

Pittsburgh, Pa,  
November 26, 1920.

## THE NEED OF EDUCATION FOR HIGHWAY DEVELOPMENT

(Committee on Highway and Highway Transport Education)

It is not expected that every man will become a builder of highways. Nor is it expected that every man will become an operator of motor vehicles. But there is not a citizen whose daily life will not be more and more influenced by the operation of motor vehicles over the public highways.

The rapid increase in transportation facilities in the United States has been in a large degree responsible for the rapid development of the country, the remarkable increase in the wealth of the people and the improvement of living conditions. More than one hundred years ago the United States first undertook the building of a great public highway. When Thomas Jefferson was President the Congress provided for the building of the National Pike to carry the traffic westward from Cumberland, Maryland through the mountains to the great agricultural regions of the Mississippi Valley. It was planned that this road would continue the traffic which came over the canal paralleling the Potomac River from the navigable waters of the Potomac at Washington. For thirty years appropriations were continued and the road was completed to the Ohio River.

During the same period the building of highways engaged the attention of the States also to some extent. The State of Kentucky, for example, began a considerable mileage of improved roads. The State of Maryland, fearing that Baltimore would lose pre-eminence as a principal trading point for the territory westward so rapidly developing, built a highway from Baltimore to Cumberland to connect with the National Pike.

After thirty years of greater or less interest on the part of the States in road building, the railroads began to develop rapidly, and our highways suffered neglect as the attention of the nation was centered upon the building of the railroads. During the fifty-year period ending in 1890, the States showed little interest in highway improvement and the Federal Government none, leaving such matters entirely to the towns and counties as of purely local concern. The first State to show interest in the building of highways after this half century, was New Jersey. In 1891 a law was passed providing for a division of cost of highway improvement between the State and the local communities, and a highway department was created to administer the measure. The example set by New Jersey was followed by most of the eastern states, and the development of modern highway legislation began slowly but surely to extend to all of the States.

In 1916, after an interval of over eighty years, the Federal Government returned to the encouragement of highway improvement by appropriating 75 millions of dollars to be apportioned among the States for the purpose. This first appropriation was followed by a second of \$200,000,000, in 1919. This action of the Federal Government met with a splendid response. Without hesitation each State accepted the terms of the Federal Aid Act and appropriated funds to meet the Federal funds. Those States which had not already established highway departments did so, and many of those having small departments increased their appropria

tions to provide for a larger personnel and a stronger organization. In place of appropriating only sufficient funds to meet the Federal Aid funds, the States and smaller sub-divisions have appropriated much larger sums, so that the appropriation of \$275,000,000 by the Federal Government will grow when augmented by the local funds into a total of more than \$600,000,000. This sum is involved in the Federal-aid program alone and does not include the large additional amounts which the states, counties and special road districts are making available. Neither does it include the very heavy expenditures which are being made within the incorporated cities and towns throughout the country. The extent of the road development already undertaken is somewhat indicated by the fact that in the Federal-aid program alone, for which provision has been made, there is involved nearly double the entire cost of the Panama Canal, and in the projects which have already been approved for improvement with Federal-aid funds, this is a total of over 33,000 miles of highway, which is nearly equal to ten roads from the Atlantic to the Pacific Ocean.

The number of motor vehicles registered in the United States prior to 1914 was about 1,700,000. In the last five years this number has increased to nearly 8,000,000, of which a very considerable number are trucks for the transporting of freight over the highways.

A recent traffic count on the state roads of one of the western States showed about 12 per cent of the total traffic is motor trucks. We have now upwards of 3 motor vehicles for every mile of highway in the United States, both improved and unimproved. The distribution of motor vehicles is not confined to any part of the United States, although the number of motor vehicles is to a certain degree expressed by population densities. In New York State, which has an average population of 218 people per square mile, there are 11.9 vehicles per square mile. In Pennsylvania, with an average population of 195 people per square mile, there are 10.8 motor vehicles per square mile. In California, which has an average population of 22 people per square mile, there are 3 motor vehicles per square mile. In New Mexico, which has only approximately 3 people per square mile, there is an average of one-tenth motor vehicle per square mile. These figures bring out the extreme range in local conditions for which provision must be made in the improvement of highways, but the extremely interesting fact, as shown by the expenditures in 1919, is that many of the States which have the lowest populations per square mile and the smallest average number of vehicles per square mile are expending a greater percentage of their assessed wealth for road improvement than are the more thickly populated states for which the valuations are much higher. For instance, the expenditure in 1919 for highways in the State of Pennsylvania was approximately .13 per cent of the total valuation, while in the State of Arizona the expenditure for the same purpose was approximately .56 per cent. The total registration plates issued in Pennsylvania in 1919 amounted to 509,272; in 1920 to 600,723, a growth of over 100,000 registrations in one year. Of this increase approximately 10,000 were commercial vehicles or about one-tenth of the total increase. Our figures show approximately 91,000 miles

of public highways in the State of Pennsylvania, so that for the present year there have been registrations equalling over six motor vehicles for every mile of highway, and the increase in registrations between 1919 and 1920 has been at the rate of nearly twenty per cent. It does not seem probable or possible that this rate of increase will continue, but it is impossible at this time to foresee the extent to which this development will go before we reach a condition which may be called the maximum motor vehicle density.

It has seemed necessary to call your attention to these facts in order to illustrate the tremendous importance which the highways in their relation to transportation have attained, and the great problems which are necessarily connected with their building and maintenance, the operation of traffic over them and the economic problems attendant upon these two, including the distribution of financial responsibility and the values to the communities which accrue from highway improvement. Particular attention is directed to the fact that these problems have come upon us within a very limited time. It has not been a slow development, giving us time to readjust ourselves to the new conditions. There has been little time for preparation and we are now faced with the necessity of a broad educational program, through which we must reach many classes if the objectives of efficient and economical use and extension of our new transportation facilities is to be gained.

The United States is not alone in its perplexity over these problems for much the same situation exists in France and in England. There is a demand for adequate, readily available and cheap transportation and the interests of the whole public will be served to the degree that such transportation facilities are made easily available. Upon our school system will to a large extent fall the responsibility of providing education of two quite different kinds - the education of the public served and the education of the public servant. In this country little attention has been given to training the young man for the public service. In fact, it is not uncommon for men to graduate from the universities without an adequate knowledge of the organization of the smaller units of the civil government in their own communities. We have been passing through a critical period which has left us with large problems to be solved and with tremendously important governmental functions to be performed, and this condition extends all the way from the Federal governmental departments through the state, county, town and municipal governmental divisions. Other countries have made a practice of training men for the public service, and these we find young men in the schools planning their entire education to fit them to enter some branch of the public service as an honorable and to-be-desired career.

Many men will be needed in the highway improvement and transport program. If, they obtain an appreciation of what real public service means, not only in the higher capacities but in the positions which control the affairs of the local communities, there must be implanted by the schools, beginning with the boys and girls in the lower grades, an interest in the development of the highways in their own communities. If they are taught who is responsible for their care, if their attention is called to the safe usage of the highways, they will have a much better background for higher training and their interest may be enlisted to the point that when it comes time to choose a college career they will take up a study of the technical branches which are necessary to an

understanding of the science of highway building and highway transportation.

A large number of technical graduates will need to be trained each year if the public is to be served by properly trained men. This is true not only in the Federal and State road programs, but in those of the cities, counties and other governmental divisions. A recent survey shows that because of the large increase offered in salaries by the industries, technically trained men, in place of going into the public service, are going to the industries. If this condition continues the results will be plainly apparent in a very few years by the decreased efficiency of the technical forces engaged in highway improvement and in the administration of the highway policies. A prominent educator recently, in reply to a question as to how men should be induced to prepare themselves in the science of highway engineering and highway transport, said, "It will be necessary to go back to the high schools and to interest the young men before they decide upon their college career." It is estimated that the number of men who would normally be absorbed by the State and Federal highway departments alone each year would amount to practically the entire number of graduates of civil engineering courses in the country. It is absolutely certain that only a small proportion of these men, under present conditions, will enter the public service, because of the larger inducements elsewhere. So it would seem that one of the greatest needs in the development of a highway program is to implant in the minds of the boys and girls in the grade schools and in the high schools an interest in the public service as a career, and to give them information as to the fields in which they can perform useful service.

The second most important need of education in highway development is that of bringing to the citizenship through the agencies of the schools a better knowledge of the service demands which the highways must fulfill. It is perhaps too much to expect that the understanding will become general in a short period of the tremendous increases in the uses of the highways which have come in the last three years. It is conservatively estimated that in the agricultural communities the vehicle-mile use of the public roads has increased at least 500 per cent, while contiguous to the more thickly populated areas the increase is at least 1000 per cent. The increased use is not alone in the number of vehicles, but in the weights and speeds of the traffic units. Size and speed are the destroying agents, and our road systems which were built for very much smaller loads are showing in many cases failures. There is too generally prevalent a feeling that the highway builders of the past have failed. Because some highways are not now satisfactorily carrying the tremendous traffic which has suddenly come upon them, there is a tendency to criticise the men in the public service who were responsible for the construction of these roads. An impartial student of the records will undoubtedly find that if the roads were honestly and conscientiously built under direction of a competent engineer, they are giving as good service as could possibly be expected under the changed conditions, and that the construction planned by the engineer is much ahead of that which the public thought was necessary at the time. The fact has been true of the highway engineer the same as of many other professions - the men who have pointed the way and who have accomplished the most outstanding results, have done so more often with the opposition of the public whom they serve than with their cooperation. Here is a prime function of the schools. There must be

implanted in the minds of the boys and girls who are now in the lower grades a different attitude toward the governmental agencies which the public has set up to serve itself. These agencies have been created in our development of democratic government, and it is presumed that changes will be made slowly in the present form. It is possible, therefore, through proper teaching in the public and higher schools, to engender in the mind of the young citizen an attitude of responsibility toward these agencies, so that there would eventually be a degree of cooperation established between public servants and the public served which would bring about a more efficient management of public affairs. How necessary this is to the future of the highway program can only be indicated by the immense sums of money which are already involved in the first few years of the enlarged program which has been undertaken. There are over two and a quarter million miles of highways in the United States. There are incorporated in the State highway systems not over 8 per cent of this entire mileage. Even this 8 per cent is administered to a greater or less extent through cooperation between the State officials and the local county or town governments. It is not likely that State jurisdiction will be largely extended within the next few years because of the large percentage of unimproved highways which is incorporated in this 8 per cent. This means that more than 90 per cent of our highways will be for a long period administered largely through the local governmental divisions. More and more help is being extended these divisions through the State and Federal road organizations, but a very large part of the business administration must be handled by the officials elected by the public to fill the public administrative offices of these local governmental divisions, and there must be a supply of technically trained men who will be available for the active superintendence of this large mileage of highways and the expenditure of the vast sums which will be appropriated for their improvement. We need men educated not only in the technical requirements of road building, but we need a larger citizenship which is more conversant with the way in which its own affairs are managed, so that it will intelligently select the men who can and will administer these offices in the public interests. In conclusion, therefore, the teacher of today, who is concerned with the great questions so closely affecting the welfare and advancement of the public as a whole, will take the opportunity to implant in the minds of his students, whether these students are of the lower or higher grades, a knowledge of the service which the public needs from its young men and will direct the attention of those who seem especially qualified, to the opportunities offered for a splendid public career in the construction and maintenance of the public highways. He will also implant those ideas of citizenship which will produce eventually an attitude of mind on the part of the public toward their public servants which will insure the choosing of public service careers by the capable young men who are willing to educate themselves for this purpose. The need for education in highway development lies in these two directions - the training of more men to carry on the actual work and the training generally of the public to the tremendous importance of the work which must be done and the economic value that will be gained by the public through the increased transportation facilities now made possible by the combination of the im-

proved highway and the motor vehicle. These problems are educational. They belong to the teacher. The progress and status in which we find ourselves a decade from now will depend largely upon the training which the boys and girls receive in these problems through the agencies now provided for their education.