SUMMARY

In repeating the subject of this paper, "Indiana's Highways in Relation to Her Future Development," the points outlined above may be summarized as follows:

That we continue to widen shoulders, culverts, bridges, and rights-of-way.

That we encourage the construction of divided lanes on more heavily traveled highways.

That we give every aid to rural electrification.

That in recognition of Indiana's important geographic position and the industrial development which is bound to come, we encourage a program of conservation and park development.

That the whole plan in the larger sense can be supported not only as a highway program but as the best type of public work.

Should we carry out these recommendations we will have measured up to our responsibility.

To what more responsible group could an appeal be made than to those assembled here? County highway engineers, county commissioners, city engineers, city officials, the Purdue civil engineering staff, the members of the State Highway Department should constitute the group if we have one in Indiana.

It must be recognized that large sums of money and years of time are required for the fulfilment of this program. There are those who clamor for the reduction of the gas tax and for the reduction of the license fee. It is my considered opinion that we should by no means curtail the funds available for highway work. I do not lose sight of the fact that highway expense represents a large annual bill to the public, but I am convinced that our highway industry is not only justifiable but one of the most important factors in the forward progress of our commonwealth.

WHO SHOULD PAY FOR THE HIGHWAYS?

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The policy controlling payment for the construction and maintenance of public works in the United States by the federal government and the various states has been one whereby the charge was made against the body politic as a whole or in accordance with benefits to the individual. When it was charged to the public at large, it was done on the theory of general social good, while when charges were made
against individuals, it was upon the theory of benefits accruing directly to them. Examples in which all of the costs of an improvement have been charged against the body politic as a whole can be found in those interurban highways which were constructed before the advent of the automobile, waterworks systems, fire-fighting equipment, general school systems, and the like. Examples of those which have been charged to individuals on the theory of large benefits are to be found in the paving of the streets and alleys in our cities, and the construction of lateral sewers and drainage systems.

Upon the advent of the automobile, the policy of charging for the improvement of certain highways which were primarily for automobile travel and of having these paid for by a tax against motor-car owners, was inaugurated. This has been carried forward until today, in a very large degree, the cost and maintenance of state trunk-line systems are paid for through taxes against automotive vehicles. This is also partially true for county highway systems, and, in a less degree, is true in regard to township roads. In some measure automotive vehicle taxes have been used for the construction and maintenance of streets within the corporate limits of cities, villages, and towns.

At this time there is considerable confusion as to the policy which should be adopted with reference to this subject: one school of thought maintaining that all highway costs, both construction and maintenance, should be charged to the automotive vehicle, while another school maintains that a certain portion should be charged against others or the public at large. In this discussion we will endeavor to follow the theory that the automotive vehicle should be required to pay in accordance with the benefits which are received, which benefits will be measured by the annual costs.

**ANNUAL COSTS**

Annual costs as interpreted in private enterprises include:

1. Operating expenses.
2. Taxes.
3. Proper depreciation charges.
4. Return on the investment.

In case of a public improvement such as the highways of the state, the annual cost would include:

1. Operating expenses, being costs of normal repairs and maintenance and keeping the highway in a safe operating condition.
2. A proper depreciation charge, being only sufficient to replace the various items of the highway as they are worn out.
3. Return on the investment, being interest on the investment at the rate which the state normally pays for money borrowed.

There is no cost to the state in the way of taxes on the properties of this character; therefore taxes do not enter into the annual costs to be distributed to the beneficiaries who use the property.

When the cost of highways has been obtained from automotive vehicle taxes in advance of construction, these annual costs would have to be modified so as to give effect to this fact. Other variations in this matter should be recognized likewise.

We will, however, assume that the total of the above annual costs will be assessed against all beneficiaries, not exclusively against automotive vehicle owners.

THE BENEFICIARIES

Our first inquiry, therefore, will be as to who are the beneficiaries of our various types of highways. Turning our attention to the state trunk-line systems which, as a rule, are of the highest type of improvement and which have come about largely through demands of automotive vehicle owners, we find that these people are not the only beneficiaries of this improvement. In addition to automotive vehicle owners we find that public utilities, such as telegraph companies, telephone companies, and pipe line companies (oil, gas, and water) are using the highway for right-of-way purposes, and that the adjoining and adjacent lands for some distance back from these highways receive some special benefits therefrom. There is also a considerable benefit to the urban centers which are connected by these arteries of communication. As a rule the public utility corporations do not pay any fee or rental for the use of these state highways as a right-of-way; however, on the theory of benefits, the automotive vehicle cannot be asked to carry this charge, and if free right-of-way is furnished public utilities or others, it should be charged against the state at large. The general benefits which arise to the urban centers by their being connected by these arterial highways is one which should not be charged to the automotive vehicle owner; neither should the benefits accruing to adjacent or adjoining land, but they should likewise be charged to the beneficiaries thereof or to the general public. The proportion of the annual cost of state highway systems which should be paid for by the automotive vehicle owners has been estimated by students of the subject as ranging from 75 per cent to 85 per cent of the total, and the studies which we have given this subject lead us to conclude that the 85 per cent is the maximum which should be charged against the automobile.
When we come to the county road systems, improvement of which is much less than the state highway systems, we find that the benefits accruing to the automotive vehicle are much less than in the case of state highways. Many of the automotive vehicles seldom or never use these county roads. They are primarily used by the owners of adjoining and adjacent lands, by public utilities for right-of-way, and for the furnishing of communication between small neighborhood groups and the larger urban centers. Such studies as have been made indicate that the charge to automotive vehicle owners should approximate 33 per cent of the total annual cost, a conclusion with which we concur.

When we consider township roads, here we find that the automotive vehicle owner has little or no interest in their improvement and receives little or no benefit therefrom. A large majority of the automotive vehicles in the country never make any use of these roads whatever. Their improvement is primarily for the benefit of the adjoining and adjacent land owners and can properly be considered largely a land-service facility. In the degree that these roads are used for right-of-way by public utilities, a charge should be made on the basis of benefits, or this part of the annual cost should be borne by the state at large. The amount of this annual cost which has been thought as a proper charge against automotive vehicles has ranged from 15 per cent to 35 per cent, and it seems to us that the former rather than the latter figure is more nearly correct.

When we come to consider the highways and streets within the cities, villages, and towns, we encounter a somewhat similar condition to that which pertains to interurban roads. While it is true that the construction and improvement of these streets has largely been borne by adjacent property owners or the municipality at large, the annual cost of those streets which are now a part of the state trunk-line system should be prorated on the same basis as the state trunk lines. The secondary streets within the municipalities, where they are part of a county highway system, might be treated as such; while for the remaining streets which are little more than land-service facilities, the annual costs should be charged against the adjoining and adjacent properties. It has been estimated that the percentage of the average annual cost of streets and alleys in urban centers chargeable to automotive vehicle owners should approximate 25 per cent, and from the studies we have made it appears to us that this is reasonable. The above annual costs to automotive vehicles are predicated upon the theory that the design, plan, construction, and maintenance of highways will be of a high standard of efficiency and economy. Where this high standard of efficiency and economy is not exercised or where the building of roads and
structures is motivated by local pride, or for any other reason, then, of course, the annual charge to the automotive vehicle as applied to any such work should be reduced.

DISTRIBUTION OF COSTS

Having determined the annual amounts which should be charged to automotive vehicles as a group, we are faced with the task of distributing this to the individual vehicles on the basis of benefits. When we consider the service which the highway renders the automotive vehicle, with the benefits enjoyed, we find that it is a composite of all the services rendered by the various elements which constitute the highway, and that the services and benefits which these elements render are not uniform in character and amount. The highway sign is of the same benefit and service to the driver whether he be driving a small or a large private passenger car, a motor bus, a truck, or a truck train, and whether he be riding for pleasure or on a business trip, or operating as a common, contract, or private carrier. The service rendered and the benefits received from a rigid concrete paved surface are much greater to one of the heavily loaded truck trains than to a light passenger vehicle.

Again it can be said that the highway renders a greater service to a longer vehicle than to the short, and to the wide than to the narrow; however, this variation of space occupied compared with the total area of the highway is of very little significance. It also renders a service in proportion to the distance used. If one wishes to be meticulous in his analysis of the services and benefits, attention can be called to the fact that the highway so designed as to permit safe travel at high speeds, for those vehicles which are capable of using the highway in this manner, is more valuable and furnishes greater service to this type of vehicle than to the slow-moving vehicle which has no need for a road of such design. It is equally true that when a vehicle, because it is slow moving, occupies much longer time in passing over the highway, it would seem not improper to reason that a greater service is furnished and payment should be made therefor.

To the tourist and others who use the highway for recreation and pleasure, a location which would provide pleasing landscapes and vistas is of value, as is also roadside landscaping and planting; however, these are of little service or benefit to the person using a commercial vehicle.

We could even go a step further and properly reason that when a vehicle or its load is a greater hazard on the highway than some other vehicle with its load, the services rendered are more and therefore an additional charge should be made therefor. If one wished, the analysis might be carried to a further refinement.
Meticulous analyses in the most minute detail are of great importance in the academic study of any subject so that one may be fully informed thereon. In the practical application of this knowledge, it is frequently desirable that the adopted practices be as simple as possible. In determining a measure of benefits to the automotive vehicle, it would appear sufficient if two were adopted, one being the benefits on the basis of individual vehicles, the total benefits for the year being vehicle miles, the other on the basis of gross weight, the total benefits for the year being the ton miles. This latter, however, would have to be modified to compensate for the effect of concentrated wheel loads upon the pavement.

CLASSIFICATION OF CHARGES

Having adopted the vehicle mile and the ton mile as the measures for determining the service rendered by the various elements of the highway, we can make a classification of these elements according to the above. Under the subdivision of vehicle miles are the following elements: land, fences, signs, signaling, clearing and grubbing, ditching and side drainage, excavation and embankment of roadbed, landscaping, snow fences, bridges and culverts, parts of bridges including foundation and excavation for foundations where the floor system is not a part of the paved surface, surfaces of earth roads, surfaces of gravel roads, and all other flexible pavements, condemnation proceedings for land, compensation insurance, engineering, and administration as applied to the above.

Those elements the annual cost of which should be charged out on the basis of ton miles are probably concrete paving surfaces and all other rigid and semi-rigid surfaces, super-structures of bridges including floor systems where they are a part of the paving surface, preparation of subgrade immediately under rigid and semi-rigid paving surfaces, compensation insurance, engineering, and administration as applied to the above.

Having determined to what degree motor vehicles are beneficiaries in the use of the various types of highways, and with information as to the annual costs, for much of which there is now a record—and when a record is not available reasonable estimates can be made—it is possible to determine the benefit which each individual vehicle receives from the use of the various highways and streets. It is not a proper subject of this paper to go into the details of this determination; however, it is apropos to say that in Michigan this detailed study has been carried out, which shows the benefit each type of vehicle receives from the use of the highways and streets, and the annual amount of fees and taxes which each vehicle should pay.
Speaking directly to the subject of this paper, "Who Should Pay for the Highways?" we find only one answer—that is, those who benefit from the use thereof. This answer is practicable of application in that today we are able to determine, with a reasonable accuracy, the amount of benefit which does accrue to each of the beneficiaries, even to the extent of determining a proper charge which should be made against each class of automotive vehicle.

CO-OPERATION BETWEEN CITY, COUNTY, AND STATE ROAD DEPARTMENTS

John W. Wheeler, Commissioner, Indiana State Highway Commission

The wording of this subject has caused me to consider carefully exactly what is wanted. If it is to be a discussion on merely co-operation of ideas and technical assistance, the paper would naturally be very short because I would only have to recall to you the statement of Governor McNutt at the annual banquet of the Purdue Road School two years ago when he said, "County and city highway officials may feel free at any time to ask the counsel of the State Highway Department on any problems that they may have, and assistance will be given when it is asked." I could announce this same offer again today and let it stand without speaking further on the subject. However, I imagine that what was really meant was more than helpful co-operation, perhaps some physical co-operation.

I might report that in the three years I have been on the State Highway Commission, some counties, some cities, and quite a few towns or villages have availed themselves of assistance from the State Highway Commission in the way of specifications, testing, engineering reports, and opinions. For the testing, of course, we have had to charge the actual costs. Reports and opinions have been made in many cases and no charge presented. This we are willing to continue and the invitation is still open.

My views on this matter of "co-operation" must be accepted as only personal. I am connected with two organizations making studies along this line, but in neither case have we progressed to the point where we are willing to give out a report. Careful scrutiny of the data which we are now collecting may cause me to change my present opinions.

STATE IMPROVEMENT OF STREETS

Let's start with the city before the first federal grant of relief money in 1934. No city streets had ever been built in Indiana except by assessment against abutting property