

Some Urgent State Highway Needs

CLIFFORD M. HATHAWAY

Chief Highway Engineer, Illinois Division of Highways
Springfield, Illinois

This topic is a very timely one. If you have any doubt as to the existence of urgent highway needs, just take a trip over some of the major highways in the rural and metropolitan areas of either Illinois or Indiana. Yes, you will be able to get over them! But you will note miles of rough-riding defective pavements which cause needless vehicle repair bills and extra operating costs and require costly maintenance. You will also lose much time and possibly your temper because of congested roads and streets inadequate for the volume of traffic they carry. And you will find many places where sharp curves or lack of adequate stopping sight-distance result in serious danger spots for the traveling public.

This is true not only for Illinois and Indiana, but also for most of the other states in the union where traffic volumes are large. In a statement recently issued by Thomas H. MacDonald, Commissioner, Bureau of Public Roads, he gives the total mileage of surfaced highways of the Primary Federal-aid System in rural areas as 210,000 miles and adds:

“The indicated need of surface replacement in the 10-year period from January 1, 1950, to January 1, 1960, is 124,000 miles on the surfaced portion of the rural Primary Federal-aid System. In the same period the 8,700 miles of the system, which on January 1, 1950, were unimproved or graded and drained, should be surfaced. The total indicated surfacing need on the Primary Federal-aid System in rural areas only is 132,700 miles.

“A similar estimate for the 14,000 miles of the Primary Federal-aid System in urban areas would show a resurfacing requirement of about 6,500 miles, making a total for the primary system of 13,920 miles annually.” Putting it briefly, Mr. MacDonald estimates that 66 per cent of the Primary Federal-aid System will need resurfacing in the next ten years.

In Illinois 3,100 miles of the 12,095 on the State Primary Road System are sadly in need of resurfacing, rebuilding, and modernization today and over half of the system will require heavy reconstruction measures by 1958.

We are now at the crossroads of the highway problem. During the next year or two it must be determined whether sufficient funds are to be allotted the state highway departments for an adequate highway system or whether the highway system will be forced by lack of funds into continuous deterioration that may result in ultimate road failures.

The economy of the state is in a large measure dependent on motor vehicle transportation. If the highway system is allowed to fail, motor vehicle transportation will suffer seriously. As *Fortune* magazine in a recent lead article stated, "America is faced with the alternative of having a high-cost modern road system, or a crushingly costly obsolete one."

REASONS FOR ROAD OBSOLESCENCE

Why have these road deficiencies developed? For well over 17 years, through a long depression and a great war, Illinois has not been able to keep pace with its highway construction needs. Even badly needed maintenance at times has had to be deferred. As a result, there is a tremendous backlog of highway work to be done if Illinois is to have a reasonably adequate highway plan.

Let us consider the history of the State Primary System in Illinois. The "hard road" State Primary program got under way in 1919. Construction was carried on at a rapid pace until 1931 and then at a somewhat slower rate until 1940. There was a big rush to get traffic out of the mud and thus let people go from place to place at all times of the year, regardless of weather conditions. In one year—1928—over 1,000 miles of road were built.

By 1925, 3,900 miles were completed. In 1930, over 7,300 miles were opened to traffic. In other words, one-third of the Primary System in Illinois is over 25 years old and three-fifths of the system is over 20 years old.

These roads, built during the 20's, were adequately designed to accommodate the passenger cars and comparatively light trucks of that period. They stood up well until the early 40's, but during the war years the heavy trucks, which were loaded far beyond the weights and the legal load limits for which the roads were designed, proceeded to shatter them rapidly. Parts of these roads have already been reconstructed and much of the remainder is in need of reconstruction now.

This should not be considered as a reflection on the engineers who designed and constructed them. The road design was for the traffic of that period in accordance with the engineering practice of that day, and the construction was done honestly and conscientiously. In 1925 the average speed of vehicles was 30 miles per hour and the average load of a truck was 3 tons. Now the average speed of a car is 60 miles per hour and the trucks have 10 to 20 ton loads.

Few people in the 20's could foresee the rapid growth in traffic volumes, the higher average speeds, and the greater truck rates which have developed since that time. Neither could anyone foresee the development of the heavily loaded truck traffic and particularly the laxity of the enforcement of the road limitation laws during the war years. Even if these changes could have been foreseen, it would not have been expedient to make improvements too far in advance of the needs then existing, nor would it have been wise to concentrate too much of the available funds on a small mileage of highways.

It should be further noted—and this cannot be emphasized too strongly—that improvements made a quarter of a century ago, and now obsolete because of traffic growth, have long since paid for themselves.

J. S. Bright, Deputy Commissioner (retired) of the Bureau of Public Roads, discussed this matter in a most able manner at the American Road Builders' Association meeting held in Atlanta, Georgia, on May 13, 1949, and I quote from him:

“Highways wear out just like a suit of clothes. There is continuous deterioration due to wear and tear of traffic and action of the elements. This deterioration is most noticeable in the road surfaces, but it is also taking place in the subgrade which supports the pavement, as well as in the structures.

“Highways also become outgrown, just as clothes do when the wearer happens to be a growing boy. In a period when motor vehicle traffic has been developing as rapidly as in the last 30 years, obsolescence becomes a greater factor on some roads than deterioration. Narrow pavements and hazardous shoulders are an outstanding example. Unfortunately, highway facilities cannot be junked or traded in on later models every few years as is done with motor vehicles.”

These deficiencies which accumulated on our highways and streets during the depression years when all expenditures were “slashed to the bone” were well recognized in Illinois around 1938 and 1939. At that time we recognized the expansion of highway capacities in order to meet the ever increasing demand and the changes which had taken place in the whole picture since the beginning of our highway system

in 1920. The division of highways carried on a rather thorough investigation of the condition of its system from the point of deterioration and obsolescence and it was determined that our roads at that time were going to pieces at the rate of 333 miles per year. When these conclusions were reached about 1940 we were on the verge of war and very little actual work was done on our proposed program.

From 1942 to 1946, Illinois as well as all other states went along wholeheartedly in winning the war and we utilized only such materials and such labor as was necessary to keep our main highways open to traffic. It is no secret and we are not ashamed of the fact that we did permit an increase in axle loadings during that period as a war measure, and I still think that we did right, nevertheless it had its effect on our highway system.

About the time the "shooting" war ended, we were confronted with two ideas. One, a pretty well thought out program involving Federal-aid and State-aid, with any reserves at their command, as a stop-gap or rather to take up the slack in converting soldiers to citizens without jobs in continuing many war plants that would be converted back to private industry. The second, was to resume that analysis and planning of our primary system which we had pretty well developed by 1940, bringing it up to date after a four to five year period of inactivity and giving still further attention to what might be anticipated in the next 25 years.

I think that every state in the union followed out more or less the same procedure and with about the same results. The comprehensive study of the deficiencies and the requirements of our highway system, looking forward into the future, is being given a very careful engineering analysis throughout the nation today. Thus far, several states have developed something quite tangible. Illinois, incidentally, has prepared a comprehensive report, and a good one, which was presented to the legislature in 1949. The unfortunate part of it was the fact that we and even the legislature decided pretty much what we needed, but the legislature did not provide the money to do what those things called for.

The so-called post war program never got a start or if it did it came about more naturally than we expected. When the war was over there did not seem to be any soldiers available to go on road jobs and there was no excess of road building materials or machinery, in fact there was an acute shortage for several years, and this was even more serious in our engineering forces, which had been sadly depleted. Young engineers and old engineers were not available to get out the necessary plans and industry was taking them over as fast as they could graduate, so the post war program has now merged with the first idea, a com-

prehensive future no longer a relief measure but instead a study for a long range program.

PERSONNEL PROBLEMS

Right at this point I want to take time to interject another thought, which was suggested to me by Professor Petty, that is the personnel problem of a state highway department which reached a low, right at the end of the war, and which quite consistently in Illinois stayed at that low until early in 1949. Then something happened and I have not got the answer yet. We were able during the year 1949 to secure enough young engineers to fill our staff completely, although I must admit that during 1949 we utilized some 200 student engineers who returned to college in the fall of 1949. Although our activities are presently curtailed from the construction standpoint due to lack of funds, I can quite truthfully say that our engineering personnel officer has on his desk at least 50 applications from students who will graduate next June and I doubt whether he will have vacancies for more than 40.

I still can't understand this situation except I do know that the legislature in 1949 made a substantial salary increase to all state employees and that shortly thereafter we got an adjustment for some 300 other men, that the department made some changes in its organization and re-analyzed its jobs having in mind the so-called "middle man" engineer. In other words, our organization was such that men entering our employ did not do too badly neither did the bureau chiefs and district engineers, but the chap that had worked for 10 to 20 years had not been getting too much consideration. We think we have alleviated that and perhaps it is the reason that we do have a sufficiency of engineers.

THE PROBLEM

In addition to the reconstruction of the original two-lane highways, many miles of dual highways are needed for roads carrying more than 5,000 vehicles daily. Also express highways where flow of traffic will be uninterrupted by cross traffic are extremely desirable in many areas. These dual highways and express highways will cost anywhere from \$200,000 a mile to several millions a mile. The cost of right-of-way through valuable builtup areas adds tremendously to the expense of express highways.

In Illinois, asphalt resurfacing of old pavement is done wherever the worn-out pavement has satisfactory alignments and grades. It costs approximately \$40,000 a mile for widening and resurfacing old worn-out

pavements, whereas the cost of constructing a new pavement is approximately \$100,000. The use of asphalt resurfacing in these cases is merely good common sense economy. Our highway department is attempting to stretch the dollar as far as possible in its highway work.

More secondary roads are required. The farmer is entitled to an all-weather "farm-to-market" road surface, but considering the many thousands of miles of the county and township roads that require improvement, this all-year surface will take a tremendous amount of funds. Probably the problem of "farm-to-market" roads might be better solved by the economies that could be obtained if the number of different sub-divisions handling them were reduced.

INCREASING COSTS OF NEW PRIMARY ROADS

In the early 1920's, the average cost of the construction of a mile of two-lane concrete-surfaced highway in Illinois was approximately \$30,000 per mile. This figure included normal grading and smaller drainage structures but large bridges and heavy grading were usually awarded as separate contracts at additional cost. In 1949, the average cost was \$100,000 per mile.

There are substantial reasons for this great increase in the cost of a mile of Illinois highway. Much higher wages are being paid to road construction workers; the cost of practically every material used in building a roadway has arisen; freight rates have increased and have added to the costs. Yet these increases have been so greatly compensated by the improved machinery and more efficient methods used in the construction of roads that they account for only a small percentage of the increased cost.

The largest factors in the cost increase are the vastly improved designs in the roadway. The present-day pavements are thicker—6 inches in 1924, but 10 inches in 1949 with a granular sub-base 6 inches thick, making 16 inches in all. They are also wider—18 feet in 1924, and 22 or 24 feet now. Greater widths provide freer and faster flow of traffic and reduce accidents considerably.

The width of the shoulders alongside the pavement has been increased from 6 feet to 10 feet, providing more adequate space for parking of vehicles along the highway to prevent interference with the moving traffic.

Grades are more even. Curves are longer and safer. Slopes of ditches, fills, and cuts are flatter, and are seeded and sodded in order to reduce erosion. Grade lines are made higher than the adjacent terrain so that interruptions to traffic by snow blockades will be cut

down and the ill effects on the pavement of a high water table will be eliminated.

These design changes are essential and have been developed as a result of experience and traffic demands. As mentioned before, the 6-inch thick pavements on the main highways built during the 1920's could not withstand the present heavy truck traffic and are now being resurfaced or reconstructed. Many lives have been lost, people injured, and much property damaged because of the sharp curves, steep grades, and sharp slopes of the early roads, and these unsafe features are being avoided on the new ones.

INCREASE IN MAINTENANCE COSTS

Maintenance costs have also increased materially. According to the records of the Bureau of Public Roads, \$75,329,000 was spent by all the states for state highway maintenance in 1923. Twenty-five years later, 1948, they spent \$458,407,000 for this purpose—six times as much. Maintenance costs will continue to increase unless reconstruction of the deteriorated portions of the highway system is made at a more rapid rate than in the past few years and naturally, if more and more of the nation's highway funds are needed for maintenance, and the money allotted for highway purposes is not increased, less money is available for the needed reconstruction.

INCOME FOR ROAD CONSTRUCTION BEHIND INCREASING NEEDS

Income for road construction and reconstruction has not kept pace with the increasing need of funds for road improvements. In 1947 an independent study of the highway needs of Illinois was made for the Illinois Highway and Traffic Problems Commission authorized by state legislature. This report showed that the estimated construction needs alone for road improvements during the next ten years would be \$171,000,000 annually. Yet only \$31,000,000 in combined state and federal funds will be available each year for the next four years. There is quite a difference between our needs—\$171,000,000—and our available funds—\$31,000,000.

NEED OF MORE FUNDS

In view of the increased costs of road maintenance and new construction, additional funds for highway purposes are sadly needed. This was forcibly brought out by the Illinois Highway Traffic and Problems Commission, which issued a report in February, 1949. I

quote from it: "It is clear to the commission that increased revenues are needed if only a part of the highway improvement program that would be desirable is to be carried forward." Further, "The commission's principle proposals on highway user revenues relate to increases in the motor fuel tax, motor vehicle licenses, and motor vehicle operator's licenses."

Let us consider the cost of state taxes to the motorist. Assume that the average car is medium-priced and travels 9,000 miles per year and the average cost to the owner is 6c a mile. This mile cost is below that given by the Chicago Motor Club and the Illinois State Garage; therefore, it is on the conservative side. On this basis the owner's annual cost is \$540.

The state taxes, which are the only state sources of revenue for state highway purposes in Illinois, consist of the vehicle license fee and the motor fuel taxes. The driver's license fee, which is now \$1 for a three-year period, can virtually be ignored.

If the car is in good shape, it will average about 15 miles a gallon of gasoline, or have an average annual consumption of 600 gallons. The state gasoline tax at 3c a gallon will then be \$18 a year. The license fee is \$10.50, thus making a total state tax of \$28.50. This figure is less than the average yearly rental for a garage. It is only 5 per cent of the total operating cost of the car, and for this 5 per cent the motorist obtains the use of a 12,000 mile highway system and thousands of miles of county roads and city streets which have been improved by participating funds from the state.

Now suppose the gasoline taxes were increased two cents a gallon and the license fee \$1.50, as recommended by the commission. This will add only \$13.50 a year to the car owner's cost, or less than 3 per cent. For this he will get the following benefits:

- (1) Better surfaces, which would cut vehicle repair bills.
- (2) Adequate widths, dual highways, and express highways, which would save valuable time.
- (3) Improved design of roads, which would eliminate hazards and reduce the accident rate.

Therefore, in closing, I wish to emphasize this fact: A slight increase in the cost per car now for highway purposes will result in an economic savings many times that increase in the future. It will also help reduce the alarming number of accidents that resulted during 1949 in the loss of 31,500 lives and injuries to more than one million. And furthermore, it will enable the state highway departments to improve the highway system to the adequate condition so necessary for our national transportation and economy.