

of the highway funds as soon as primary rural roads reach an advanced stage of completion. City work should first be concentrated in extensions of state primary highways so as to give continuity of good surface through all towns. When this need has been met, other heavily-traveled and generally-used streets should not be dissipated on a hit-or-miss city street program, but should be used logically on thoroughfares of general motor use.

Adequate consideration of primary roads and city streets should not overshadow the great importance of secondary or "farm-to-market roads." The development of this highway system will mean lower transportation cost, lower food prices, lower taxes, and a more well-knit social and economic structure. On such roads, the type of improvement should be in accord with traffic needs. Stage construction may well be used and so planned that each stage of improvement will permit additional development without economic loss.

In order to plan these road programs of the future with intelligence, fundamental traffic and economic facts must be had. This emphasizes the importance of searching tax studies and commonsense traffic surveys, interpreted by experienced highway administrators for the guidance of legislative bodies.

Highway research must be continued, and encouraged. Much notable work has already been done. From extensive researches, such as the Illinois Bates road test, have been developed the modern principles of paved road design and construction. The same searching study should be made of the problem of producing scientifically at least cost of service road surfaces suitable for secondary road development.

The foregoing statements represent the writer's view of some of our future highway problems and answer in a limited way the question, "Where do we go from here?" But the inescapable fact remains that we are going nowhere in highway development unless we win the battle already raging and prevent further diversion of highway funds.

## A CRITICAL ANALYSIS OF OUR HIGHWAY FINANCING METHODS

By Roger L. Morrison, Professor of Highway Engineering  
and Highway Transport, University of Michigan

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For at least fifteen years, our main highway problem was to build roads fast enough to take care of the ever-increasing traffic. Administrative and construction methods have improved steadily, and billions of dollars have been contributed by owners of real estate and motor vehicles. While few high-

way departments have had all the money they needed, most of them have been fairly well supplied.

But suddenly we have been struck by a storm, and the funds are slipping. The revenue from both property taxes and motor vehicle taxes has decreased. Taxes are being paid with difficulty and the demand for relief from the burdens of taxation is becoming more insistent. The various units of government are fighting over the share of motor taxes each shall get for its roads or streets; and in the meantime the legislatures of many states, hard pressed between demands for reduced taxes on the one hand and for increased appropriations because of unemployment on the other hand, are looking toward the highway funds as a means of salvation and are diverting these funds more and more to other purposes. This, fortunately, has not been yet done in Indiana.

A critical analysis is rather difficult to make in the midst of all this turmoil, but it was never more sorely needed than at present. If highway progress is to continue, our financing methods must be carefully considered for possible improvements, and our expenditures must be economically justified and so made as to give the greatest returns to those who furnish the money. Finally, the public must be informed as to the nature and extent of the returns they receive.

At least one of our present difficulties is the word "tax." Not without reason, it has become probably the most hated word in the English language. In fact, we have become almost hysterical about it. For instance, not long ago a prominent metropolitan newspaper stated that the average man works 200 days a year for his family and 100 days to pay his taxes. If that is true, then the thing to do is to abolish all taxes immediately and let the man work 300 days for his family, if he has a job!

But a critical analysis shows that this statement is hardly true. The man is actually working just as much for his family while he is earning the money to pay for his children's school as when he is getting money for their clothes. His share of the cost of the city fire department is in exactly the same class as his fire insurance premiums, and he is spending money for the family no more when he is buying gas or tires for the car than when he is buying a road to drive it on.

We can get nowhere in the solution of the problems of highway finance until we recover from the illusion that a tax is something extorted from us by a spendthrift government, and gone forever, as far as we are concerned. It is certainly true that a good deal of our tax money is wasted, and I doubt if any one would claim that absolutely no road funds are wasted; but whenever that may be the case, the thing to do is to concentrate the attack upon the waste, and not start firing in all directions simply because the money with which we purchase roads is labeled "taxes."

## HIGHWAY IMPROVEMENTS AS INVESTMENTS

Highway improvements should be, and practically all of them are, investments which pay good dividends. Investigators have found that it costs about one cent a mile less to drive a car over a gravel road than over an earth road, and about one cent a mile less over a smooth pavement than over a gravel road.

It is comparatively easy to determine the annual cost of a gravel road or a pavement, and the annual savings to be obtained by improving a given road can be found by determining the average number of vehicle-miles which are traveled over it in a year, then multiplying that figure by the vehicle-mile savings of the type of improvement under consideration. If the estimated annual savings are less than the annual cost of the improvement, then it would usually be a mistake to make it. If they are greater than the cost, then it would be more expensive not to build than to build. By applying this test, we can be assured that we are building only roads which are sound investments.

For example, suppose we have an earth road which costs \$200 a year for maintenance. Assume that to improve the alignment and grades and build a gravel road will cost \$6,000 a mile for grading and drainage and \$4,000 a mile for surfacing, or a total of \$10,000 a mile. I do not know how these figures compare with present prices in Indiana, but they will serve to illustrate the method.

If a gravel road is properly maintained and lost gravel is replaced from time to time as a maintenance operation, there will be no definite limit to the life of the road; but we will say that conditions will probably require a pavement in 10 years. At the end of that time, the gravel surface will be destroyed in the paving operation, but the grading will still have a value of, say, \$5,000. The annual depreciation, then, of the surface and part of the grading will be \$500 a year during the ten-year period.

Unless money is worth as much invested in a road as it would cost us to borrow the money, then the road is hardly worth building. Our investment the first year is worth \$10,000 and at the end of ten years it is worth \$5,000, so that its average amount during that time is \$7,500, and 5 per cent interest on that sum is \$375 a year. If maintenance costs \$500 a year, the total annual cost of the gravel road will be \$500 plus \$375 plus \$500 or \$1,375. Since the earth road costs \$200 a year, the net increased cost of the gravel road is \$1,175 a year.

Now, if each vehicle-mile costs 1 cent less on the gravel road than on the earth road, in one year, or 365 days, each daily vehicle will save \$3.65 in gas, tires, etc., on the gravel road. Since the gravel road costs \$1,175 a year, we must have a traffic of 322 vehicles per day to break even.

If the actual traffic is 422 vehicles a day, we will have a net profit of  $100 \times \$3.65$ , or \$365 a year, due to the new road; but if the traffic is only 222 vehicles a day, there will be a loss of \$365 a year, and the construction can not be justified from the standpoint of savings in vehicle operating costs. Perhaps other considerations will make it desirable to build the road, but in that case, I do not see why the motorists should be required to pay for it. To my mind, those who profit in other ways than by decreased vehicle operating costs should assume the burden.

Of course, there are other types of savings involved in certain projects, such as savings in distance, or savings in time, as in the case of by-pass highways, or it may be a saving of lives, limbs, and damages where safety is primarily involved. For distance or time reductions, the annual savings can be at least approximately estimated and compared with the annual cost of the improvements.

I believe that the first change from our present methods should be the analysis of all highway projects from a cost vs. savings standpoint, and the comparative analysis of different projects to see which ones will give the largest returns. In this way only can a sound improvement program be formed, and one which the public will support when they understand it. The day is probably passing when we can get billions just by hurrahing for good roads.

#### DIVIDING THE FUNDS

Our principal source of highway funds at present is the motor vehicle, and one of our main problems in this connection is how these funds should be divided. It does not seem unreasonable to begin with the premise that they should be so spent that the motorists will receive the largest possible returns for their money.

Let us first consider only rural roads, omitting city streets. According to the last annual report of the secretary of the American Association of State Highway Officials, the average state highway system includes 14 per cent of the total road mileage. Five years ago, the average was 10 per cent.

The reports of six state transportation surveys have been printed which show the percentage of roads included in the state highway systems studied and the percentage of the traffic using these roads. At the time the surveys were made, the six states had an average of 10.5 per cent of the total mileage in the state systems and an average of 62.5 per cent of the total traffic used these roads.

Offhand, it would seem as if the state highway department should be given a portion of the motor vehicle taxes equal to that portion of the total traffic which uses the state highways. However, there are several factors which make it difficult to

determine just what is a fair and reasonable division of funds. For instance, the amount and distribution of property taxes for roads is important, and questions as to relative needs can be answered only by means of a complete highway transportation survey.

In some states, there is much discussion of the allotment of state motor vehicle taxes to cities, and in that connection the fact that traffic on state highways is predominantly city traffic is apt to be overlooked. As an example, in your neighboring state of Ohio, it was found that 87.6 per cent of the passenger cars and 84.5 per cent of the trucks using the state highways were city-owned, and I believe that is more or less typical of other states. There is so much which can be said on both sides of the subject of motor tax allotments to cities that a discussion can not be attempted in this paper.

As a second improvement over present methods, I would suggest, then, that in allotting motor taxes, the primary consideration should be the greatest return to the motorist who furnishes the money, rather than the desire of various units for relief from other forms of taxation. That should materially aid the process which has been referred to as "getting the most feathers with the least squawk."

#### HOW MUCH SHOULD THE MOTOR VEHICLE PAY?

And that brings us to the question of the division of highway costs between real estate and the motor vehicle. Forty years ago the roads were used by horse-drawn vehicles and were built mainly by means of statute labor and property taxes. Soon after the motor car came upon the scene, it was forced to contribute something to the cost of the highways. Finally, the horse and statute labor both practically disappeared and the motor vehicle took over entirely the use of the roads. It also took over a large share of their cost and the question now is whether or not it should pay all the cost of all the roads.

One solution of the problem would be to divide the motor vehicle funds according to the best interests of those who pay them and then, if that does not furnish enough money for local roads, raise the difference by property taxes. If no road is improved beyond the point where the annual cost will be less than the annual saving in vehicle operation, then it is hard to see why the users should not pay the cost. However, there may be so many roads needing justifiable improvements that automobile funds can not take care of them all within a reasonable time.

#### OBJECTION TO MOTOR TAXES

As long as all motor taxes were spent upon the highways, there was little real objection to the taxes, as most people

realized that they were getting back more than they paid, but with the diversion of funds, in many states, the resistance to the taxes is rapidly increasing. Unfortunately, very few of the objectors make any differentiation whatever between the payments for roads which are returned to them in savings in the cost of operation, and those which are really taxes for general government purposes.

For instance, they point with horror to the ratio between the total amount of the taxes and the market value of the car, or to the gasoline tax in comparison to the price of gasoline, with never a word as to the dividends they get from improved roads.

As a matter of fact, if the car is worth only \$15 and the taxes are \$30 a year, it does not mean a thing in the world, provided the annual operating costs are decreased more than the amount of the tax. Three thousand miles of driving over gravel roads instead of earth roads, for example, will give the motorist back his \$30, and another 3,000 miles will give him 100 per cent net profit. What has the value of the car, or the price of the gasoline, got to do with that? Nothing, *as long as all the money is spent on roads* and as long as the operating savings in each case exceed the costs.

#### GAS TAX DIVERSION

The gas tax is an ideal method of raising highway funds. The owner pays by the mile for his use of the roads. The heavier his car, or the faster he drives, the more damage he does, at least to some types of surfaces, but heavy cars and fast driving use more gasoline and hence automatically increase the tax.

However, it is difficult to see how a gas tax has any element of fairness as a general revenue measure, except possibly as part of a general sales tax. Gasoline consumption is a good measure of road use and road damage, but is by no means a measure of ability to pay for the ordinary costs of government. For instance, why should a salesman making, say, \$2,000 a year, and driving 25,000 miles a year to do it, contribute five times as much to the general fund as a man making \$20,000 a year but driving only 5,000 miles annually? I have never heard anyone attempt to defend a gasoline tax for general purposes upon any basis except that in the past it has been easy to get. Apparently, no one has claimed that it is fair.

It is this diversion of motor vehicle funds that is preventing the construction of many money-saving roads and arousing an unreasoning opposition to motor taxes in general. This, of course, does not apply to this state at the present time.

## BOND ISSUES

Any general discussion of highway financing must include some mention of bond issues.

In recent years, there has been a very general feeling that there is considerable virtue in a "pay-as-you-go policy" and that during times of serious business depression a burden of debt is a handicap to a state or county the same as it is to an individual.

Also, many costly blunders have been made in connection with highway bond issues in the past. For instance, many counties have bonded themselves to the limit for gravel or macadam roads and then made no provision whatever for maintenance. As a result, the roads were full of holes in a few years and had to be rebuilt, although the bonds remained painfully present. Frequently, the roads were built without the services of a qualified engineer and much of the money was wasted during construction. Many of these roads were built for the horse and proved to be entirely inadequate for the automobile.

Once, as a small boy, I ate two or three times as much strawberry shortcake as any boy could assimilate at one sitting, and the result was disastrous. For at least ten years, I could hardly sit at a table where there was shortcake. I hated it with a bitter hatred. Now, that shortcake was good, wholesome food—the only trouble was my misuse of it; and I am wondering if a good part of our suspicion and dislike of highway bonds is not due primarily to the misuse of such bonds, or to the idea that interest charges are included in the price of the roads.

Does anyone consider that the interest on a real estate mortgage is part of the price of a house? Of course not. It is part of the annual cost of *using* the house, and the same is true of a road.

As Professor Agg points out, a "pay-as-you-go" policy is really a "pay-before-you-go" policy, because you pay this year and have to go for perhaps 20 years before you collect all your dividends.

Let us assume that it is proposed to build 10 miles of pavement at a cost of \$25,000 per mile and that the net saving in vehicle operating costs will be \$1,000 per mile per year. Let us further assume that the funds available for construction amount to \$25,000 per year.

Under a "pay-as-you-go" policy, only one mile can be built each year, so that the first year the saving will be \$1,000; the second year, with two miles built, it will be \$2,000; the third year, \$3,000, etc. At the end of the tenth year the total savings will have been \$55,000.

Now assume that 20-year serial bonds are issued for \$250,000 and the whole 10 miles is built at once. The savings then

will be \$10,000 a year and the total savings at the end of the tenth year will have been \$100,000 instead of \$55,000, as under the "pay-as-you-go" plan. The \$25,000 per year available funds will be ample to pay the interest and retire the bonds.

I do not, by any means, recommend indiscriminate bond issues, but I wish to call attention to the fact that, when properly used, this is a sound financial policy. It is adopted by the majority of our largest and most successful corporations and there are doubtless many cases where it can be used to advantage in connection with highway construction.

Another point to which I should like to call attention in the general matter of highway finance is the fact that if the people of the United States pay out, say \$1,000,000,000, in a year for roads it does not mean that the "annual" highway cost for that year is \$1,000,000,000. The annual cost is the sum of one year's depreciation, plus interest and maintenance costs for all the roads in the country, and the rest is a capital expenditure to be enjoyed in future years.

#### CONCLUSIONS

To summarize, I may say that, in my opinion, all highway projects should be analyzed as to costs and savings to be sure that they are economically justified. I may add that in most cases the annual savings far exceed the annual costs.

Motor vehicle taxes should be so divided among the state, counties, and the cities that the motorists will receive the greatest benefits for what they pay.

If the motor taxes, when so divided, do not furnish enough funds for local roads, I can see no fair and just way to make up the difference except by taxation of local property.

#### AN INTERPRETATION OF THE NEW INDIANA ROAD LAWS

By W. M. Holland, Executive Secretary, Indiana Highway  
Constructors, Inc., Indianapolis, Indiana

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The subject assigned me has been construed to cover the measures enacted at the special session of the 77th General Assembly, begun on the 7th day of July, 1932. I shall endeavor to interpret these laws in their order of importance to this assembly.

#### DIVERSION OF MOTOR VEHICLE REVENUE

The laws which divert motor vehicle revenues from the state highway commission to the counties, cities, and towns of Indiana are certainly of the highest order of importance and