

HIGHWAY FINANCE AND THE CONSUMER

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The inadequacy of much of our principal highway mileage, in both rural and urban areas, has long been apparent in the record of accidents and congestion, and in the inconveniences which have become typical of motor vehicle transportation. Despite the expenditure since 1921 of more than 30 billions of dollars for highway construction, and a total expenditure of 50 billion dollars, much of our most heavily traveled road and street mileage is incapable of providing safe and efficient transportation. Many of these roads conform in their basic design to the early roads laid out long before the advent of motorized transportation. The successive improvements and enlargement of these basic facilities have failed to alter many of the conditions which long ago rendered them obsolete.

THE FUTURE HIGHWAY BILL

During the war, the urgent need for more highway capacity so apparent during the years immediately preceding hostilities was largely forgotten. Today, however, with a record 37 million motor vehicles in operation, and traffic levels higher than at any previous period, the inadequacies of our highway system have once again become a subject of widespread concern. According to the American Association of State Highway Officials, expenditures aggregating 30 billion dollars are necessary during the next 10 years to rehabilitate a million miles of roads which, it is claimed, are in such a state of deterioration that

they offer a constant menace to drivers.

How much the highway bill would amount to if the goal of a satisfactory standard of service were to be sought can be gleaned from the numerous plans for modern facilities which were formulated during the war. On the Interregional Highway System, for example, it was estimated that on over half the rural sections the cost, in 1941 dollars, would be from \$100,000 to \$700,000 per mi., while the required outlay in cities would run from \$700,000 to \$1,250,000 per mi., exclusive of land. A one-mile expressway proposed for Chicago was estimated to call for \$4,000,000 per mi. at pre-war prices, and 10 mi. of highway through the heart of Baltimore would cost \$10,000,000.

Today these and all other prewar estimates are completely out of date. One reason is the sharp increase in prices which has continued through 1946 and 1947. The index of construction cost for a standard mile of highway rose from 82 in 1941 to 123 in 1946. But beyond this fact, the volume of postwar traffic has already exceeded all previous highs, and with the demand for automobiles still seemingly limitless, it is possible that new record volumes of traffic will be established for many months to come.

Under these circumstances, where are the funds to be obtained to achieve the standard of highway service required for safe and efficient highway transportation? It is true that the more traffic, the more user tax revenues, but it is also true that the greater the vol-

ume of traffic, the more fabulous the sums of money required to provide adequate accommodations. Moreover, it should be noted that unlike the trend in most prices, the amounts charged the consumer for his use of the highways have for the most part remained fairly stationary. In only eight states during 1947 have tax rates been increased; in 40 states the rate of payment for highways, in the form of gasoline taxes and registration fees, remains substantially unchanged from the prewar level. This has been made possible in part by the ample cash balance in state highway accounts as a result of deferred wartime construction, in part by the generous authorizations of Federal funds under the 1944 Federal-Aid Act, and in part by reason of the slow start of the construction program, due to shortages of men and materials.

WHERE THE CONSUMER'S DOLLAR GOES

Only a part of the total funds made available for highway purposes is available to build new main highways of adequate design. In 1946, approximately 2/3 of highway-user revenues were left to the state highway departments after aid had been distributed for local roads and to non-highway purposes. Of the money comprising the state highway share, 56 cents of every dollar was absorbed by the expenses of maintaining the existing system, paying debt service on roads already built, and defraying the cost of administration. And of the total spent for construction and maintenance, only 4 percent found its way to urban streets where the most urgent bottlenecks and the highest costs were to be found.

The objective of raising the standards of our roads and streets, therefore, together with maintaining existing facilities, presents a formidable financial undertaking at

a time when the highway dollar goes only a fraction as far as it used to. Can the consumer afford to pay the necessary additional sums to obtain the highways he needs? Over the past two decades he has been contributing an increasingly larger share of the total money available for highways. In 1921 he paid only 12 percent of the bill. By 1941 he was paying 51 percent. There is no apparent reason to conclude that this trend will not continue, so that the question is whether the consumer in the future must not only pay a higher percentage of the total highway bill, but a higher percentage of an increasing total bill.

FINANCIAL CAPACITY OF THE CONSUMER

The relation of individual incomes to automobile ownership and use provides ample demonstration of the financial capacity of the consumers of automobile transportation service. In 1941, for example, only 12 percent of families with less than \$500 cash income owned automobiles, but 94 percent of those with \$10,000 a year and over owned cars. Half of the families in the lowest income class who were car owners could not afford to drive as much as 3,000 mi. per yr.; and even in the income class from \$1,000 to \$1,500, 30 percent of car-owning families restricted their travel to less than 3,000 mi. annually. In the upper income groups, however, there was none who drove under 3,000 mi. during the course of the year; 94 percent of these motorists drove over 10,000 mi. per yr.

Further evidence of the financial position of many automobile owners before the war is indicated by the direct relationship between individual incomes and the amounts spent for car ownership and operation. In the period 1935-36, motorists having incomes under \$1,000 per yr. spent only \$40 to \$60 a

year for car operation. Persons with incomes ranging from \$5,000 to \$10,000 spent an average of five times as much for this purpose.

The proportion of automobile owners who are extremely sensitive to the cost of automobile transportation accounts for a major part of total automobile transportation expenditures. Specifically, in 1935-36, 27 percent of all such expenditures were made by motorists with incomes up to \$1,500 a year. And 59 percent of all expenditures were accounted for by persons with incomes of \$2,500 and under. It is true that the present distribution of income differs substantially from that of the prewar decade; that there has been an extensive shift from low-income brackets to the middle-income classes. Under existing tax policies and price levels, however, it is to be doubted that a major proportion of car owners are better able to afford car ownership and operation now than they were before the war.

CONSUMER PAYS FOR HIGHWAYS

The "average" motorist before the war operated his automobile at a cost of 4 cents a mile. Of this amount, 0.4 of 1 cent represented his payment for highways. In absolute amounts, this charge totaled \$35, of which \$10 was the registration fee and \$25 the state tax on gasoline. In other words, approximately one-tenth of the cost of automobile transportation represented highway cost and nine-tenths was the cost of the vehicle, its upkeep and repair, tires, gasoline, oil, insurance, and miscellaneous items.

An "average" motorist, of course, is hard to find, and costs in reality differ widely among motorists. This follows from the wide range in prices paid for automobiles, the varying performance characteristics

of different vehicles, and the differing conditions under which automobiles are operated. In addition to variations in cost per year or cost per mile, consumer payments for highways likewise vary among the states. Registration fees for passenger cars range from approximately \$3 to \$19, and state gasoline tax rates from 2 cents to 7 cents a gal. Thus, for 10,000 mi. of highway use, the motorist in Florida pays \$58, but in Missouri he pays only \$23.

These variations are important because they signify the different impacts of highway tax payments on the motorists in different states and in different income classes in the same state. For the so-called "average" motorist who pays 4 cents a mile for automobile transportation, highway tax payments may range from 6 to 16 percent of the total cost of owning and operating an automobile, depending on the particular state. Similarly, a motorist in the lowest income brackets, who holds his costs down by driving an old car sparingly, may find the proportion of his total outlay which represents highway taxes may be very substantial.

As a specific example, suppose that a motorist in Idaho before the war drove 4,000 mi. a year at 2 cents a mi., excluding highway taxes. He was able to drive at this low cost by purchasing an old car, doing most of the repair work himself, and avoiding such charges as insurance and garage. Total cost per year would be \$80, plus taxes. In Idaho a flat fee of \$5 is charged to register the vehicle, and the tax on gasoline is at the rate of 6 cents per gal. Total tax payments for 4,000 mi. of travel would be in the neighborhood of \$21. Operating costs, including taxes, would be \$101, and taxes would comprise over 20 percent of this total.

WHAT CAN THE CONSUMER AFFORD?

When the situation of the "average" motorist is examined, the fact that only one cent out of every 10 cents paid for automobile transportation goes for highways raises the question as to whether or not this is a reasonable division of emphasis. To state the case in terms of total expenditures for automobile transportation, it is estimated that in 1946 approximately 11 billion dollars were spent for automobile purchases, gasoline, and other operating items, exclusive of taxes. The additional sum of approximately one billion dollars was paid by passenger car owners for the use of the highways. This picture of 1946 expenditures similarly raises the question of whether, in view of the inadequacy of our highways, it is reasonable to spend 11 billions for automobiles and the products required to make them go, but only one billion dollars for the 1½ million mi. of surfaced roads on which safe and efficient operation depends. If the facilities necessary for highway transportation were all supplied by one agency, as in the case of railroad transportation, it is doubtful that over 90 percent of all funds spent for this purpose would be allocated to vehicles and their operation, and the remaining small percentage used for highways. Certainly the railroads would not devote such exclusive attention to rolling stock if it were apparent that roadbed and rail capacity were wholly inadequate to permit safe and efficient transportation.

The need for greater emphasis on highways seems to be a logical conclusion in view of the tremendous new construction requirements which are so obvious today. But when we consider the size to which the total highway transportation bill has already grown, and when we examine the financial position of the large

majority of consumers, it is necessary to ask how large a segment of our national income can be devoted to this purpose, and how long it will be possible for low-income motorists to absorb the increasing cost of automobile transportation. For, while the cost of food and other necessities of life have risen even further than the elements entering into transportation costs, the fact is that the consumer must eat before he rides, and the more required for food, clothing, and housing, the less may be available for automobiles.

Certainly the goal should be to reduce the cost of automobile transportation, at the same time improving the standard of service. If the evidence appears to support an increase in the amount of highway expenditures, such an increase should be justified in terms of its effectiveness in reducing total transportation costs. The question, in other words, is whether we can increase highway expenditures without moving farther and farther away from the objective of achieving low-cost transportation.

USING WHAT WE HAVE

It is apparent that the need for better highways and streets does not necessarily mean a greater expenditure of public funds. Certainly a first step toward attaining higher standards of highway service is to use existing facilities as effectively as possible, and to apply existing funds as productively as possible. That neither of these goals has been attained is obvious; and the potential improvement of the traffic situation which lies in traffic engineering and in sound financial management is undoubtedly tremendous. The widespread adoption of one-way streets, the provision of off-street parking, and the sensible development of public transit would be equivalent to many millions

of dollars of new street capacity. And the allocation of motor vehicle tax revenues on the basis of highway use and need, together with a judicious programming of expenditures, would mean the equivalent of new tax dollars.

There is no need to dwell on these possibilities. Their potentials are known, as is also the resistance to their adoption. It is sufficient here to note that a plea for greater amounts of money for highway loses much of its urgency as long as the existing road system is poorly utilized and existing funds ineffectively spent.

ECONOMICS OF GOOD ROADS

A factor which requires emphasis at this point is the effect which the provision of adequate highways may have on automobile operating costs, and the possibility that the construction of a costly highway may actually reduce rather than increase the cost of transportation. There are many examples of how the cost of vehicle operation is lowered by means of raising the quality of the highway. The principle is demonstrated by prewar data comparing a trip on the old Boston Post Road in Connecticut with driving over the limited-access Merritt Parkway, a four-lane divided road running parallel to the Post Road. Between two cities connected by these roads the distance is 55 mi. by the Parkway and 53 mi. by the Post Road. The trip by the Parkway can be made at an average speed of 52 mi. per hr., consuming no more gasoline than is required to make the trip on the old highway traveling at an average of 25 mi. per hr. The driver who uses the Parkway makes the trip safely and in comfort, and saves 40 min. This is possible because the cost of driving at a uniformly high speed is less than the cost of numerous stops and starts, and sporadic bursts of speed. The

driver using the old highway encounters 116 traffic lights on a 48-mi. section, which cause an average of 41 stops per trip, or nearly one every mile.

A similar illustration of the lower operating costs on superior roads is supplied by the comparison between a 92-mi. section of the German motor road system and a roughly parallel state road 101 mi. long which connect the same cities. The state road at the time of these tests was in good condition, and well-constructed for long-distance trips, but the route passed through three large towns and 32 other localities, and along the route there were 219 crossroads and 744 branch roads. Trial runs at speeds as high as feasible were made on each of these routes, which revealed that the trip could be made at an average speed of 44 mi. per hr. on the ordinary road and at 74 mi. per hr. on the superhighway. From these tests it was demonstrated not only that the trip by superhighway saved more than one hr. on a trip of little over 100 mi.; in addition, the wear on both car and driver was found to be much less for the high-speed trip. Instruments were installed to record the number of times the speed changed more than 6½ mph., and how many times the circumference of the steering wheel was turned more than 2.3 in. Results showed that there were 440 speed changes during the trip on the ordinary road, and that manipulations of the steering wheel were in the ratio of 570 on the ordinary road to one on the motor road. The brakes were used 491 times on the ordinary road and three times on the motor road.

A second test was then run on both roads at the average speed of 44 mi. per hr., which had been found possible on the ordinary road. Because the motor road was free from obstructions, this average was nearly a uniform speed. The most

surprising saving was in gasoline consumption. On the ordinary road the car traveled 14 mi. per gal., while on the motor road it traveled 22 mi. per gal. The fast trip on the motor road, at 74 mi. per hr., was accomplished with mileage per gal. of fuel over half again as great as on the slow trip on the ordinary road.

Evidence has been collected of similar gasoline savings realized daily by the 50,000 motorists using Arroyo Seco Parkway in California. A 20-mi. trip by expressway consumes a gallon of fuel whereas by existing surface streets consumption would be 1.5 gal. Each motorist thus saves more than 10 cents per 20 mi. of travel by using the Parkway, and total savings in gasoline alone amount to nearly one million dollars per year. A half cent saved per mile more than offsets what the average motorist pays in total for his use of the highway system. Other savings, especially in accident costs, provide further evidence of the savings which result from operating on good roads.

In addition to demonstrations of the savings which can be realized in time, money, and lives, there are many examples of the surprising increase in capacity which these modern roads make possible. In urban areas a single well-designed four-lane expressway will carry the same number of vehicles, at nearly double the average speed, as five 40-ft. city streets with no parking and favorable control of cross traffic. Under the less favorable conditions which generally obtain on city streets, eight streets of 54-ft. width would be required to equal the carrying capacity of one four-lane expressway. According to the United States Commissioner of Public Roads, "These comparisons are so startling that many well-informed people will not easily accept them."

The justification of expenditures

for high-cost roads, then, may be found in comparing these savings in vehicle-operating costs with the cost of the highway. If the cost of providing special facilities is half a cent per vehicle-mile and the savings in gasoline or other operating costs is an equivalent amount, the project does not increase the total cost of transportation. Moreover, there is a net gain for the consumer in a higher standard of service, including faster and safer transportation.

APPLICATION TO THE HIGHWAY PROBLEM

Comparison of highway costs and savings for specific projects has long been accepted as a method of determining the economic justification of proposed highways, and excellent papers on the subject have been submitted to the Highway Research Board over a number of years. The application of this principle to highway systems as well as to specific sections of highway is equally sound, and may be used to determine how far it is possible to go in the direction of specially designed highways before the total cost of transportation must inevitably rise.

There are several defects in the practical application of these concepts, however. Granting that the construction of a new limited-access road will produce such savings in operating costs as to achieve a net reduction in total transportation costs, the tremendous initial investment poses a problem of where to obtain the necessary funds at once. Because current revenues may be inadequate to permit extensive investments of this magnitude, pay-as-you-go finance may not meet the needs. It is this situation, often coupled with unreasonable formulas for distributing the proceeds of motor vehicle taxes, which in large measure explains the current toll road movement. The cost to the

consumer of driving over a toll facility may be less, including the toll, than the cost of operating over the "free" road. Quite aside from the relative merits of toll roads and free roads, the rebirth of the turnpike is a practical demonstration of the fact that it is often more economical, in terms of total transportation costs, to spend more for highways, and as a result, less for vehicle operation.

CAN HIGHWAY FINANCIAL SUPPORT BE INCREASED?

The obvious alternative to the toll road, of course, is for the state to issue bonds to permit the desired projects to be undertaken and promptly completed. In many states at the present time neither this procedure nor the application of the toll principle is required, because funds are plentiful and only materials and construction capacity are wanting. In a few years, however, greater resort may be made both to toll roads and to bonding, especially when the current surplus of funds in the state highway account has been eliminated.

For most states, however, the problem of building modern traffic facilities without increasing the net burden on the motorist will probably not be solved either by toll roads or by borrowing. Resistance to the rejuvenation of the turnpike, plus the burden of outstanding highway obligations, will prove to be formidable barriers. What solution can be looked for, then, which may be universally applicable, and which will permit the realization of extensive new facilities without at the same time increasing the total cost of transportation to a point discouraging the use of the automobile and overburdening the already overburdened consumer? The answer is to be found in precisely the same fact which poses the problem: the fact

that we spend so little for roads yet so much for automobiles and their operation. It is in the 90 percent of the highway transportation bill which is represented by vehicle and vehicle-operating costs that the key to greater financial support for the highways lies. By directing our efforts to the reduction of the consumer's expenditures for automobile purchase, gasoline, tires, and similar payments, we might apply some of these savings to the development of highways, thus tending to correct the current one-sided emphasis on expenditures for the vehicle. If automobile transportation is to be safe, efficient, and at the same time economical, this accomplishment, barring government subsidies, is possible only by directing more of the consumer's dollar to highway purposes and a lesser proportion to gasoline, cars, and allied items.

Whether such a readjustment of consumer expenditures might be brought about depends on technological developments and the policies of large segments of industry participating in the manufacture of vehicles, petroleum, tires, and accessories. Principally, however, the answer lies with those who design and manufacture the automobile. The possibilities of entirely new concepts of automobile design, with economy of both first cost and operating cost as their objective, hold the key to the future realization of low-cost automobile transportation. These possibilities, in conjunction with power plant developments and fuel technology, could bring about the reduction in operating costs necessary to release more of the consumer's transportation dollar for the provision of highways capable of accommodating the automobile.

There is nothing impossible of attainment in the suggestion that in the future we might apply more of the consumer's dollar to the

highway and less to the vehicle. The adoption of high compression engines and high octane fuel promises in the near future to save the motorist a billion dollars a year. Numerous other attacks are being made by industry on the high consumption of gasoline. Many new features of automobile design, too, are being developed and tested, and the direction of significant innovations is toward ultimately lower car prices and lower costs of operation.

It should be remembered that the consumer is interested in how much it costs to own and operate an automobile, and the quality of the service. He is concerned over the cost per year or per mile or per

month. How much of the total goes to highways and how much to the vehicle is immaterial, except for the methods used to pay the bill, or the increments by which the costs are defrayed. As far as the family budget is concerned, \$100 is \$100, whether 10 percent is for the highways and 90 percent for the operation of the vehicle, or vice versa. If it is possible in the future, without increasing the total automobile transportation bill, to provide greater financial support for the highway system by reason of savings in the purchase and operation of the vehicle, we will then be witnessing real progress in highway transportation.

INFORMATION NEEDED FOR THE FISCAL AND ALLIED PHASES OF LONG-RANGE HIGHWAY PROGRAM PLANNING

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Planning has now come to be an accepted function in the highway departments of the 48 States and the District of Columbia, although its status and the recognition given to it vary considerably among the States. Certain investigations and research projects that might be acceptably classified as studies preliminary to planning had been made in a few States prior to 1934, but highway planning as such received its greatest impetus by the passage by the Congress of the act, signed by the President on June 18, 1934, which authorizes the use of 1½ percent of the Federal-aid apportionments for "surveys, plans, and engineering investigations of projects for future construction" on any

road system. This provision of the law was permissive rather than mandatory, but, under the vigorous support accorded to it by officials of the Bureau of Public Roads, within two years all the States had inaugurated fact-finding studies which came to be known as State-wide highway planning surveys.

Up to the present there have been two phases of planning-survey operations. The initial phase, which was composed of a series of related fact-finding studies, has been completed or practically so in a majority of the States. The primary aim of the initial studies, all of which were set up as one-time projects, was to gather together basic facts and present them in