Address by Thos. H. MacDonald, Chief, Bureau of Public Roads, at a dinner tendered to publishers, editors and writers by the National Automobile Chamber of Commerce, New York, March 1, 1922.

THOMAS H. MacDONALD: Mr. Chairman and Gentlemen: It is gratifying to know that I am the guest of honor here tonight. It reminds me a great deal of the way in which some of the writers who are here put out their stories, always leaving something interesting to be continued in the next.

About three weeks ago, more or less, we were working at the office one day over some reports, Mr. White of the Motor Truck Committee of the Automobile Chamber of Commerce, and some other men, and as they left the room, Mr. Pyke Johnson, who is the business end of the organization at Washington, came back in and I thought perhaps he had left his hat or something. He said: "By the way, we are going to have a dinner up at New York on the first of March and we would like to have you come up and take dinner. Just a few of us are going to meet there." About a week later I got a letter from him saying that he hoped I had not forgotten about the arrangement, that they were expecting to have two or three committees of the Automobile Chamber of Commerce there. And a week or so later he said if I had anything to say I should just perhaps take into consideration that there would be some writers there that evening. When I get here tonight I find that I am the guest of honor. I should call that a story in at least four or five installments.

Gentlemen, we have a coin of the realm, sometimes, which is known as a copper cent, one cent. Perhaps people in foreign countries still have some respect for the penny. We should have, with all the admonitions that we have had about saving our pennies and watching them grow. But I don't believe that as American citizens we profit very

largely by all of that advice which we receive. With it all, the American copper cent is not a greatly respected coin, particularly I judge at places such as this in which we are dining tonight.

Our milkman drives a truck. It is rather a large truck because he hauls a large load and it so happens frequently that as I come downstairs in the morning after he has been there I see deposited on the front step the daily portion of milk--we are not able to get the milkmen who come on trucks to deliver milk to the back door. They deliver it on the front steps. The old type of milkman who came with the horse and wagon would come to the back door but not so with the truck man. I think Mr. Graham has, however, very fully explained the position which they hold in the business world today, and, what is admitted, does not have to be proven as a matter of law.

Now I am very fond of milk and particularly of what comes on top of the milk and I do not consider a day well begun unless I have oatmeal and cream. I figure that the cost of the highway in the transportation of that milk, which I consider essential to my personal well-being - to me as the average American citizen is one penny and the highway cost of all of the rest of my food which is transported over the roads is nothing at all. That was the cost of the American highways to the individual man, woman and child in this country last year after deducting the exact revenue which the automobiles contributed to the road built, as direct automobile license fees. The amount deducted does not include any of the intangible income from motor vehicles. Of course, I understand it is tangible enough when it is paid we admit, but I mean that deducting only the direct revenue which the automobile paid in licenses into the road funds, the bill of the American people, each man, woman and child, was

one penny per day in 1920. It does seem to me, therefore, that we can afford the highways. Perhaps I am not exactly accurate, the cost may be about one and one-tenth cents as near as we can estimate it. I have contemplated the poorest child in the poorest tenement district in New York City and I have wondered if we could decrease the bill to him of our American highways, if we can consider that the transportation of food which he eats is not worth at least one penny per day. I cannot conceive of any one so situated in this country whose tangible personal benefit from the American highways is not at least one copper cent per day from the highways themselves.

We are thinking of highways and automobiles in combination. We are thinking of them as transportation of a certain form. I believe that we should realize that the United States is founded, as Mr. Graham has well said, upon the possibility of maintaining a sufficient and efficient transportation system in all its phases. And we should not think of transportation over the highways or highway transportation alone, but should think of the transportation over the rivers and over the waterways as well.

I want to talk for just a very few minutes about this problem as we are approaching it from the standpoint of the United States and I have a few figures which I am not going to refer to more often than necessary.

In the building of our other transportation systems, or at least in the building of the railway transportation system, the same individual or corporation, the same owner, owned both the rolling stock and the roadbed. In this development of highway transportation the individual owns the rolling stock and the public has undertaken to provide the

roadbed and it has not up to this time done a very good job. In 1910 we were spending for all highway purposes in the United States about $120,000,000. That was largely for the horse-drawn vehicle and its expenditure constituted pretty largely a service to the agricultural population, which at this time represents about forty per cent. of our people. At the same time in 1910 there were only about a half million automobiles in the country.

In the eleven-year period we have increased our motor vehicle registration about eighteen hundred per cent. and we have only increased our expenditures for road purposes, at least our effective road expenditures for road purposes, about four hundred per cent. That is, we have been lagging very far behind in the building of road beds for the rolling stock.

In 1921 our estimate of the accumulated investment in highways for the eleven-year period was $2,526,000,000, exclusive of the amount we have spent for maintenance each year. The estimate of rolling stock values is $8,322,000,000. That is, there has been over three times as much investment in rolling stock between 1910 and 1921 as we have expended during the same period for highway construction.

Our expenses last year for all road purposes were about $600,000,000. That includes not only the Federal and State expenditures for the main state highways but the local expenditures outside of the municipalities, such as the township, county and district expenditures. And based on that total estimated cost is my estimate that it costs the American individual, each man, woman and child in the United States, about one penny per day for the highways. It seems to me that we certainly receive a personal benefit from the food and supplies that come over the highways to us at

least greater in extent than one penny or one and one-tenth cents per da Because of the large appropriation made by the Congress for federal aid we have obtained the erroneous impression that the Federal Government is back of the highway movement. Our estimate of the amount that the Feder Government contributed last year toward the total bill for highways was only about fourteen per cent., and the portion of the cost which the automobile paid in direct taxes we figure at about nineteen per cent. That is, between the Federal Government and the automobile itself we pai about thirty-three per cent. of our total bill. That leaves sixty-seven per cent. to be paid from other sources which were largely tax sources, partially bond and partially direct.

Most of the things that we have known about highways are not so. You will find flat contradictions of practically everything we have accepted as trite and academic and almost proverbial. For example, we have had it imposed upon us almost as a commandment that thou shalt not build a road which will not last longer than the life of the bond. I think all of us will agree to that as a general proposition but the only thing that is the matter with it as I see it, is that it is not so.

The State of New York issued bonds for $100,000,000 and I have seen within very recent times articles written in which it is said that the roads are going to pieces so badly that they will be gone before the bonds have been paid. And I think very likely the road surfaces built with the proceeds of those particular bonds will be gone before the bonds are paid. But it is a fact that this year in New York State we are in cooperation with the State, in widening these old macadam roads with eighteen feet of concrete, leaving a strip of the old macadam in the middle. This work has only been begun but it has been successfully begun

making a twenty-four-foot surfaced roadway in place of the old twelve or fourteen-foot macadam surface, on the same roadbed that was built with the bond money and at a cost which is enough less than the average cost of new construction of concrete eighteen feet wide to absorb the old cost, the first cost, that the State has invested in those roads. In other words, so far as I can see it, New York State by the investment of $100,000,000 and by building cheap roads when her needs were for cheap roads, has been having the service of those roads all these years at not to exceed the interest cost on the investment and has all the investment left. And we will have to have a marked change in the price standards that we have now reached before that fact is not so.

When you think of cheap roads, sand-clay roads, gravel roads, macadam roads, you should think of them in a somewhat different way than you have in the past; you must think of them as cheap roads plus maintenance. So much of our value in roads has disappeared; that is, the original value in roads has disappeared simply through lack of maintenance, and as the roads are placed more and more under state supervision and systematic maintenance is given them, we find that we obtain real service from these cheaper types of road.

The Federal Legislation which was passed last year provided that the Federal funds shall be expended upon a definite system which shall not exceed seven per cent. of the public road mileage within the country. That system we estimate will reach one hundred and eighty to one hundred and ninety thousand miles of public highways and it will be sufficiently extensive so that, when completed, it will connect within each state practically all of the county seats. That is, there will be a gridiron of roads crossing each state, touching or connecting each countyseat with

the adjoining county seat, and thus interconnect at the state borders with the roads from other states. So that it should be possible eventually, when you get upon a road at any point in one part of the country to go to any other county seat point in any other part of the country without leaving that particular Federal aid system of roads. It is going to take a long time to do this work, but we are engaged upon a very large work. One hundred and eighty thousand miles is probably the minimum mileage that will be required to complete such a system and it may run as high as 190,000 or 200,000 miles.

The whole question, as I see it, in regard to the Federal aid system of building roads is, having started upon the building of the system--how fast are we going forward? There has been appropriated by the Congress to the states for helping to build this system of roads, $340,000,000. We have placed under contract about $214,000,000 and have the remainder of it still to place under contract, $126,000,000, of which we expect from forty to sixty million to go under contract before the first of this July. That is, by the first of this July, we will not have funds sufficient to run another year unless further appropriations are made.

Now, I am not pleading for appropriations, I am only bringing this viewpoint before you. With ten millions of motor vehicles in this country how long can we wait for a system of roadbeds over which to operate that rolling stock? If we conclude that we are willing to spend from the Federal Treasury $50,000,000 per year, taking into consideration the roads, about seventy thousand, which have already been improved, and leaving a balance of say 120,000 miles, it will take in the neighborhood of twenty years to do the job. Are we willing to wait twenty years to

get a system of roads that will extend from county seat to county seat, understand not all paved roads by any means?

If we conclude that we can spend $75,000,000 per year from the Federal Treasury we can do this job, assuming that we can still impose on the states as we have been doing in the past, when under a law that says we can pay fifty per cent. of the cost we have been getting along with paying forty-two per cent. the states paying the remainder because they were in a bigger hurry than the Federal Government, if we conclude we can pay $75,000,000 per year it will take us fifteen years. If we conclude that we can afford $100,000,000 a year for that purpose we can do the job in ten years. That is the fact that has to be decided by the Congress and by us here and by the people in the United States who are going to use ten million motor vehicles this year, - whether they are willing to wait ten or fifteen or twenty years for a system of improved roads.

This system of improved roads, as I say, will not all be paved roads. The mileage of roads which has been built up to the present time through the state and federal funds has included about seventy per cent. in mileage of the cheaper types of highways. But the reverse is true as to the cost. Thirty per cent. of the roads, - the modern paved roads which are being built, - will cost in the neighborhood of sixty-two per cent. of the total fund. So that the larger mileage is costing only about thirty-eight per cent. of the funds. But we must take into consideration that in very many parts of the United States the cheaper forms of highways will serve adequately if maintained and it is a part of the federal law, a requirement of the federal law as to the receipt by the states of continued federal appropriations that the state must undertake, as a state, the maintenance of the highways and must put the system of

highways on which the federal aid is expended under a patrol system, which means that someone is responsible for every mile of highways within that system every day in the year.

The lack of such a system is the reason that we have not received service from our highways in the past. We have never been able to impose a sufficient sense of responsibility upon the local communities, the local officials such as the county board of supervisors, to secure maintenance of the highways. You gentlemen who are used to driving largely over the highways will follow the state roads and you will find, generally speaking, unless your highway happens to be afflicted with detours at that particular time, due to new construction, you will find that the state highway system is in a good condition of maintenance, but on the roads branching off from it there is poor maintenance. There is a distinct line between the state and the county authority. The county authorities, except in very rare instances, have never maintained their roads. They have never been willing to put a man on a stretch of road and keep him there and give him responsibility and make it his job to take care of that particular piece of road. With such maintenance as is required by the Federal Highway Act we are going to be able to get adequate service out of the cheaper forms of roads. So I think our estimates based on what has been done in the past are reasonably accurate, and that we can complete the job in twenty years at an expenditure of $50,000,000 per year or in ten years with an expenditure of $100,000,000 from the Federal Treasury.

Now that would perhaps require us to raise more of the money from transportation, not as a tax, however, on transportation. If you consider that our estimates as to the investment in motor vehicles are somewhere

near right at $8,000,000,000, a twenty-per cent. depreciation of the motor vehicle is over $1,000,000,000 per year, it is actually $1,600,000,000 per year. I do not know how much of that depreciation we can prevent by improving the roads, but if we can cut the bill for repairs by $600,000,000 that would be enough to say our total road bill for last year. We don't imagine that by better roads we can save the total depreciation on the automobile and I do not know just exactly how we are going to arrive at a fair division between the roadbed and the motor vehicle of the profits from transportation.

I said in the beginning that we were approaching this from a rather difficult angle because the individual owns the rolling stock and the public owns the roads, and I don't know how we are going to get the individual to sit on one side of the case as the automobile owner and on the other side of the case as a part of the public who owns the rolling stock and divide fairly the profits due to highway transportation, which is made up of the automobile on one hand and the improved road on the other hand. But in some way we have got to divide the profits that accrue from this transportation between the roadbed and the automobile.

I suspect that these figures of transportation are so large that they don't mean a great deal. I confess it is difficult for me to think in trillions or in billions or even in millions of dollars or ton-miles. But now if you take butter for instance and think of it in tons I can encompass that somewhat more nearly. We have been making a study recently of the uses that are made of the roads by the automobile and by the motor truck in Connecticut. We have been studying the Boston Post Road near the state line between New York and Connecticut and also we have been studying the road near the Massachusetts line, between Massachusetts and Connecticut.

The strange part of it is that we find over in Connecticut that on the Boston Post Road thirty-seven per cent. of all the motor vehicles belonged to New York State and only fifty-three per cent. of them belonged to the people in Connecticut. And when we went over near the Massachusetts line we found a worse situation - more than half of the motor vehicles, or the automobiles belonged in Massachusetts and much less than half on the road belonged in Connecticut. That is, the people of New York and of Massachusetts were together using the roads more than the people who owned the roads and were building them. These are not estimates. They are taken from the actual count of each individual motor vehicle which was not only counted and the commodities which it carried and the passengers as the case might be studied and their destinations taken but each was weighed.

We found, for example, that the Boston Post Road was carrying eggs for an average haul of 58 miles. We found an average haul of all commodities on that road something like seventy miles. That one road was carrying commodities figured at an annual value of at least $15,000,000. The division was approximately only fourteen per cent. to agricultural products and about seventy-three per cent. to the manufactured products.

Strange as it may seem, the heavier commodities you see hauled around the streets on motor trucks such as coal, sand, gravel and materials of that character are not the commodities we find are hauled over the public highways. The commodities that go to the public highway on the long distance haul, are the higher priced, smaller bulk commodities in which time is an element. So that we find that predominating in the commodities that are hauled, not the heavy classes of commodities which go to the railroads, such as coal, ores, gravel and stone, but to lighter and more expensive commodities - butter for example. We find on that one

highway, seventy-three thousand ton-miles of butter. That is, the haulage of butter on that highway for the year as represented in this census amounted to seventy-three thousand ton-miles. The haulage of eggs amounted to seventy-nine thousand; of fruit to one hundred and sixty-one thousand ton-miles. That means that New York was sending up into that district, or that that district was sending down to New York commodities such as you eat, have on your table, fresh every day, butter, eggs, fruit, all commodities in which time is an element. I think we all agree that with eggs, at least, time is an element.

We counted on the Boston Post Road, in a fourteen day census, thirty-eight thousand passenger automobiles and trucks. Between Massachusetts and Connecticut the division was fifty per cent. Massachusetts and only thirty-four per cent. to Connecticut. That is the division of the vehicles themselves. Between Connecticut and New York it was fifty-three to Connecticut and thirty-seven to New York. So I think that we rather well prove the case that the lines between the states, the lines between the counties certainly are being broken down and that in figuring on the automobile as a transportation agency we must think of it in larger terms than in terms of the state alone. Think of what that means with the people of one state building the roads and the people of another state using them. As I say, I do not know how we are going to divide the cost of highways or the profits which we receive from transportation and which are a product of the highway and the motor vehicle so as most fairly to pay the highway bill. But it does seem to me that one cent or one and one-tenth cents per day to the individual in the United States is a comparatively small amount to pay for that form of transportation.

This census, this study of the actual haulage upon the highways

will be continued this summer until we are able to deny, I am positive, the fact that the railroad and the automobile and truck are competitors. That is, except with a very small margin. I do believe that the automobile and the truck will come in to add to the sum total of our transportation and that it will in a greater degree become an ally of the railroad than a competitor.

To develop our present views with regard to these things which I stated a minute ago we have found to be untrue, has taken a great deal of research, and we are engaged now in studying on a very elaborate scale all of the elements which go to make up the physical characteristics of the highways, the highway surfaces and the highway supports or the subgrades under them. In that work we have enlisted in a national highway research programme, as many of the colleges and universities as we can persuade to join. We are putting to work the engineering research plants and testing plants which have been developed at the universities and colleges and that work is being conducted in all parts of the United States - not only on the higher priced roads, but down through the South, for example in North Carolina and South Carolina upon the sand-clay, the gravel and the top-soil roads. In California--and here is another thing that is not so--people say that the roads of California have gone to pieces and that they have been gradually giving up the ghost. The Bureau made a very careful survey of twelve hundred and ninety miles out of the entire system of about fifteen hundred miles of concrete roads which have been built in California since 1909; that is a period of over ten years. In that ten-year period, of the entire mileage that has been built less then thirteen per cent. is all that shows signs of distress or has been broken down. It is true that cracks appear in the slabs; cracks will

appear in concrete slabs no matter how well they are laid, and no matter how long they will last; but less than thirteen per cent. of the mileage of roads in California has broken down and needs replacement. And those roads, gentlemen, were four and five inches thick and seventy per cent. of all of the highways which showed distress were laid over the clay and adobe soils. It is my judgment that they would have shown about the same distress when laid over that kind of soil had they been very much thicker. It is not so much a matter of the vehicles that are going over our highways as it is the character of material which lies under our highways that is causing us concern. When you go down to Texas and find that those black wax soils shrink so in drying as to open cracks and crevices that you almost are afraid to step across, you are not surprised that they withdraw their help from support of the surfaces over them in that shrinking process. As a matter of fact, when you see cracks in concrete roads they very frequently mean that the concrete road has lifted free from the sub-grade which lies under it and is supposed to support it due to the warping action of the sun. On a hot day the monolithic road slabs curl downward at the edges so that their centers are lifted clear off the sub-grade. A heavy motor vehicle running over the road at such a time may be supported by a thin wedge of air in place of the sub-grade itself.

Those things are facts as they have been developed. It is not going to be increasingly difficult to carry the traffic over the highways. It is going to be increasingly easy to carry the traffic if we study out the scientific principles which we must know and apply in order to carry heavy loads upon soils such as we have and which vary from place to place in the United States. If we were building all roads over good gravel or over good sand sub-grades we would not need to worry about how heavy the

motor vehicles become because all we would need would be a thin slab on top to take care of the wear under the wheels and the sub-grade would do the rest. But where we have a sub-grade that becomes so soft that it squashes out from under our road every time it gets wet, and every time it gets dry shrinks away from it and does not hold it up so that the slabs are not supported by anything whatever, it is not to be wondered that the road cracks.

It seems to me that, in this matter of highway transportation, the main thing is to judge its development by the facts and not by current gossip that obtains or prevails relative to instances where the highway may have failed. I want to contradict one other thing. I should not take so much time but I want to contradict the oft heard remark that our highways are going to pieces now.

During the period of the war practically all maintenance was withdrawn from the highways at the period when we increased our rolling stock over them more than twelve hundred per cent. It has taken the whole time since the war period to bring those highways back. Take, for example, in the State of Massachusetts, this year they have expended what they figure would be the equivalent of about three years' normal maintenance money on the highways. But with that expenditure they feel that they have brought their highways back not only to as good condition as they were in before the war but to a far better condition and that is generally the condition of the highways as we find them--that they are in better condition today than they have ever been before notwithstanding our rolling stock over them has increased more than eighteen hundred per cent.

Gentlemen, I thank you.