

IOWA STATE LIBRARY
Law Department

7
16

Good Roads

BY

PAUL BEER

IOWA STATE MFGS. ASS'N.

(m.d.)

Good Roads.

"Of all inventions, the alphabet and printing press alone excepted, those inventions which abridge distance have done most for the civilization of our species."—Lord McCauley, in his History of England.

The public highway has, from the earliest time, been a barometer of civilization. No matter what of progress and advancement in science, art, and commercialism, an interest in good roads invariably marks the outpost. Perhaps now, more than at any other time in the world's history, is the public highway demanding its full share of consideration.

"If our farm life is to be made more attractive, and our agricultural resources fully developed, it is essential that the rural highways of the country be improved. However fertile the soil and however favorable the climate, the farmer cannot make any great headway toward material prosperity without improved roads. The school system may be perfect and the churches may be numerous, but if the roads are bad, the farmer is isolated from both. If these statements be accepted as true, it must follow that without road improvement we can expect no very great social, moral, mental and material development on the farm."

PRESENT STATUS OF ROAD IMPROVEMENT.

The problem of building country roads to suit traffic is the one great problem relating to modern highway construction. An ever increasing volume of traffic, and weight of loads, and the advent of swift moving vehicles, are bringing about a transitional state in our traffic conditions similar to that which occurred 150 years ago when the wheeled vehicle superceded the pack horse. In view of present development, it is apparent that the determining factor of traffic in time to come will be the mechanically

driven vehicle. These new conditions are introducing elements of destruction in addition to those which have heretofore characterized improved roadways, so that now it is apparent that however permanent, economical, and satisfactory the old methods of highway construction may have been, they are today obsolete, extravagant, and wasteful.

The present demand is not merely that we shall have good roads, but roads that mean satisfaction and comfort to the user, economy to the taxpayer, and so constructed that the question of durability, permanency and freedom from repair is without concern.

“According to an investigation made by the office of public roads, there were at the close of 1904, 2,151,570 miles of public roads in the United States. Of this mileage, 108,232.9 miles were surfaced with gravel, 38,621.7 miles with stone, and 6,809.7 miles with special materials, making a total of 153,664.3 miles improved, or 7.14 per cent. It is estimated upon the basis of such state reports as are available that there has been an increase in macadam roads since 1904 of 12.5 per cent; of gravel, 15 per cent; and of special surfacing materials, 25 per cent; which would indicate a total of 176,429.3 miles of improved roads at the present time, or 8.2 per cent of the total mileage.

The total expenditure for the year 1904 amounted to \$53,815,387.98 from property and poll taxes payable in cash, \$3,530,470.93 from bond issues, \$2,607,322.66 from state treasuries, and \$19,818,236.30 representing statute labor computed upon the basis of the prevailing wages in each county for that class of work, making a total of \$79,771,417.87. It is, therefore, apparent that the expenditures have been out of all proportion to the results accomplished. It is unnecessary to seek far to discover the causes which are responsible for the poor condition of our public roads.

In the first place, until within the past few years, the policy of extreme localization prevailed in all of the states in the administration of the public roads, and today this policy prevails in

the great majority of the states. It places upon the county, and in most cases upon the road district or township, the entire burden of constructing and maintaining the roads and leaves to it the initiative as well as the final determination as to the policy which shall be pursued in carrying on the work.

“In the second place, our road laws for the most part do not contemplate the necessity for skilled supervision in road work; hence nine-tenths of the work done is under the direction of men who have no knowledge of road building, and who have only a passing interest in it. This is a situation which is truly amazing, for skill is demanded in practically every other line of work.

“The third element, which of itself would prove an effective hindrance to efficient work, is that of statute labor, or the method of assessing road taxes in day labor, and of allowing an undisciplined body of workmen who have no inclination to render an adequate day's service, who have no acknowledge whatever of the work, and who are frequently unused to manual labor.

“The fourth element of weakness in our system lies in our method of maintenance. We repair our roads as a rule at such times as farm work will permit, and this means that the roads receive attention once or twice a year. Such a system is absurd, for certainly repairs will be more thorough and cost less money and labor if made as soon as defects appear than if the road is allowed to go almost to ruin before attention is given it”—Excerpt from a report by the United States office of public roads.

ECONOMIC EFFECTS OF ROAD IMPROVEMENT.

At the annual meeting of the Des Moines Commercial Club in December last, a prominent railroad official averred that the railroads were actually transporting the farmers' produce for 1c per ton per mile. Compare with this certain records which have been tabulated by the United States office of public roads.

The immensity of the burden which bad roads impose upon transportation is shown in the following data: An investigation

conducted by the office of public roads in 1896 indicated that the average cost of hauling on the roads in the United States was 25c per ton per mile; the average length of haul, 12.1 miles, and the average load 2,002 pounds.* An investigation by the Maryland geological survey in 1899 indicated the cost of hauling in Maryland to be 26c per ton per mile. In 1906 the bureau of statistics of the department of agriculture sent letters of inquiry to 2,800 country correspondents, who reported an average cost per ton mile of 23c, and an average haul of 9.4 miles. The rate of 23c is, if anything, too conservative. The report of the interstate commerce commission for the year ending June 30, 1906, showed that 265,000,000 tons of freight handled by the railroads was agricultural, forest, and miscellaneous farm products. If we assume that 200,000,000 tons, or less than 80 per cent of this total was hauled over the country roads, the cost of 23c on an average haul of 9.4 miles would be \$432,400,000. This does not include the enormous tonnage hauled by wagons to canals, wharves and docks, and with this considered it would follow that the total cost of transportation on our wagon roads is well over \$500,000,000 annually.

Accepting these figures as true, it follows that with good roads a reduction in the cost of hauling from 23c per ton mile to 11.5c per ton mile would mean an annual saving of \$250,000,000.

FOREIGN COST LOW.

According to consular reports, the cost of hauling in Germany, France and England averages about 10c per ton per mile. Leading textbooks on highway engineering give the cost of hauling on broken stone roads in ordinary condition 11.9c; earth roads containing ruts and mud, 39c; sandy roads, when wet, 32.6c; sandy roads, when dry, 64c; all of these cost figures being ton mile costs.

The cost of hauling is largely determined by the size of the load that can be hauled, the number of trips that can be made in a single day and the wear and tear on teams and equipment. The

influence of grades may be illustrated as follows: If a horse can draw a load of 1,300 pounds on a level earth road he can draw only 900 pounds on a 5 per cent grade. Steep grades are dangerous in winter for the reason that they become slippery. They are subject to serious damage by heavy rains and if the road is covered with crushed stone without first reducing the grade, the cost of maintenance is very largely increased.

SMOOTH SURFACE NECESSARY.

The importance of a firm foundation and a smooth surface cannot be over-estimated, as next to grades it influences the size of the load and the number of trips possible to make in a day. This may be illustrated by the statement that an average horse can draw one ton on a clay road, one and two-thirds tons on the best gravel road, two and three-fourths on the best macadam, four and one-half tons on the best bituminized macadam and five tons on a brick road.

Summarizing briefly the foregoing data, it may be said that the chief causes for the high cost of hauling are:

First—Steep grades.

Second—Uneven and non-uniform road surface and lack of drainage.

John Wanamaker offers data showing the cost per ton mile of auto truck service between New York City and the country districts thereabout. During fifteen months his eight auto trucks covered a total of 217,714 miles at a cost of 7c per ton per mile. This is an average of over 27,000 miles per truck, or approximately sixty-nine miles per day for each month of twenty-six days; including as this does layouts and reserve days when trucks were not needed, and the further consideration that at best one hardly expects a cheap ton mile transportation cost between New York City and the country districts, the above is a remarkable showing.

With good country roads and the application of the motor

driven truck to the transportation of farm products between the farm and the farmer's market, transportation costs will be very materially reduced.

"It is essential to the prosperity of the farmer that he realize how close and intimate is the relationship of roads to agriculture. The selling price of farm products is largely determined by factors beyond the control of the farmer, and his profit is represented by the difference between the cost of production and transportation and the selling price. If he can materially reduce the cost of transportation, he thereby increases this margin of profit without increasing the burden upon the consumer, because the selling price is not increased."

To reduce this transportation cost between the farm and the farmer's market, the work of road improvement should be directed; first, toward the reduction of grades; second, the proper drainage and surfacing of the roads.

EFFECTS OF ROAD IMPROVEMENT UPON AREA OF PRODUCTION AND CHARACTER OF PRODUCTS.

The cost of transportation materially effects the size of the area which can be cultivated about each shipping point, for the reason that the profit to the producer is represented by the margin between the cost of production and transportation and the selling price; and when the item of transportation becomes so great as to wipe out the difference between the cost of production and the selling price, production must cease or be carried on at a loss. That is to say, those farms which are now at the greatest distance from a market will, by improved roads, be enabled to so reduce the cost of transportation as to make a much greater profit than is possible with poor transportation facilities.

Improved roads would enable the farmer to more successfully introduce the system of intensive farming. If the roads were properly improved the market would be accessible to him for any

and all of the products, at all times, which soil and climatic conditions would make possible of production.

LAND VALUES.

“An increase in the value of farm lands is the inevitable result of any permanent improvement in the roads. This increase in value of lands has been variously estimated at from \$2 to \$9 per acre, although numerous examples are available of far greater increase in specific cases. Francis P. Loomis, United States consul at St. Etienne, France, reported to the department of state in 1891 as follows:

“The road system of France has been of far greater value to the country as a means of raising the value of lands and putting the small peasant proprietors in easy communication with the markets than have the railroads. It is the opinion of well informed Frenchmen who have made a practical study of economic problems, that the superb roads of France have been one of the most steady and potent contributions to the material development and marvelous financial elasticity of the country. The far-reaching and splendidly maintained road system has distinctly favored the success of the small landed proprietors, and in their prosperity, and the ensuing distribution of wealth, lies the key to the wonderful financial vitality and solid prosperity of the French nation.”

The land and industrial agent of the Southern Railway Company reported that in Jackson County, Alabama, a bond issue of \$250,000 was voted, and within the next two years 125 miles of macadam roads were built. The average value of all farm lands in Jackson County, on the basis of the United States census of 1900, was \$4.80 per acre. The selling price was from \$6 to \$15 per acre. Within a short time after the completion of the road system, the land increased in value and found ready purchasers at \$15 to \$25 per acre. In Bradley County, Tennessee, the assessed valuation was a fraction over \$9 per acre; \$176,000 in bonds were issued, which were sold for \$210,000. Today Bradley

County has about 160 miles of excellent macadam roads, and lands that were valueless before these roads were built, now find ready purchasers at from \$15 to \$30 per acre.—Excerpt from a report of the United States office of public roads.

It is possible to show in detail numerous other far-reaching advantages to the farmer in addition to those already herein set forth. Suffice it to say that improved roads will bring—

- Better schools and greater attendance.
- Better health and quicker medical attention.
- Better farms and more cultivated land.
- Better crops and cheaper transportation.
- Better economic conditions and more products.
- Better social conditions and less isolation.
- Better church attendance and better citizens.

LEGISLATIVE ACTION.

To keep up an interest in and to properly promote good roads, but more particularly for the proper construction and maintenance of our public roads, we should have a legislative act providing for a state highway department and the establishment of a state highway commission and the office of state highway engineer. This act should prescribe the duties of each and fix the compensation of the state highway engineer; should authorize state aid for the establishment, construction, maintenance and repair of public highways and bridges; create a fund and make appropriations therefor; provide for the working of state convicts in the preparation of road building materials, and provide for application by the counties for state aid.

This law providing for state supervision and state aid in road improvement, should be so framed, as to remove its administration, as far as possible, from political influences. To this end, therefore, it should be provided that a non-paid state highway commission should be appointed by the governor, said commission to consist of a professor of civil engineering from each of

the two leading universities in the state, and one civilian member. A commission thus constituted would have a majority of its members selected because of their training and engineering ability, and without reference to their political affiliations which would insure a non-partisan and technically competent and efficient commission. The civilian member to be appointed by the governor should be chosen with the object in view of bringing to the commission a man of business ability and experience, which is essential to the proper and economical organization and prosecution of its work. This commission should appoint a state highway engineer and should fix his salary, and the engineer so selected and appointed should be a competent civil engineer, skilled and experienced in road construction and maintenance.

With a commission thus constituted and thoroughly organized, it would be possible to carry on the great work of good roads to the lasting benefit of our entire people.

ROAD MATERIALS.

The manner in which high speed motor cars damage a road surface was discussed in a number of the papers submitted to the International Road Congress held in France during the year 1908. Much has been said about the suction of the broad rubber tires of motor cars drawing from the roadbed the binding material upon which its life depends, and while this is in a measure responsible for the dust nuisance and the rapid deterioration of highways subject to heavy motor traffic, it is not the chief cause of damage. Stone roads, waterbound with screenings or sand, were designed to sustain a rolling traffic, and with reasonably broad tires and moderate speed, very little damage is caused by such traffic, although the loads may be very heavy. The motor car, however, is a self-driven vehicle, the power being usually applied to the rear axle, and the rear wheels act as driving wheels. The tractive force or shear exerted upon the road surface by these driving wheels is doubtless the chief cause of the injury which is so apparent. The fine dust, or binding material, is not

so much sucked out of the roadway by the rubber tire as it is ground out and thrown into the air by the driving wheels. As the conditions of the surface layer or the ground in which these reactions are applied are unfavorable for resisting them, they are the main cause for wear and tear on roads traveled by automobiles.

FOR MACADAM ROADS.

Hence, it should be sought to give tangential cohesion and elasticity to the top surface of the roadway by a proper choice and arrangement of the materials of which it is made. To this end the bituminized macadam roadway has become the popular roadway for resistance to the tractive force of both mechanically driven and horse-driven vehicle.

To show the possibilities in permanent road construction, the following estimate of a bituminized macadam roadway, constructed of gravel with natural lake asphalt as a binder, is submitted:

| | Paving Cost Per sq. yd. | Per mile of 14 ft. road 8,214 sq. yd. | Per mile of 16 ft. road 9,387 sq. yd. |
|-----------------------|----------------------------|---|---|
| Gravel at \$.80..... | \$.95 | \$7,703.30 | \$ 8,917.65 |
| Gravel at .90..... | .97 | 7,967.58 | 9,105.39 |
| Gravel at 1.00..... | 1.00 | 8,214.00 | 9,387.00 |
| Gravel at 1.10..... | 1.04 | 8,542.56 | 9,762.48 |
| Gravel at 1.20..... | 1.08 | 8,871.12 | 10,137.96 |
| Gravel at 1.30..... | 1.12 | 9,199.68 | 10,513.44 |

This is a very conservative estimate. The different prices given are based on different prices for gravel. This type of roadway is chosen because it has been selected by the New York state highway commission as that best adapted in the way of permanent road construction for all the needs of traffic, both motor driven vehicle and otherwise, and which is furthermore considered an economical road in that it has a low first cost and low maintenance cost. This road may be constructed by either the so-called mixed or penetration methods.



3 1723 02117 8934

These estimates are figured on a basis of gravel ranging in price from 80 cents to \$1.30 per cubic yard; sand, \$1.25 per cubic yard. From the general conditions existing in this state, this form of construction would seem to be the most feasible, taking into consideration not only the price but the availability of material. However, in using this form of pavement, it is very essential that the highest grade of natural lake asphalt be used as a binder.

If arrangements could be made by which lime rock might be produced for the base and gravel for the wearing surface, such a road would be much more satisfactory than one constructed entirely of gravel. The cost per mile using this combined construction would be approximately \$8,000 for a fourteen foot roadway, and \$9,000 for a sixteen foot roadway.

In conclusion, bear this great fact in mind: Ninety-eight per cent of the traffic in this country goes over the public roads. Accepting this as true, think of the enormous amount wasted each year by the American people in excessive transportation charges. Further back in this article, is a quotation from Mr. Francis P. Loomis, United States consul at St. Etienne, France, concerning the wonderful prosperity of the French nation. Now note this startling comparison! The United States with its great expanse of territory has 176,429.3 miles of improved roads; France, which is but little larger than the state of New York, has 355,000 miles of improved roads.

Let us stop and consider whether we shall stand still in road improvement, or whether we shall adopt an aggressive good roads policy and so keep abreast of the great world nations in all that makes for progress.

PAUL BEER.