

THE NECESSITY FOR PROPER SUPERVISION AND  
INSPECTION OF ROAD WORK

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For over a hundred years - a few years more than a full century - Alabama has held the honor of statehood. For the same period she has been confronted with all of the responsibilities and perplexities which statehood imposes. Her name itself is suggestive. "Alabama". Taken, it is said, from the name of an Indian tribe of the Creek confederacy. The words are from the Choctaw tongue - "alba - aya - mule". Meaning "I open or clear the thicket." Does this not build in our imagination a conception, inadequate perhaps, yet conveying some understanding of the conditions which confronted those sterling pioneers who undertook here, out of this great area, to organize a state, to establish a stable government, and to under-write the future of an American commonwealth. We cannot but know they visioned not alone the fertile lands cleared and transformed into productive fields, but in good time highways opened and improved, giving access to these fields providing one form of transportation necessary to develop the business of the state, and even more important, making possible the free inter-mingling of all those who were to become its citizens. We know that the impelling motives which prompted the establishment of the state were the fundamental desires to establish homes, and with these, schools, churches and,

again, in good time, the institutions of higher learning which have each followed the other wherever in this country our people have taken root in the soil of virgin lands. They founded here a State. For a full century the endeavor has gone forward unceasingly to rear a proud structure. Measure, if possible, the human effort, the labors of muscle and brain, the patriotism, and the unselfish giving that have been in all these years invested within the borders of Alabama, and out of which has matured something more, something greater than the physical properties, something finer than the farms, the cities, the institutions. It is the State of Alabama - a heritage-in-trust for those who are now its citizens, - a guarantee of hope to its people - a promise of opportunity to those who dwell within these borders. Such is Alabama. Such is every American State, each one a product of fine vision and leadership, of the support and toil of its people, supplemented and enriched by great natural resources. And if sometimes we find ourselves out of harmony with conditions as they are, in all fairness let us look about, project ourselves for a little time into some other land, into those countries beyond our borders, and then, with the knowledge and with the convictions which cannot help but mature, let us in all honesty of spirit give thanks that our destiny has given us this land in which to live.

If all the people within a state would work together in this spirit, our progress would be much more rapid. Properly organized effort is government and whatever the public undertakes to do for itself is thus fundamentally a question of government. Not only the quantity but the quality of public accomplishment is determined by the ideals - the attitude of mind not only of those who govern but also of those who are governed. In the activities, which are necessary to the establishment and building of a state, Alabama has progressed from phase to phase. Always those who have gone before have left a responsibility to carry on for those who come after. Administration has succeeded administration, and each has had its major burdens. It has not been possible for any one generation to do all of the things which were desirable to accomplish. And so many things have necessarily been pushed aside for those things which have been considered more essential. Thus it happens that Alabama for decade after decade held the viewpoint in common with most of our American States, that the highways were of local concern, to be handled as local problems, and it was not until 1911 that the State undertook as a state responsibility to assist in highway improvement. Even then the aid was very limited, and in the eight-year period following the state

allotments for highway building aggregated only approximately \$800,000. The same year, 1911, a State Highway Department was established to administer state aid, and the total expense of the State Highway Department for the eight-year period was but \$87,000.

As stated before all matters of accomplishment and public policies within a state are in the final analysis the product of the attitude of mind of those who govern, and those who are governed. A state may engage in productive enterprises which mean progress for its people, or it may not. That there may be progress there must be vision and courage manifested in great degree by those who are placed in the administrative positions through which the State is governed. But they are powerless to accomplish unless there is vision and faith and support from the public itself. The amount of support both moral and financial which comes from the public is dependent first upon their necessities and, second, upon their faith in integrity, leadership and ability of those who govern.

Alabama physically is a large State, embracing within its borders 51,260 square miles. The census of 1920 credits a population of 2,348,000, an increase of 9.8 per cent during the preceding decade. Of this population 76 per cent live in the rural districts, and 22 per cent in the urban districts. The density

of population per square mile is 45.8. The increase in the value of farm lands from 1910 to 1920 is estimated at 97.7 per cent, that is, the value of farm lands nearly doubled in that time. The census for the same year, 1920, gives a value for all farm crops of over \$304,000,000. Alabama is the 26th State in size and 18th in population. She has high rank in the value of her mineral products, chiefly coal and iron ore. But in 1920 her agricultural products were estimated at five times the value of her mines and quarries. In 1921 the estimates of rural highways in Alabama total 58,410 miles, divided into classes as follows:

Unimproved earth	38,236 miles
Graded earth	9,750 "
Sand clay	6,198 "
Gravel	3,874 "
Macadam	502 "
Paving	50 "

Alabama has a very large area, more than 58,000 miles of public roads, and 78 per cent of its people live in the rural districts. Its great production is of agricultural products, but with a large production also from its mines. For the proper growth and development of such a State and for service to its people, urban and rural, an adequate system of highways is one of the very fundamentals. But we find that in 1921 the total revenues available, state and county, for highway purposes, were approximately \$5,500,000, of which \$2,400,000 came from taxes, \$1,900,000 from bonds and long term warrants, and \$1,200,000 from

motor vehicle fees and Federal aid. The expenditures are estimated at \$4,724,000. In 1913 there were registered 8,300 motor vehicles in the State. Nine years later, in 1922, the registration had increased to 90,052.

In Alabama, as in every other state, and particularly the great agricultural states, there existed long before the advent of the motor vehicle the necessity for improved highways. Some progress was made, but slowly, and it was not until the modern motor vehicle in combination with the impru highway demonstrated beyond question the ability to supply highway transport requirements, that a great national movement to build adequate highways became a fact. In 1915 in recognition of the tremendous undertaking that lay before the state in providing improved highways to serve the needs and demand of the public, the Federal Government enacted the first Federal aid measure. Other acts soon followed, carrying appropriations to continue the work, and these Federal appropriations were available for highway building under certain definite conditions and requirements.

There has been much misunderstanding and many misconceptions of the requirements of the Federal highway laws. There have been some criticisms voiced particularly as to the restrictions imposed in these laws upon the ability of the state to

freely along any lines which it may desire to initiate. As is usually the case, these criticisms grow out of a misunderstanding of the principles and facts involved. The requirements of Federal highway acts were primarily conceived by those in administrative control of the highway policies in the states themselves. There has not been a single principle written into the Federal aid laws that was not born out of the experience of the States which had inaugurated state aid some years before and had thus had long experience in the administration of state funds in the building of the most important highways, whether undertaken as a matter of aid to the counties or through an organization acting independently of the counties. This statement should be repeated. The principles of the Federal Highway Act are the outgrowth of the experience not of the Federal Government as such, but of the States, and there is not a principle written into the Federal aid acts that did not have the endorsement of a majority of all of the States acting through their officials in charge of their highway departments. The only limitations or requirements which have been written into the Federal acts are those which have proven successful in the administration of state highway work and the record is clear that without the observance of these principles there has been no adequate administration in any State.

The most important of the Federal highway requirements are these:

1. That the state shall establish a department adequately organized and supported to administer the joint Federal and state funds within the state.

2. That there shall be laid out a system of the most important interstate and intercounty roads in each state, not exceeding 7 per cent of the total mileage, upon which the Federal aid funds shall be expended until the system is completed.

3. That the types and standards of road construction shall be adequate to carry the traffic.

4. That the roads shall be properly maintained.

5. That State funds shall be provided to meet the Federal funds for construction, and also that State funds shall be provided for maintenance of the roads as they are improved.

Highway administration and highway engineering are being rapidly crystallized along definite scientific lines. It is entirely possible for a State to proceed with its financing and building of a system of highways with the assurance that it is proceeding along sound economic lines, if it is willing to adhere to the principles which are the outgrowth of the experiences of other States, either in their own work or in the combined State and Federal work. Herein lies the crux of the situation. The



management of affairs of a State Highway Department demands experience and a high degree of technical knowledge. It demands loyalty and patriotic endeavor. Such an organization has been functioning in this State since 1911, yet it has had inadequate support financially, and has been severely criticized. It is accepted that many of the criticisms have doubtless grown from a lack of understanding of the difficulties and necessities of the highway work, and as this lack of understanding gives way to a knowledge of the real work that the Department is accomplishing, the support of the public generally will follow. But some of these criticisms have been dishonest. They have been inspired by wrong motives. Let it be clearly understood that the fact that more miles of highways have not been completed since Federal aid funds were available, is entirely due to the lack of financial support and other handicaps imposed upon the highway department of this State. From 1919 until January, 1922, the State Highway Department did not have funds with which to meet the Federal funds available, and were thus dependent upon the counties to supply the necessary funds to meet the Federal funds. It is well known that a considerable part of this delay was due to the fact that the first law providing for funds was declared unconstitutional, and does not indicate any lack of desire on the part of the people of Alabama to support the highway program and to make available the

necessary funds but great consideration must be given to the fact that even though there are funds available, the amount of road construction that can be undertaken in any one year is limited by the amount of transportation for material and other facilities which can be made available and diverted from the other needs, public and private, and used for highway improvement. Thus, the building of a large mileage of highways becomes a task extending over many years, and when there is such a large need for improved highways as exists in this State, there should be no delay in proceeding to carry on each year a reasonable highway program. The task at best will consume a long period, during which the cost of operating over unimproved highways will be a tremendous loss to the State. This loss is waste which can never be regained.

In order to extend highway service to recognize fairly the needs of the people in all parts of such a large area as this, it is necessary to make as the first objective for improvement a relatively limited mileage of highways extending into every county and including those highways which carry the most traffic in each community. The laying out of such a system has just been accomplished in the State of Alabama, and it is found possible within the percentage limitations of the Federal Highway Act (7 per cent of the total mileage) to include all of the important highways and

reach the county seat of every county. This system will provide the main trunk lines into which the local roads will feed, and on which will be concentrated the heaviest rural and urban traffic for the whole State. The building of such a system of highways is rightly regarded as a state responsibility and must be financed by the State as a whole. Wherever an attempt has been made to finance a system of state highways through county cooperation, the plan has failed. The system as now laid out contains a little less than 4,000 miles on which it is estimated there are approximately 29 miles of pavement, 110 miles of macadam surfaces, and 1692 miles of low types of improvement, largely gravel and sand clay.

It is apparent that it is not possible to undertake the improvement of such a large system with all high-class roads, nor is such a plan necessary. The practical plan is to proceed each year with as large a construction program as the State can support along two lines:

1. The building of what are known as high types, the paved roadways, where the traffic is now so heavy that any other type of road could not be maintained and would prove a waste of the public funds. The demands for such types of roadways exist where the traffic concentrates near the larger centers of population.

2. The improvement of a large mileage each year by grading, draining, building of permanent waterways, and placing of gravel, sand-clay or other low cost surfaces which will adequately support the traffic under proper maintenance of the strictly rural districts. In time, if and when the traffic becomes heavier, such road beds will be compacted and in far better condition to receive the paved surface than when first built.

These principles do not apply only to Alabama. They are established by the experience, and are applicable to the conditions, of all of the States. Yet no matter how sound the plan of action, it must depend upon the State Highway Department to carry into effect, and the Department must be clothed with authority to decide and must be supported by the people of the State in its decisions.

Right here permit me to pause to pay tribute sincere and heartfelt, to that friend of the good roads movement, Senator Bankhead, of Alabama, who was the Chairman of the Senate Committee on Post Offices and Post Roads when the first Federal Aid Act was written into the Federal Statutes. Senator Bankhead personally, and his committee, stood against all pressure from many and varied sources, and wrote into the first act the principles which have been proven so sound in their application to the highway work in this country. His colleagues at that time from the State, and those who have followed him in both branches of the Congress, have been numbered among the most ardent supporters of the Federal

## Highway laws.

As a system of improved highways becomes a reality in this State, built through the combined efforts of the State and Federal Governments, let us not forget the efforts of those, some of whom are now gone, who were highly instrumental in writing the laws out of which this development has grown.

From 1916, including the present fiscal year, there has been apportioned from Federal funds to the State \$8,365,000. Authorizations have been made by the Congress for Federal aid appropriations for the two succeeding years, from which the State will receive when the appropriations are made, more than \$2,600,000. Since the State funds from the \$25,000,000 bond issue became available in January, 1922, much progress has been made in placing work under construction. Since Federal aid was made available there have been completed 353 miles of highways, having a total cost of \$5,661,000, the average cost being \$10,400 per mile. Projects practically completed or under construction on February 1st totaled 504 miles, and the total cost was \$3,784,000. The total payments of Federal funds up to February 1st amounted to \$2,976,000. Bearing upon the types of highways which have been built, of the 353 miles of completed work there were 3 miles graded and drained, 208 miles of sand clay surface, 97 miles of gravel surface, 5 of water bound macadam, 9 of bituminous macadam, 23 of bituminous concrete, 5 of Portland cement concrete, and bridges totaling

over one mile in length. These figures are indicative certainly of the tremendous responsibility which imposes in the State Highway Department, as that body is responsible for the direct administration of the combined Federal and state funds within the State. The facts as here developed indicate that with the present state of development of highways in Alabama, if the people are to be widely served, the highway department must be left free to plan a program for years ahead, reaching into every county and carried on as rapidly as the physical task may be accomplished and within the available funds. The Alabama highway department can give the administration and supervision necessary to accomplish satisfactory and efficient results if they are given adequate support, not only financial, but the belief and trust of the people of the State.

The details of building a highway are many. The engineering and administrative tasks in building a large mileage of new highways and maintaining those already built are innumerable. Consider the criticisms that have been made in the State and the cost of the making of plans, of surveying, of the necessary inspection of work in progress. A year ago the Bureau of Public Roads was called upon to make a study of the cost of administration by the highway department. But before dwelling upon the cost let us examine some of the reasons why supervision and inspection are necessary.

First, as to surveys. It is true that a survey does not build the road, but the survey and plans determine what the road is to be when completed. There is not a mile of high class modern highway in existence which did not, before the work was started, exist as a pre-conceived idea in the mind of a competent engineer. The surveys measure the amount of work which the contractor has done, and are the basis of the amounts which are paid him.

After the first surveys come the planning of the grades and the design of the road surface. It is in the production of the finished plan that the engineer makes use of not only his own experience and knowledge, but the experience and knowledge of many other engineers who have reduced or are reducing highway planning to careful scientific principles.

And the inspection. The finished highway is not alone the result of surveys or the plans which are made, but also of the workmanship and materials which are incorporated. For example, about two years ago in building a concrete road some unusual cement was used in the construction of the pavement. A few months after that road was opened to traffic, that portion of the road in which this cement was used failed completely. The remainder of the pavement remained in good condition. In the west some concrete cores taken from a stretch of concrete pavement developed a very low strength, and on examination showed that dirty sand had been used in

making the mixture. This section of road failed very badly. When concrete was first used in highway construction, the necessity for carefully proportioning aggregates was not realized, and pit run gravel was used in a county in one of the northern States, and the roadways built failed so badly within a few years that it was necessary to entirely replace them. In another instance limestone was used which carried so much free lime that within a few hours after being placed in the pavement the lime slaked and disintegrated the surface of a section of the pavement so badly that it had to be taken up and re-laid. A northern city prior to 1918 exercised no control over the quality of paving brick used in its streets. After that time specifications were adopted and proper inspection made of the material. These earlier streets now show up in decided contrast to the streets in which material was properly inspected and tested.

The necessity for inspection and control of both workmanship and materials which go into roadway construction cannot be over emphasized. In 1920 the State of Illinois inspected and tested nearly one and one-quarter million barrels of cement and one million cubic yards of aggregates, at a cost of less than one per cent of the total cost of construction. The State of Pennsylvania makes a careful inspection of materials, and the cost has not exceeded one per cent of the cost of construction.



One instance could be added to another to prove that it is not the cost of maintaining adequate inspection and supervision that is expensive to any State, but that it is the lack of competent supervision and inspection which is the costly, inefficient course for any State to pursue. In 1921 the Bureau of Public Roads made a careful study of the cost of the administration and engineering work of the Alabama Highway Department, and found that it was between 5 and 6 per cent of the expenditures for the work supervised.

A study of the expenditures for all the state highway departments, 3% to 12%.

1. Cheapest roads where cost is high - most expensive where cost is low - on same basis.
2. Cost depends upon kind of work.

Summary.