916

# Road Surfacing Material Chart of Iowa



**LEGEND:-**

-  Counties having surplus of gravel over own needs
-  Counties having sufficient gravel for own needs
-  Counties having lime-stone and some fine river sand
-  Counties having no deposits of suitable road surfacing materials

Map of Iowa  
 SHOWING GRAVEL RESOURCES OF THE STATE  
 Compiled by the  
 STATE HIGHWAY COMMISSION  
 From the reports of  
 COUNTY AND DISTRICT HIGHWAY ENGINEERS  
 AND THE GEOLOGICAL SURVEY OF IOWA  
 Dec. 1916

# Report of Better Roads Commission

DECEMBER 30, 1916

GOVERNOR G. W. CLARKE:

Acting in accordance with appointment and instructions from you under date of August 17, 1915, the undersigned respectfully report upon their investigation of road building in Iowa and in other states as follows:

Contrary to our expectations we are pleased to report that there is an abundance of road surfacing material in this state suitable to its traffic conditions. Most of it is gravel, but experience in Indiana, Wisconsin, Minnesota and New Hampshire has shown that gravel properly placed will carry traffic on any of our roads, excepting possibly within a few miles of cities of 15,000 inhabitants or more and even under the heaviest traffic gravel surfacing is worth all it costs until a more durable surface can be had. Sixty-six counties in our state, as shown by the chart furnished us by the state highway commission, have local material sufficient for their own needs. Twenty-two counties have a surplus from which material can be shipped to the thirty-three counties which do not have material of their own and we find that it has proved practicable upon large contracts in other states to ship gravel 100 miles for road work.

After careful investigation of the cost of construction of various types of road surfacing in other states and with the actual cost in many counties of our own state before us we can report with confidence that it is possible to surface all of the main traveled roads in all but a few of our counties without adding new tax levies to our present public burden, provided our laws will permit our people to adopt the same efficient methods of construction and the same pro rata distribution of the cost over periods of tax levies as has proved desirable in most of the other states. It is our conclusion that we are now raising road taxes enough in this state for our present needs if we will but concentrate our road funds upon more permanent work.

(We are advised by the United States department of public roads in circular 63 under date of Oct. 2, 1916, that every state in the union excepting four now has a larger per cent of its highways surfaced than we have in Iowa and yet our total tax burden for roads and bridges is greater each year than that of any state excepting two.) The average for all the states is 11.3 per cent of all their roads surfaced, while we have only 1 per cent of our roads surfaced and some states, such as Indiana and Ohio, have surfaced 42.6 per cent

and 35.8 per cent of their roads, respectively. We are taxing ourselves for enough to build better roads if we would be willing to invest more of it in permanent work. Our state highway commission reports for the year 1915 that approximately \$5,000,000 was spent in temporary work upon our roads and only \$2,000,000 in permanent work.

We find from data in the office of the state highway commission that only 785 miles of the 15,766 in the county road system have been put to permanent grade within the past three years, whereas the engineers' rough estimate shows that the entire county road system of this state could be put to permanent grade ready for surfacing for approximately \$21,245,000, which is little more than the taxes we will spend upon the county road system within the next five years.

After deducting from the total mileage the 3,849 miles of the county road system which have been built to natural grade and assuming that the natural grade is very close to a permanent grade and making allowance for both temporary and permanent grade construction which has been done, it appears that it has taken our counties three years to do one-twelfth of the necessary grading on our county road system alone. At this rate of progress we will be thirty-six years preparing a road bed ready for surfacing on our main roads and our townships have less money per mile for township road work than is available for county work, hence the rate of progress in the townships must necessarily be slower. Such is the waste of temporizing with one year's tax money at a time.

In the matter of surfacing our county road system we have accomplished next to nothing in the three years so far. Fifty-seven counties have as yet done no surfacing at all upon their main roads designated as the county road system. Only 214 miles of county roads in the entire state have been surfaced after three years of progress at a high rate of expenditure. This is progress at the rate of seventy miles a year; a rate which can not surface the county roads alone short of 200 years unless accelerated by some change in our present methods. By contrast Ohio and Indiana have already surfaced roads equivalent to twice our entire county road system in each state; Minnesota has five times the number of miles surfaced that we have, Missouri eight times and Illinois eleven times. In all of these states the first cost of a surfaced road is distributed pro rata over the tax payments of a short period of years.

In several of our counties boards of supervisors have seen the necessity of anticipating fixed revenues so as to do the permanent grading within the next few years and they have sold county bonds at very low rates of interest to provide the funds at once, which bonds will be paid out of taxes that will be collected in the near future. This is the established custom now in all states and it prevails in 41 per cent of all the counties of all the states for distributing the cost of permanent road work equitably over the taxing period in which the improvement is to last. A hill cut to grade will stay cut forever, gravel once placed can be cheaply maintained forever, pavements built will endure from twenty to thirty years and bridges of reinforced concrete will last 100 years or more. It is our firm conviction that our highways and bridges should be built of permanent types of construction just as we build our court houses and our school houses and that the first cost should be distributed over a period of years approximating the life of the improvement in the same manner in which we are accustomed to finance all other public works.

Having discovered that nearly all highway improvements in other states have been financed and the more permanent work made possible there by anticipating taxes we confidently urge that the people of this state be given ample authority in townships, counties and special districts to pledge their revenues for reasonable periods of time for the payment of the cost of their highways as they use them. The same rate of taxation or less is accomplishing vastly more surfacing and more permanent grading in other states by the partial payment plan, while we seem to have been taxing our people more heavily for our piecemeal plan of construction.

Large contracts let to experienced men with efficient equipment have reduced costs in many counties in this state. Crawford county reduced grading from 28 cents to 18 cents per cubic yard and Clay county reduced hauling of gravel from 50 cents per load to 30 cents by contracting in large units. Knowing this and realizing that such reduction in costs are possible only by making several years' taxes available at once we have pursued a very careful investigation as to methods of distributing the tax burden and of financing which prevail in other states from which we have been satisfied that no material change should be made in our present classification of roads under township and county jurisdiction. We find everywhere that the first step toward road improvement has been the selection of main traveled roads upon which said improvement can first begin and this has already been done in the designation of our county road system and the levying of special taxes for it.

Our local roads, by roads or secondary roads as they are variously designated in many states, can be improved either thru the

present township unit or thru the special district plan as prevails with marked success in Missouri, Texas, Arkansas and several other states. We find great progress being made in several states by designating a state road system and providing for construction by the state, but it is our belief that our present plan of construction by the counties and by the townships with only general engineering supervision from the state will give us good results. It is far more constructive at this time to start with the plan of administration which we have and improve that plan than to tear it down for some other plan which will have to endure the same period of delay in experimentation thru which our present plan has already passed.

Aid from state funds to the counties upon some equitable plan has promoted progress to a marked degree in Wisconsin, Illinois, Minnesota, Ohio and other states, and could be adopted with success in our own state when provision is made to comply with the provisions of the federal law for receiving the national aid apportioned to Iowa.

We find that the anticipation of taxes by means of county bonds is already the established custom with boards of supervisors in more than half of the counties in this state for the construction of permanent bridges and within the past few years it is being done for more permanent road work as is evidenced in the report of bonded indebtedness appended hereto, but there should be some provision in our statutes for referendum upon large projects. Bonding a county for large sums for roads or bridges should be submitted to a vote of the electors upon resolution by the county board or upon petition from a few electors just as we now submit to the electors the determination of bonding for court houses.

In order that there should be the least discrimination in the selection of roads that are to be improved and in order that there shall be the utmost freedom for the people of any locality to build the kind of roads that they may want we urge that the townships be given the same power to use their corporate public credit as the counties now do and that provision be made for referendum within the townships as to bonding township revenues for roads.

In all states we find the one great problem for solution is the proper distribution of the tax assessment according to the benefits to be derived from the improvement. Every state seems to have evolved a different plan. All plans work fairly well and an extensive inquiry made by us by letter to farmers living upon hard surfaced roads in ten states has developed that everybody who once obtains a hard road seems to be satisfied with it regardless of the taxing method used. The benefits from highway improvements are largely public. The state at large, the county and the immediate locality derive benefits which vary in degree and then the market

town to which the roads lead and the land adjacent derive special benefits, all of which should be recognized in any scheme of tax levies. A road or bridge which lasts for a period of years distributes its benefits throughout the years in which it is used and hence its first cost should be distributed fairly over that period of tax payments.

In Wisconsin, Minnesota and Illinois a success has been made of aid to the counties from state funds and in this way property within cities and towns is assessed for rural highway improvement, but in our state we already have the motor vehicle license assessed at large and returned to the counties so we do not need any additional state tax. In our judgment, this motor vehicle license should be collected by the county government as other taxes are collected and only that portion of it necessary for the maintenance of the state highway commission remitted to the state treasurer by the county treasurers. The license number plates could be purchased by the state, consigned to the counties and recorded by the state when issued by the counties.

If it is necessary to provide a state fund for roads in order to comply with the provisions of the federal law for aid from the national government then it is our opinion that this fund should also be derived from the motor vehicle license. We urge that all motor vehicle license funds should be concentrated upon the main roads as provided by law now, but that they be further restricted to the surfacing and to road maintenance only. At present we are losing much direct benefit from this enormous fund because a vast amount of it is being expended in bridge and culvert work in almost every county in the state.

If our auto license revenues were devoted exclusively to surfacing and anticipated for ten years at 4½ per cent we could expend as much as \$2,000 per mile on sixty miles of good graveled road in every county in the state and pay the entire cost with average interest in ten equal annual payments out of our auto license revenues alone. The normal increase in the number of cars licensed would easily yield enough more revenue to maintain those roads in serviceable condition to the end of the period for which these taxes had been anticipated. If we were to distribute the first cost of a graveled road over twenty years the same auto license revenues alone would amortize the entire cost of 100 miles in each county and the increase in autos would maintain the roads. We could in this way have the roads to use while the auto licenses which we are paying anyway would be paying the bill. Contrasted with only two miles of surfacing per county on county roads done in three years past it becomes apparent that our monies can be greatly conserved by more permanent construction. Whatever is added from federal aid funds, voluntary contributions or special benefit assessments

would merely make more roads possible to be improved in the same way and still there would be available for grading the present tax levies upon general property for the county road fund. When we had repeated this process four times we would have anticipated nothing but motor vehicle revenues for forty years which is less than has been done with the state bonds in New York and California.

A paved road which has cost \$10,000 per mile in this state, if amortized upon a twenty-five year plan, would cost approximately \$700 per annum for payments upon the principal, average interest and probable maintenance. We now have available in our county road funds each year about one-third of this sum for each and every mile of the county road system. Such a road can be financed only by additional assessments upon property, both city and rural, which is to be most benefited by the improvement or else by revenues not yet provided by law.

We are convinced that property within towns should be assessed for some part of rural highway improvement especially for the more costly types of surfacing which are made necessary within the vicinity of large towns by reason of the traffic which originates within those towns and our investigation in all the states convinces us that this can best be provided by the creation of special road improvement districts which will include within special tax levies those towns served by the roads improved, said levies to be determined by a vote of the electors within the districts to be improved. Voluntary contributions of large sums for road work by commercial clubs is an acknowledgement of this benefit to the towns served, but it should be apparent that it would not be so uniformly equitable to include town property in all of the general county levies when much of a county road system lies remote from the town thus assessed. The district levy would confine the assessment within the zone of benefit from the improvement and the success of our drainage district and consolidated school district laws should encourage us to apply the same plan to road improvement.

We are also convinced by our inquiries in other states that land near to an improved road derives a special benefit from the improvement. The average opinion of 400 farmers who replied to us was that land adjacent to a good graveled road had been increased \$13 per acre by reason of the improvement and the same concensus of opinion was that paved roads had increased nearby lands fully \$30 per acre. The willingness of land owners in Clay county of this state to contribute \$300 per mile for graveled roads, the same willingness of landowners near Mason City to contribute \$4,000 per mile for a paved road and the raising of \$5,200 in contributions for a mile of paved road in Marshall county convinces us that land owners appreciate the special benefit to be derived and are willing to

be assessed for it. All roads can not be permanently improved at once and it is only by assessing for this special benefit that taxes can be equalized as between the land owner nearest and those more remote from the improvement.

From the zone plan in Utah to the assessing for one mile back in each direction from the improvement as practiced in Indiana, Ohio and Missouri the methods are varied, but we are convinced that from 20 to 30 per cent of the cost of surfacing a road, exclusive of the grading of any road, could equitably be assessed to land lying nearer to that road than to any other road which has been surfaced and such a provision ought to be made in our statutes wherever township or county roads are being improved by township or county boards. It is not so important when assessing under a special district law because enough roads are then improved within a district to distribute the special benefit equitably thru special levies upon all property within the district.

The equitable distribution of the first cost of any long time improvement over the period of time in which it is to be used can be accomplished only by anticipating taxes with bonds. We have conferred with those who buy public bonds and we have inquired into the experience of other states where all permanent road and bridge work is financed with bonds and we are convinced that next to state bonds the lowest rate of interest can be obtained upon public credit by issuing bonds which will be the direct obligation of the counties. Such an issue was sold by Marshall county this month for bridge work at a net interest cost of  $4\frac{1}{8}$  per cent. It is our belief that the bonds should always be county bonds no matter whether the tax levies from which the county will pay the obligation are assessed as county levies, special district levies or special benefit levies on property near by the improvement. The county credit stands highest in the money markets of the world, next to that of the state, and the state, or the county can well afford to lend its credit to any special district within its borders. All the county government needs for its security is the legal and valid pledge to its bond fund of tax levies, either within its own power to make or properly pledged by any other taxing power. It would be unwise to create any new bonding units or add any more road officials as such a law would have to be tested in court before bonds could be readily sold under its provisions.

Whenever tax levies for any period of years are anticipated by bonds the bonds should mature in equal serial payments so as to insure to the taxpaying public that the debt will have been discharged as rapidly as the improvement wears out. The state of New Jersey has recently provided by statute definite limits of time for bonds which vary according to the estimated life of the improvement, said limit of time being shorter

for gravel than for pavement. In our judgment, a general provision requiring approval of any bond issue by the state highway commission would insure careful restraint of bonds under advice from our own experienced engineers. Generally bonds in other states run for ten years for graveling and from twenty to fifty years for paving or bridges, the average for all the states being twenty-eight years. With reasonable allowance for maintenance paving can justly be distributed over the tax levies of twenty-five years, while a modern concrete bridge would outlast even a fifty year bond and a permanent road grade protected with surfacing would endure forever.

That it is thoroughly practicable to advance our road improvement so that the people of today while they are yet on earth may have hard roads to use without burdensome taxation and without passing a debt on to generations yet unborn is made evident by the estimates which we have secured from various counties. Boone county, as reported by its county engineer, could permanently grade and gravel its entire county road system within three years, issue bonds for what it would cost in excess of present revenues and could pay the bonds with interest in the seventh year without any increase in its tax levies. Buena Vista county found from the estimate of its county engineer that its county road system could be graded, drained and graveled in three years and its bonds paid in the eighth year without any increase in present tax levies and at a mass meeting held in Storm Lake last spring, attended by over 700 farmers, it was voted 4 to 1 to do the work on the bond plan. This summer sixty-three miles were put to permanent grade and thirty miles were graveled upon contract. In other counties it might require from ten to fifteen years owing to the greater cost of grading and graveling. However, there are many counties in our state which have been paying bridge taxes for sixty years with scarcely a single bridge of masonry today to show for the money expended, while other counties could finish replacing all of their temporary bridges with permanent masonry and pay off the necessary bridge bonds within ten to twenty years without increased bridge taxes, after which they would no longer need much of any bridge tax at all. We submit in this connection data supplied by the state highway commission as to amount of bridge bonds outstanding and estimates by county engineers as to the probable amount of bridging yet to be done. We find that approximately \$4,000,000 out of a total of \$6,000,000 of bridge taxes is being invested each year in permanent work and our state ranks far better in its bridge improvements than in road surfacing. We attribute this fact to the permanent work made possible by the quite general use of county bonds in over half of our counties to make future taxes available at once for bridges.

If our bridge taxes had been made higher in order to realize this money each individual would have been compelled to withdraw the extra funds from private business where it is usually worth from 6 to 8 per cent. By utilizing the public credit three millions of capital have been brought into this state at a cost of  $4\frac{1}{2}$  per cent annual interest. Our people have had the bridges to use while paying for them and they have been saved the difference of  $1\frac{1}{2}$  to 3 per cent in the interest rate. Those who use the bridges are paying for them each year as they use them. It is not as tho a debt had been passed on to one's children for a dead horse, but it is a loan of capital from the vast accumulations of the east to be used by us in needed public works and paid for by those who get the use of those works for which they pay.

If our state constitution could be amended so as to permit state bonds to be sold and the proceeds loaned to the counties the state's credit would sell at 3 per cent annual interest. If loaned to the counties for road work at 5 per cent the profit of 2 per cent compounded would amortize or pay off the principal in 28 years and the taxpayer would never need pay anything more than the interest charge for his roads.

The people of California by a majority of four to one or more in the recent November election ratified a second state bond issue for roads and provided that each county should pay the interest charge upon that portion of the state fund expended within the borders of that county but the principal is to be discharged from taxes levied upon public service corporations and inheritances. In the same general election the people of New Jersey, by a large majority, approved a second issue of state bonds for roads which are to be paid out of automobile license funds. Everywhere in which we have investigated the method of financing road improvement by using the public credit to anticipate a few years' taxes seems to carry by larger majorities the more it is tried.

It is clear to us that we could begin to improve our highways in this state by this same method without increasing our tax levies. If our people should ever desire to add new taxes for more roads than present levies will amortize within reasonable periods that problem can be met in the future when it arises.

It has excited our admiration to find in many states and notably in Colorado, New York and California the willingness of the people of the whole state to use funds of all the people with which to build special roads thru mountains and far into the desert where no road could ever be surfaced from local funds. The example has prompted us to suggest that our state could in some measure equalize the unequal endowments of road surfacing material which have left a third of our counties bereft of material of their own. Our state needs employment for its convicts at

work which will not send prison made merchandise to market in competition with free labor. We have no mountains to level nor desert wastes to bridge with highways, but many counties do have a surplus of road material and our convicts should be put to work at the expense of the state to load upon cars at gravel pits and quarries free of charge the material which must be shipped into counties which have none of their own. In this way can all the people of a common family within the state come to the aid of their less fortunate counties without launching the state into the building of state roads when and where any administration in power might desire to reward its friends.

Your commission extends to you its appreciation of the honor, the trust and the confidence which you have placed in its members. We have conducted our labors with the utmost harmony at our own expense and we find it a pleasure to contribute this as the duty of citizens called into the service of their state by its governor.

We have found that there is an abundance of material in most of our counties for surfacing our roads.

We have found that present taxes are high enough to accomplish the desired results if properly conserved in more permanent types of work.

We believe that the anticipation of fixed revenues will make possible much more permanent work at less units of cost by reason of the efficiency of large contracts.

We recognize the difficulty of amending our state constitution for utilizing the state's superior credit, hence we advise that the counties and townships be used as bonding units for all classifications of highway improvements, but that tax levies of townships and special districts may be pledged to the county bond fund for improvements within the districts covered by the levies pledged.

We believe that property specially benefited should be assessed for a small portion of the cost to equalize the tax burden with those whose property is not so fully benefited.

We urge that the electors be given power to initiate as well as to determine by ballot what kind of roads they want and how the work is to be financed.

We recommend that the motor vehicle license be collected by the county governments and be devoted solely to the surfacing of roads and their maintenance.

We suggest that it would be unwise to destroy the present plan of county and township administration of highway affairs for a new plan which would involve further delay in experimentation.

We believe that no new set of road officials should be created but present township and county taxing bodies can be given authority over all kinds of tax levies for roads.

We have found progress greatly promoted by aid from various states to their counties and suggest that some portion of our motor

vehicle license fund be used for this purpose in conjunction with aid from the national government already provided by federal enactment.

Because of the necessity of shipping road material from one county to another we recommend that the state assist those counties so unfortunately situated by using its convicts at gravel pits and quarries to load free on board cars the material which is to be used on roads in other counties.

Our state stands first in its per capita wealth and first in automobiles per capita. We respectfully urge that the next legislature give to our people every possible means for lifting our state from its present position as fifth from the bottom in the percentage of

its roads which are surfaced while taxing its people for roads and bridges more than do any of the states excepting two. First in ability to spend, first in our need for hard roads to use and third in taxes spent we deserve something more than forty-fourth rank in results as measured by the surfacing done.

Respectfully submitted  
with addenda hereto,

D. W. NORRIS,  
J. W. FOSTER,  
J. C. DAVIS,  
C. E. CAMERON,  
J. M. BROCKWAY,  
E. T. MEREDITH,  
E. F. ROSE.



# What Farmers Think of Hard Roads

Your commission sent letters of inquiry to farmers who are living upon hard surfaced roads in ten mid-western states and it is notable that out of 400 replies received everyone declares the hard road to have proved a benefit to him in excess of its cost. Each correspondent seems to be satisfied with the kind of a road which he has whether it be of gravel, macadam, brick or concrete and the consensus of opinion when 400 replies have been averaged seems to be that a graveled road has increased nearby land values at least \$13 per acre, while paved roads have increased adjacent land \$30 per acre. These estimates are mere opinions of many farmers living in several states, but they would indicate that a surfaced road is always a distinct benefit to the farmer who can use it as well as a benefit to the value of the land which it serves. That surfaced roads are tremendously popular, where they are enjoyed, is evidenced from the fact that no one in reply to our broadcast inquiry was willing to condemn them on account of their cost.

Macadam roads averaging \$3,900 in cost per mile raised the value of land \$12.50 per acre and decreased the time spent in marketing by nearly one-third.

In all cases farmers living along surfaced roads are generally satisfied with the method of raising the money for the work. Whether the work has been done by the state or by the county, by regular taxation or by special levy against benefited property seems to have been given little consideration. The conclusion of the matter is that the people are so well pleased with the improved roads, and have received such benefit from them that in every case they are considered well worth the cost and the money spent in their making, as a good investment.

A graveled road at Cedarville, Greene county, Ohio, costing from \$800 to \$2,000 per mile caused an immediate rise in land values estimated at \$25 per acre, and made possible the marketing of crops at all seasons of the year, and cutting down the time spent by farmers going to and from town from one-third to one-half. Macadam roads in Wayne county, Ohio, brought an increase of 10 per cent in farm values and brick roads in Wayne county of the same state brought about a rise of 25 per cent in land values. In Scioto county, Ohio, the people are dissatisfied with the amount of permanent roads which can be built with the present available funds and are themselves asking that the tax levy for this purpose be raised from one-half to one mill. Ohio people in general stand committed to the good roads idea and are after improved highways as fast as they can be built.

Illinois has a variety of surfaced roads and all have given good satisfaction except so-called graveled roads in Bureau county. In this county loose gravel was hauled and spread on an ordinary dirt road bed. The result was a temporary improvement after the gravel had been packed down, but results were not lasting or satisfactory enough to be recorded as successful. In the same county a strong movement for practical gravel or macadam roads is on foot, and these will doubtless soon replace the former plain graveled roadways. Rock roads in Cumberland county increased the value of land considerably, depending on the location of the land and lessened the time required to travel to and from market an average of one-half. Concrete roads at Carlinville, Macoupin county, immediately became popular, a correspondent from the place stating that "benefits derived socially, financially and morally are too numerous to mention." Henry county is constructing six miles of concrete, but it is not as yet finished. Oiled roads in this county were not satisfactory.

There is probably less need of surfaced roads in Nebraska than in most of her sister states, but a

stretch of the Lincoln highway passing thru Hall county has been paved with concrete and other roads in the same county are being planned as a result.

Concrete roads are giving eminent satisfaction in Wayne county, Michigan. A correspondent from Trenton writes:

"Good roads are good roads. That is all there is to it. I would as soon live here as I would in the city of Detroit, which is 16 miles away. We can take our family in our machine and in forty minutes we are in the center of the city. The same thing applies to drawing loads. We can draw five tons of hay now where we used to draw two and one-half tons."

Another Wayne county man made extra money on his wheat by holding and marketing at an advantageous time. He could not have done this without his paved road. Wayne county is bonded for \$2,000,000 and road matters are handled by road commissioners at \$1,800 each per year. Perry county, Missouri, has several hundred miles of surfaced roads and is rapidly surfacing every road of consequence within its borders. The five main roads leading out of Perryville, the county seat, are surfaced with crushed rock or gravel for a distance of fifteen miles out. Material for the work is convenient and the cost of construction is very low, averaging around \$600. Much of the work is done by the farmers who also contribute part of the money put into the roads, the remainder being provided thru special taxation and state aid. A correspondent says that everybody in the county is a hard-road booster. Land values have increased on an average of \$12 per acre as fast as the roads reach the farmstead. Pettis county, Missouri, has 160 miles of limestone and gravel macadamizing, costing about \$4,000 per mile. A correspondent from this county owning 520 acres of land paid a total of \$50.99 in road taxes last year, but does not consider it excessive for the benefits received.

Wisconsin communities having improved roads have experienced great increases in land values as well as the other usual benefits of permanent roads. In the counties of Kenosha, Door, Richland, Fond du Lac and Jefferson, the price of land increased an average of \$15 per acre because of hard roads. Many of the roads are of concrete costing from \$4,000 to \$12,000 per mile. One correspondent states that this type of road is becoming more popular than the macadam which was the construction of the first improved roads. In Brown county nothing but concrete roads will hereafter be built. The people favor the issuance of county bonds to raise the money for vast road improvements to be begun at once.

From Saint Joseph, Howard and Jefferson counties, Indiana, come reports of very satisfactory graveled and macadamized roads costing from \$4,500 to \$6,500. The cost of upkeep on these roads runs from \$100 to \$200 per year. Land values have increased from one-fourth to one-third and the time required to travel to and from town has been reduced from one-third to one-half. There is a general demand among Indiana residents for state aid in road construction and this will probably soon come. At the present time the money for road construction is raised entirely or almost entirely by increased taxation. A correspondent from this state says: "More people would be in favor of hard roads if the work was done more intelligently and if we had state aid."

In New York state the movement for better roads continues to gain headway and a Monroe county farmer says that many miles are now in construction and many others are being petitioned for. In reply to a question as to the social and financial value of good roads he said:

"Socially they are good and bad. Good by reason of easy travel both by horse and machine to

church and other social functions and for children to attend school. This same thing attracts city people who purchase farms expecting to make easy money running farms by tenant help which is nearly always a detriment to any community, by reason of their shifting or restless nature. Financially it is different. It does in every case I know of increase the financial value of farms on or near such roads. As a whole, the advantages far outweigh the disadvantages. This is a fruit and vegetable country and our products are nearly all perishable, hence it is desirable to market them when salable, regardless of seasons, roads or weather conditions. It also enables us to use motor trucks to take advantage of advanced prices caused often times by bad roads. It decreases the cost of marketing by half as the size of load can easily be doubled either by wagon or motor."

Minnesota has a variety of improved roads, gravel, macadam, concrete, brick and brick and macadam. The cost runs from \$400 to \$6,000 per mile, but land lying along the roads have increased in value from 10 to 20 per cent. Reports from Carlton, Waseco, Winona, Crow Wing, Ramsey, Scott and Itasca counties indicate that nowhere are good roads appreciated more than in this state. Because of good roads farmers receive from 5 to 10 per cent increases in prices thru ability to sell at the proper time and one-third of the time formerly spent on the road is saved. Most of the roads in Minnesota are built with state and county funds, and this plan seems to meet the approval of Minnesota people.

There seems to be a tendency over all the territory covered by the investigation to believe, where brick or concrete roads have been tried that they are much to be preferred. Several correspondents stated that excessive auto travel on macadam, graveled or crushed rock roads caused rapid deterioration and consequent high cost of upkeep. Where the two types of highways have been tried in the same community, the brick or concrete are much preferred in spite of the greater original cost. The growing use of the automobile is doubtless responsible.

It would be hard to estimate in any way the social value of roads good for 365 days in the year, but without exception the several hundred correspondents stated that the good roads had brought about a distinct betterment of social conditions. In a number of instances increased church and school attendance is reported as the result of the establishment of passable roads.

They have also been responsible for bringing farmers and their families together in social and co-operative organizations. In short, wherever good roads have been built the social status of the farmer has advanced equally or at a greater rate than his physical prosperity.

Summarizing the result of the investigation covering ten neighboring states, it is found that gravel and crushed rock road costing on an average of \$650 per mile increased land values \$13 per acre and lessened time spent on the road by one-third.

Brick roads costing \$11,000 per mile increased land values on an average of \$30 per acre and lessened the time on the way to and from market by one-third.

Concrete roads, which seem to be quite popular especially in the states lying to the east, cost nearly \$10,000 per mile, raised the acre value of land by \$30 and saved over one-third time on the road.

The information contained in this report cannot be said to be definite nor exact as it is based largely on the estimation of people who may or may not be able to render intelligent opinions. It will serve, however, to plainly indicate the popularity which hard roads of every type enjoy where they have once been established.

Respectfully submitted.

BETTER ROADS COMMISSION.

## Our Low Rank for Results

First in per capita wealth which is our ability to pay; first in automobiles per capita, which measures our need for hard roads; third in amount of annual tax burden for roads and bridges which is the price we pay Iowa ranks forty-fourth in percentage of roads surfaced, which measures the results we have obtained for the money we have spent.

The following information is obtained from Circular No. 63 issued by the office of public roads at Washington, D. C., Oct. 2, 1916:

	Expended on Roads and Bridges in 1915	Number Miles Surfaced	Per Cent of All Roads Surfaced
Alabama .....	\$4,283,207	5,915	10.7
Arizona .....	1,076,178	350	2.9
Arkansas .....	2,803,000	1,200	2.3
California .....	20,753,281	13,000	21.3
Colorado .....	2,193,000	1,750	4.4
Connecticut .....	3,484,944	3,200	22.7
Delaware .....	397,500	300	8.
Florida .....	5,501,135	3,500	19.4
Georgia .....	3,700,000	13,000	15.3
Idaho .....	1,974,636	950	4.1
Illinois .....	9,263,995	11,000	11.7
Indiana .....	13,000,000	27,000	42.6
Iowa .....	13,606,299	1,000	1.
Kansas .....	5,510,000	1,250	1.1
Kentucky .....	3,122,430	13,000	22.1
Louisiana .....	3,569,709	2,250	9.1
Maine .....	3,293,902	3,000	11.7
Maryland .....	5,630,000	2,950	17.9
Massachusetts .....	6,557,279	8,800	46.6
Michigan .....	10,174,738	8,600	11.6
Minnesota .....	8,292,000	5,500	5.9
Mississippi .....	2,900,000	2,500	5.5
Missouri .....	8,369,189	8,000	8.3
Montana .....	3,676,318	775	2.
Nebraska .....	3,520,000	500	.6
Nevada .....	250,000	75	.5
New Hampshire .....	2,363,414	1,800	12.8
New Jersey .....	7,163,584	4,600	31.
New Mexico .....	584,919	450	3.8
New York .....	24,255,648	17,500	21.8
North Carolina .....	5,510,000	6,500	12.8
North Dakota .....	2,500,000	1,100	1.6
Ohio .....	12,975,688	30,920	35.8
Oklahoma .....	3,410,000	300	.3
Oregon .....	6,182,000	7,780	21.1
Pennsylvania .....	12,541,257	9,883	10.8
Rhode Island .....	594,119	1,246	58.8
South Carolina .....	1,000,000	3,500	8.3
South Dakota .....	1,450,000	850	.9
Tennessee .....	3,503,500	8,625	18.7
Texas .....	9,500,000	12,000	9.3
Utah .....	1,213,100	1,053	7.
Vermont .....	1,475,145	3,478	23.1
Virginia .....	4,018,399	4,760	8.9
Washington .....	6,670,702	5,460	12.8
West Virginia .....	2,759,212	1,200	3.7
Wisconsin .....	9,960,980	14,050	18.5
Wyoming .....	441,291	500	3.5
Total.....	\$266,976,399	276,920	
Average.....			11.3

# Hard Roads a Benefit to the Towns

In order to ascertain the view of people living in towns as to the value or benefit of surfaced roads letters of inquiry were sent to highway commissioners, engineers, county auditors and city mayors in several adjoining states and the result of our inquiry was that everybody who gave us a reply expressed enthusiasm for the community benefit which his town had derived from surfaced roads. None who replied seemed to fear for a moment that the improved roads were not worth more to his town and to his business than they cost.

South Bend, Mishawaka county, Ind., reports that the Lincoln highway is being concreted across this county, and business men feel that this city has been materially benefited by improvement of hard surfaced roads radiating from this city. Other roads in this county are being constructed of crushed rock, and farmers are petitioning for hard surfaced roads as rapidly as possible.

Martinsville, Ind.—Morgan county has three brick roads entering the city. Business men enthusiastic over hard roads. Farm lands increased in value and farmers clamoring for more hard roads.

Decatur, Ind.—Adams county has built macadam roads at an average cost of \$5,000 per mile. The mayor reports that merchants barely paid running expenses thru four months when mud roads were impassable but that their trade shows little variation now thruout the year. He says that land has risen \$25 per acre in the vicinity of the good roads and that he has never found a farmer near that town who would be willing to give up his hard road for what it has cost.

Logansport, Ind.—Cass county has constructed about five hundred miles of hard surfaced roads. Bonds have been issued by the county to pay for the construction. Business men and farmers have been greatly benefited by reason of the convenience provided for travel, and land values have greatly increased since the road improvement. Land that was selling for \$50 and \$60 per acre is now selling at \$150 per acre.

Dixon, Ill.—Lee county has hard surfaced roads radiating out of this city in every direction, and we are advised that both business men and farmers have been greatly benefited by reason of the construction of such roads. Merchants have been able to draw trade from a much larger scope, and the value of land has increased very materially.

Paris, Ill.—Edgar county has fifteen miles of state aid brick roads, from 10 to 14 feet wide. The township tax has been used for this purpose. The road cost \$1,000 per mile per foot of width. They are now talking bond issue for the building of more hard surfaced roads, so that those who will use these roads in future years may pay pro rata for them.

Pontiac, Ill.—Reading township in Livingston county voted in December, 1914, a bond issue of \$63,000 for road improvement, and the money was used for the construction of macadam roads. This is a strictly farming community, and the farmers feel that they have received direct benefit in the rise in value of lands and the convenience of travel. The bonds run five years, which places the tax on the people of that township to the extent of \$1 on every \$100 assessed valuation each year. The board of supervisors of this county intends to submit to the voters the question of issuing bonds for the county system of roads, and in order to know the sentiment of the people, the county superintendent of highways called a meeting of the taxpayers, and after explaining to them that the additional tax which they would be required to pay would amount to approximately 30 cents on the \$100 valuation, it was the unanimous sentiment of all present (52) that they submit the question.

Vermillion County, Illinois, has voted \$1,500,000 in bonds to build brick and concrete roads. Hancock county is making arrangements to oil its roads. The

DeKalb county board of supervisors has a proposition before it now to build hard surfaced roads.

Washington C. H., Fayette county, O.—Seven of the leading pikes entering this city have been surfaced with brick and the farmers along the same seem to be delighted.

Newark, Licking County, O.—This county has at this time about ninety miles of pike under construction, partly water bound macadam, partly cement, part asphalt and the tar bound macadam. They are as yet undecided as to which will make the best road. They have about twenty petitions on file for more pike, which plainly means that they like hard roads. The Brown law in this state assesses the property for a mile on each side of the road; the first half mile is assessed 9 per cent and the next half mile 6 per cent, which makes 35 per cent borne by the county, 35 per cent by the township, and 30 per cent by the property owners. They find that the property fronting on the pikes increases about 5 per cent in value and the other property in proportion. This method of financing is liked best by the people. The pikes they are building at the present time are by the state aid, and the state pays 50 per cent and the county 50 per cent.

Warren, O.—In Trumbull county over twenty of the twenty-five townships of this county have been bonded by a vote of the people for from fifty to one hundred thousand dollars each for road construction which money has been spent, and at this time, this county has available about \$150,000 per year, which, with the share the township and property owners will pay, will amount to \$250,000 per year for the next five years. The auditor of this county advises that plain water bound or gravel roads are satisfactory for medium traveled roads. He also advises that roads of all descriptions should be patrolled, and ditches and ruts be repaired as needed. He further advises that at first the farmers were opposed to building hard surfaced roads, but now they are two or three to one in favor of them.

Brownwood, Tex.—Brown county has issued \$150,000 in bonds for hard surfaced roads, and with this money has paved eight miles on each of the public roads leading into Brownwood. The investment is reported as having been satisfactory to both business men and farmers, and land has increased in value out as far as the paved roads go.

Alpena, Mich.—Alpena county issued its bonds to the amount of \$100,000 in 1888 which started the good roads system in this county. The board of supervisors has appropriated from \$5,000 to \$40,000 per year each year since for maintenance and additional mileage of new roads, and in addition to those appropriations, it has been customary for the county to vote about \$10,000 more per year to aid the townships in constructing new roads. Business men and farmers in this county feel that they have been directly benefited.

Sedalia, Mo.—This city has about 150 miles of rock road leading in and out in different directions which have been built at a cost of about \$3,500 per mile. A twelve mile road district was formed and the money secured by bond issue. The farmers did not take very kindly to the building of these roads before they were constructed, but since they have enjoyed the use of them, they are boosters.

Fulton, Mo.—A special road district was formed in Callaway county, and \$100,000 was voted for road improvement, and the proposition carried by a big majority. Macadam roads were built, business men have been benefited, and land adjoining these roads has advanced in value 35 per cent. Farmers are reported as being enthusiastic.

Lexington, Mo.—A road district eight miles wide was formed in Lafayette county five years ago, and \$125,000 issued in bonds, and twenty-six miles of macadam road was built. Very little opposition to the bond issue in the town, and about 40 per cent

opposition in the country. Since the road has been built business men and farmers feel that they have been benefited.

Winona, Minn.—In 1912 sixteen miles of paved surface roads were built in Winona county. Individual and private capital furnishing 25 per cent of the cost which was \$7,500 per mile. At first the movement did not meet with favor among the farm-

ers in the county. They disliked the idea of a bond issue, but a few weeks use of the roads have made them all boosters. In the financing of this road, farmers whose farms adjoined the road were asked to contribute \$1.25 per acre; those as far as three miles out, \$1 per acre, and those farther out, who used the road only occasionally, were asked to contribute 50 cents per acre. This was cheerfully paid.

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## State Aid to Promote Progress

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The law recently passed by the federal congress providing for aid from the national government to the various states will make it necessary for the coming legislature in Iowa to determine whether this state shall undertake direct aid from state funds in order to meet the requirements of the federal authorities as provided in the national aid law. We have adequate administration now provided in our present state highway commission and this commission can now comply with all provisions in the federal aid law excepting that of appropriating funds equal in amount to the federal aid offered.

It is our recommendation that a state fund be provided from the automobile license revenues either by increasing the license rate or by appropriating the normal increase over and above that collected and returned to the counties during the current year.

We are advised that boards of supervisors have already designated from the county road system primary roads to the extent of approximately fifty miles in each county upon which a system of construction can be begun with national aid funds and the remarkable results obtained in a great many states which have adopted either the plan of aid from the state or direct construction by the state convinces us that we will obtain vastly more value for our auto license money by concentrating it on work worth while than by the present plan of dissipating over \$2,000,000 annually in scattered work of no consequence. In three years with millions raised for roads from automobile owners we are unable to show any roads that are fit for auto traffic in wet weather and the loss of life upon our highways is becoming appalling.

From the apportionment of national aid as made to the various states our own state will receive approximately \$2,193,000 from the federal government during the next five years. To avail itself of the provisions of the act our state must:

1st. Accept the provisions of the act by legislative enactment.

2nd. Have a state highway commission or state highway department.

3rd. Have a definite, comprehensive, and practicable plan of road improvement covering a five year period

4th. Such plan as the state may adopt must be submitted for the approval of the secretary of agriculture.

5th. There must be an agreement between the secretary of agriculture and the state highway commission as to the character of the proposed road construction.

6th. The work must be done, as provided by the state laws, under the supervision of the state highway commission.

7th. The state must adopt a reasonable plan for the maintenance of roads receiving federal aid.

If a plan of state aid, or, as it is sometimes designated, "state reward," should be adopted, whereby the automobile fund is used for the exclusive purpose of aiding counties to construct, in a uniform manner, a system of main roads on the plan of the county road system already laid out, the counties, with the aid of the state, could readily build from this fund a total for the state of one thousand miles of uniformly constructed road each year, and, in view of the natural increases that will accrue to the automobile fund, by the increased number of machines used, this entire system of state roads could be constructed upon uniform lines, and surfaced with gravel or other similar material. This could be done on the pay as you go plan without anticipating revenues. Neighboring states, like Wisconsin, Minnesota, Michigan, and Ohio, have adopted a state aid system with apparently successful results.

In addition to the sources of revenue above suggested, a discriminating and practical use of the prison labor of Iowa, in either actual work upon the highways or employment in producing surfacing material, could be utilized as an additional contribution from the state to highway improvement. The average daily population of the penal institutions at Anamosa and Fort Madison is about 1,200. There are great possibilities for this labor, if it were intelligently and systematically directed, in the way of good roads construction.

The legislature of the state of Iowa, by Chapter 134, Acts of the 35th General Assembly, approved April 18th, 1913, made fairly comprehensive provision for the employment of prisoners on public highways. Preliminary to the employment of prison labor by boards of supervisors or other public officials upon the public highways of the state, or any public works, the law requires the application for such labor to be made in the first instance to the highway commission, and requires the highway commission to supervise the work, and determine whether or not the prisoners can be advantageously used.

It would seem to be unnecessary to require the assent of the highway commission as to the particular kind of labor used in highway construction, and the employment of prison labor would be much simplified by authorizing the warden of the penal institution furnishing the labor and the board of control to permit the use of such prison labor, and to determine the duration of the labor and the matter of compensation.

It would also seem desirable to make the matter of compensation for prison labor on highways and works of public improvement a little more definite. Our prison labor should be used upon our public highways. This kind of labor is doing wonderful work on the highways of other states.

# PROGRESS IN CONSTRUCTION OF COUNTY ROAD SYSTEM

As Reported to State Highway Commission by County Engineers

COUNTY	Surveyed	Built to Nat. Grade Stand. Width	Built to Temporary Grade Stand. Width	Built to Permanent Grade Stand. Width	Length of County System	Surfaced	Est. Cost Putting County Roads to Permanent Grade
	Miles	Miles	Miles	Miles	Miles	Miles	
Adair	32.69	15.94	10.50	2.0	172.0		\$350,000
Adams	2.0	47.0	1.0		117.0		175,000
Allamakee	21.46	0.0	0.0	20.42	116.0		290,000
Appanoose	0.0	16.0	0.0	0.0	157.0	0.0	250,000
Audubon	1.2	120.9	0.0	1.2	137.0	0.0	275,000
Benton	78.8	186.0	3.75	5.0	211.0	1.6	200,000
Black Hawk	74.31	89.73	0.28	5.37	168.8	8.35	185,000
Boone	53.8	3.0	5.20	28.0	158.0	0.0	100,000
Bremer	45.27	30.27	0.0	2.9	125.5	2.08	140,000
Buena Vista	167.0	91.85	0.0	41.79	167.0	3.43	120,000
Buchanan	20.65	2.70	2.40	11.76	168.8	8.88	175,000
Butler	24.75	17.50	0.0	0.0	174.2	3.25	175,000
Calhoun	77.75	73.00	3.25	40.75	168.0	3.0	140,000
Carroll	30.75	0.0	2.75	11.25	175.0	0.0	250,000
Cass	5.00	0.75	4.25	0.0	142.0	0.25	250,000
Cedar	8.91	20.10	0.97	5.67	158.3	0.0	190,000
Cerro Gordon	45.02	25.5	4.5	3.71	138.7	2.0	130,000
Cherokee	24.0	31.0	0.0	24.00	148.0	0.0	185,000
Chickasaw	22.25	11.25	4.0	0.0	154.5	0.0	185,000
Clarke	0.0	48.75	0.0	0.0	114.0	0.0	175,000
Clay	60.3	0.0	0.0	10.2	150.0	19.8	100,000
Clayton	58.0	1.0	2.75	0.0	199.3	1.0	500,000
Clinton	37.98	42.55	1.85	20.45	195.5	9.1	225,000
Crawford	43.34	0.98	0.0	23.68	149.0	0.0	300,000
Dallas	29.08	22.50	0.0	25.6	171.5	1.25	150,000
Davis	0.0	30.50	0.0	0.0	155.8	0.0	250,000
Decatur	0.0	0.0	0.0	0.0	152.0	0.0	250,000
Delaware	15.88	35.75	0.0	8.88	171.8	6.50	160,000
Des Moines	31.78	0.0	1.54	5.86	81.5	0.0	120,000
Dickinson	12.97	4.22	0.0	1.21	93.3	2.50	85,000
Dubuque	61.0	24.0	0.0	10.0	167.8	0.0	325,000
Emmet	53.51	27.08	2.86	1.31	103.5	14.68	90,000
Fayette	33.75	76.5	0.0	19.25	202.0	0.0	370,000
Floyd	17.06	114.5	0.0	.89	138.0	2.21	135,000
Franklin	68.50	33.50	0.0	1.75	178.5	4.50	165,000
Fremont	7.1	0.0	3.03	0.0	143.0	0.0	230,000
Greene	56.0	1.0	0.50	23.25	132.5	13.0	90,000
Grundy	34.58	71.0	5.0	1.50	153.5	0.0	150,000
Guthrie	7.37	65.0	2.50	1.28	196.0	2.00	375,000
Hamilton	61.55	57.92	1.62	44.12	177.0	0.0	130,000
Hancock	54.77	13.77	18.66	7.94	151.0	8.10	135,000
Hardin	101.25	50.75	0.0	17.75	173.8	4.25	150,000
Harrison	17.75	21.25	10.0	1.0	168.0	0.0	335,000
Henry	86.1	120.6	0.0	1.0	132.3	0.0	200,000
Howard	17.25	14.50	2.25	3.37	122.3	1.12	120,000
Humboldt	48.85	76.15	0.0	16.1	129.0	11.65	90,000
Ida	8.75	8.0	.75	0.0	132.0	0.0	200,000
Iowa	24.2	108.3	23.9	0.62	171.0	0.0	180,000
Jackson	0.0	0.0	0.0	0.0	162.0	0.0	320,000
Jasper	31.0	8.0	7.5	1.5	204.8	0.0	275,000
Jefferson	8.88	50.87	0.0	0.0	135.3	0.0	205,000
Johnson	119.54	54.22	0.72	0.91	157.0	0.0	230,000
Jones	21.6	0.0	1.54	3.89	181.0	0.81	265,000
Keokuk	41.95	75.0	0.0	7.19	167.8	0.0	300,000
Kossuth	34.66	92.0	0.0	25.10	265.0	7.8	250,000
Lee	71.5	95.5	0.0	13.0	150.0	13.0	250,000
Linn	21.8	6.25	6.15	1.60	219.3	2.42	325,000
Louisa	-18.18	97.57	0.0	4.44	109.0	-2.07	155,000
Lucas	0.0	0.0	0.0	0.0	136.0	0.0	270,000
Lyon	24.75	0.50	0.0	10.0	188.5	0.0	160,000
Madison	10.73	5.25	1.65	1.43	162.0	0.0	325,000
Mahaska	16.75	14.0	25.75	1.0	131.8	0.25	200,000
Marion	12.32	136.0	1.29	1.54	166.8	0.0	325,000
Marshall	146.44	152.82	3.50	4.25	187.8	0.0	200,000
Mills	26.90	19.28	5.99	1.65	110.0	0.27	170,000
Mitchell	0.0	115.87	0.0	0.0	126.0	0.0	60,000
Monona	13.07	0.0	2.92	0.0	155.0	0.0	300,000
Monroe	18.15	0.0	0.71	1.0	144.5	0.0	360,000
Montgomery	2.50	53.50	0.55	0.0	125.0	0.0	200,000
Muscatine	48.53	64.04	0.0	1.96	135.2	2.34	200,000
O'Brien	59.94	91.50	3.81	10.87	181.0	0.0	170,000
Osceola	7.50	39.25	0.0	5.0	132.0	0.0	125,000
Page	32.82	0.0	9.05	0.0	174.0	0.0	275,000
Palo Alto	71.19	10.50	7.71	31.68	162.0	1.72	130,000
Plymouth	33.41	20.71	7.09	0.0	208.5	0.0	250,000
Pocahontas	39.4	68.95	23.5	9.85	168.5	12.5	140,000
Polk	12.88	82.25	1.0	1.0	180.0	3.5	175,000
Pottawattamie	57.18	2.5	7.74	6.21	254.0	1.0	500,000
Poweshiek	10.75	27.0	9.0	5.75	138.3	0.0	220,000
Ringgold	0.0	0.0	0.0	0.0	183.0	0.0	400,000
Sac	99.65	13.0	0.0	28.55	148.0	19.40	100,000
Scott	8.73	88.75	2.0	2.15	135.8	3.58	150,000
Shelby	20.77	0.0	0.0	0.0	157.0	0.0	375,000
Stoux	20.98	0.0	0.0	0.53	216.0	0.0	225,000
Story	82.5	56.75	0.0	54.75	135.0	4.5	60,000
Tama	35.87	0.0	0.75	7.75	207.0	0.0	250,000
Taylor	10.0	0.0	2.0	0.0	172.0	0.0	350,000
Union	0.0	0.0	0.0	0.0	152.0	0.0	250,000
Van Buren	0.0	0.0	0.0	0.0	132.8	0.0	175,000
Wapello	13.5	11.75	1.75	0.0	121.8	0.0	180,000
Warren	8.25	0.0	0.25	3.50	170.0	0.0	250,000
Washington	8.6	102.9	0.0	7.7	177.0	0.0	250,000
Wayne	11.62	93.87	0.0	0.0	167.0	0.0	330,000
Webster	85.00	7.15	0.25	33.89	181.0	1.0	150,000
Winnebago	59.50	1.0	29.25	25.25	128.8	0.0	150,000
Winneshiek	0.0	108.0	0.0	0.0	202.3	0.0	400,000
Woodbury	34.2	7.67	6.05	11.60	213.0	0.0	400,000
Worth	97.75	80.25	0.0	0.0	114.5	0.0	60,000
Wright*	28.25	42.50	0.0	9.5	173.5	4.0	160,000
Total	3,419.07	3,849.48	289.03	785.92	15,766.5	214.66	\$21,545,000

NOTE—Wright county permanent grading reduced 13 miles and graveling to 11½ miles owing to lack of survey for work.

## LEGAL LIMIT OF INDEBTEDNESS AND BONDS ISSUED

COUNTY	Bonds Outstanding January 1, 1916, as Reported by County Engineers			Legal Limit of Indebtedness 1 1/4% of 1915 Assessment	Additional Indebtedness Permissible	Estimate Cost of Replacing Temporary Bridges with Permanent Structures
	Bridge	Road	Total			
Adair				\$367,977.00	\$363,443.00	\$1,500,000.00
Adams	\$7,500.00		\$7,500.00	287,045.00	257,433.00	1,300,000.00
*Allamakee	1,900.00		1,900.00	341,861.00	291,411.00	2,000,000.00
*Appanoose				346,136.00	217,467.00	1,750,000.00
Audubon	42,000.00		42,000.00	367,921.00	283,392.00	1,000,000.00
*Benton	25,000.00		25,000.00	659,390.00	627,176.00	1,125,000.00
Black Hawk	13,000.00		13,000.00	860,077.00	829,973.00	1,500,000.00
Boone	49,450.00		49,450.00	548,346.00	467,317.00	850,000.00
Bremer				410,583.00	410,534.00	750,000.00
Buchanan				439,167.00	429,451.00	1,500,000.00
Buena Vista	40,000.00		40,000.00	508,964.00	414,720.00	300,000.00
Butler				516,073.00	505,684.00	1,125,000.00
Calhoun	25,000.00		25,000.00	496,164.00	261,164.00	1,200,000.00
Carroll	95,000.00		95,000.00	502,860.00	362,465.00	1,750,000.00
Cass	81,000.00		81,000.00	496,639.00	414,589.00	1,300,000.00
Cedar	10,000.00		10,000.00	571,332.00	511,332.00	1,200,000.00
Cerro Gordo				591,097.00	570,427.00	800,000.00
Cherokee	13,000.00		13,000.00	482,023.00	447,396.00	900,000.00
Chickasaw	28,000.00		28,000.00	354,813.00	326,813.00	1,500,000.00
*Clark	22,000.00		22,000.00	254,425.00	230,815.00	1,000,000.00
Clay	102,000.00	\$7,000.00	109,000.00	427,252.00	249,626.00	400,000.00
*Clayton	35,000.00	15,000.00	50,000.00	532,448.00	482,448.00	2,500,000.00
Clin-ton	52,000.00		52,000.00	813,757.00	693,730.00	1,800,000.00
*Crawford	50,000.00		50,000.00	654,890.00	558,089.00	3,500,000.00
*Dallas				547,255.00	505,255.00	1,100,000.00
*Davis	31,500.00		31,500.00	285,426.00	253,926.00	2,300,000.00
Decatur	13,550.63		13,550.63	316,420.00	215,513.00	2,400,000.00
Delaware				446,795.00	444,795.00	1,200,000.00
Des Moines	29,500.00	19,500.00	49,000.00	575,390.00	410,955.00	500,000.00
Dickinson	18,000.00	3,506.81	21,506.81	252,834.00	192,422.00	500,000.00
Dubuque				858,241.00	506,731.00	1,400,000.00
Emmet				274,886.00	188,246.00	400,000.00
*Fayette				600,612.00	503,235.00	1,400,000.00
Floyd	66,234.14	17,486.49	83,720.63	433,636.00	347,494.00	1,000,000.00
Franklin				471,939.00	457,046.00	1,300,000.00
Fremont	182,000.00		182,000.00	357,762.00	175,552.00	1,400,000.00
Greene				468,264.00	327,426.00	1,500,000.00
*Guthrie	31,900.00		31,900.00	444,570.00	423,952.00	900,000.00
Grundy				462,334.00	429,834.00	1,000,000.00
*Hamilton				491,910.00	491,910.00	750,000.00
Hancock				354,360.00	348,287.00	750,000.00
*Hardin				557,460.00	548,293.00	1,250,000.00
*Harrison				516,197.00	407,204.00	3,000,000.00
*Henry				416,406.00	275,573.00	750,000.00
Howard	39,000.00		39,000.00	306,659.00	265,773.00	750,000.00
Humboldt				361,093.00	349,452.00	500,000.00
Ida				379,318.00	379,318.00	720,000.00
Iowa	50,500.00		50,500.00	518,079.00	418,213.00	1,750,000.00
Jackson	130,000.00		130,000.00	445,250.00	235,464.00	1,500,000.00
*Jefferson				686,742.00	589,032.00	1,400,000.00
*Jasper				354,990.00	325,490.00	1,750,000.00
Johnson	50,000.00		50,000.00	625,689.00	517,337.00	1,500,000.00
Jones				465,383.00	417,565.00	1,400,000.00
Keokuk				533,020.00	380,133.00	1,300,000.00
Kossuth	142,000.00		142,000.00	598,354.00	484,458.00	1,500,000.00
Lee	25,000.00		25,000.00	562,900.00	251,773.00	1,640,000.00
Linn				1,120,889.00	1,069,639.00	1,125,000.00
Louisa				344,012.00	325,012.00	850,000.00
*Lucas				252,288.00	175,153.00	1,000,000.00
Lyon				480,070.00	447,377.00	1,000,000.00
Madison	41,068.38		41,068.38	398,903.00	339,722.00	1,600,000.00
Mahaska	71,131.16	19,406.16	90,537.16	568,683.00	395,683.00	1,000,000.00
*Marion	176,000.00		176,000.00	470,800.00	124,300.00	1,750,000.00
*Marshall				627,078.00	627,078.00	2,000,000.00
Mills	35,000.00	5,000.00	40,000.00	349,767.00	297,681.00	1,000,000.00
Mitchell				410,571.00	395,974.00	600,000.00
Monona				452,906.00	450,736.00	3,000,000.00
Monroe				270,718.00	191,958.00	950,000.00
Montgomery				394,319.00	324,868.00	1,200,000.00
Muscatine				544,482.00	467,943.00	750,000.00
O'Brien				518,375.00	377,375.00	675,000.00
Osceola				285,008.00	277,005.00	900,000.00
Page	48,260.00		48,260.00	541,345.00	422,345.00	1,600,000.00
Palo Alto				351,454.00	345,639.00	625,000.00
Plymouth	2,839.14		2,839.14	712,560.00	681,879.00	1,500,000.00
Pocahontas	51,000.00		51,000.00	456,104.00	360,603.00	750,000.00
Polk	285,000.00		285,000.00	2,069,602.00	1,307,602.00	975,000.00
*Pottawattamie	75,000.00	65,000.00	140,000.00	962,276.00	747,219.00	4,000,000.00
Poweshiek				570,062.00	570,062.00	1,500,000.00
*Ringgold				310,380.00	310,380.00	1,800,000.00
Sac				513,068.00	442,457.00	1,100,000.00
Scott				1,180,776.00	1,122,169.00	950,000.00
Shelby				497,565.00	488,528.00	1,200,000.00
Sioux				695,389.00	695,389.00	750,000.00
Story				600,108.00	598,773.00	300,000.00
*Tama				637,172.00	637,172.00	1,500,000.00
*Taylor				388,787.00	364,867.00	1,750,000.00
Union	114,000.00		114,000.00	320,299.00	189,129.00	1,250,000.00
Van Buren				290,611.00	171,172.00	1,750,000.00
*Wapello	119,000.00	23,000.00	142,000.00	490,184.00	45,181.00	1,000,000.00
*Warren	45,000.00		45,000.00	464,919.00	415,919.00	1,300,000.00
Washington				554,442.00	536,442.00	1,200,000.00
*Wayne				357,553.00	357,553.00	1,350,000.00
Webster				752,422.00	729,240.00	1,000,000.00
Winneshiek	162,000.00		162,000.00	264,862.00	264,395.00	250,000.00
Winneshiek	162,000.00		162,000.00	435,303.00	191,518.00	2,000,000.00
Woodbury	59,000.00		59,000.00	1,209,001.00	568,253.00	2,750,000.00
Worth				265,185.00	262,795.00	80,000.00
Wright	106,000.00		106,000.00	482,862.00	372,630.00	1,300,000.00
Totals	\$2,891,333.29	\$174,899.46	\$3,066,232.75	\$50,682,574.00	\$41,760,367.00	\$127,990,000.00

Note.—\*The following named counties have issued or probably will issue bonds during 1916 to take up outstanding warrants in road and bridge funds: Allamakee, Appanoose, Benton, Clarke, Clayton, Crawford, Dallas, Davis, Fayette, Guthrie, Hamilton, Hardin, Harrison, Henry, Jasper, Jefferson, Lucas, Marion, Marshall, Pottawattamie, Tama, Taylor, Wapello, Warren, Wayne, Ringgold.  
Amount of additional indebtedness permissible ascertained after deducing outstanding warrants as well as bonds.