

HIGHWAY ADMINISTRATION IN THE UNITED STATES  
OF NORTH AMERICA

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-by-

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ered at the First Pan American Congress of  
Highways shall be considered as final.

For purposes of administration the highways of the  
United States of North America are divided into three main  
classes: The local roads which are administered by the  
counties or other subdivisions of the States; the principal  
inter-county or State roads which are administered by the  
State highway departments; and the Federal-aid roads or main  
inter-State highways, administered jointly by the State high-  
way departments and the Bureau of Public Roads of the Federal  
Government.

This division of responsibility takes into account the  
relative importance of all roads and gives the responsibility  
for each of the three classes to the units of government most  
directly concerned with each class. Considering the form of  
the government of the North American Republic and the usage  
of the roads it is the most consistent and reasonable system  
that has been devised; and to it is due, more than to any  
other one cause, the great modern progress in road improvement.  
Practically all roads, under this system, are administered,  
financed, constructed, and maintained by one or another of the  
units of government, or by two or more units jointly. The  
toll road system is all but abandoned.

The present methods have been subjected to the test  
of experience and have been found to be thoroughly sound  
under North American conditions. Whether or not they can  
eventually be applied without modification in the South is  
a question which the sound judgment of Latin American  
engineers will decide; but certain basic principles upon

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which the methods are founded have, I believe, a universal application. It is to those principles, rather than to the details of organization that I shall in the main confine my remarks, although it will be perhaps of some advantage to illustrate, by example of the North American practice, the application of the principles.

Before doing so, however, it will be interesting to trace the evolution through which the present methods have developed. No two of the republics of the Western Hemisphere, I presume, have at present exactly comparable highway conditions; and it is probable, therefore, that no single system of highway administration can be devised which would serve with equal efficiency to solve the problems of all the nations. But all are moving in approximately the same direction and meeting successively the same or similar obstacles. It is probable therefore that in the experience of the United States of North America, as the oldest, there may be warning and inspiration to those which have not advanced so far along the common course.

Looking backward one perceives clearly that highway administration in my country has been influenced profoundly by three factors: (1) The state of other arteries of transportation; (2) the mode of highway transportation; and (3) the density of population.

In the early days of the Republic, before there were either railroads or canals, the highways afforded the only arteries of travel other than the natural watercourses. As the possibilities of the latter as means of communication were limited, and as it was imperative that the Federated States should be bound together by ties of common interest and trade as rapidly as possible, the construction of highways was one of the first concerns of the Federal and State governments. The interest of the States and the newly created Federal Government in these highways was at least as great as that of the local communities through which they passed, for they were at one and the same time the inter-State connections, the joiners of towns, and the ways between the villages and the plantations,

At this period, then, we find the States and the Federal Government taking a very active interest in the highways, and making provision for their improvement either by direct appropriation of public revenue or by franchises granted to turnpike companies. The National Pike, built under the laws of the State of Maryland from Baltimore to Cumberland,

Maryland, and by direct Federal appropriation and under the direct supervision of Army engineers westward almost to the Mississippi River, is the classic example of early highway building. The State of Kentucky early began the building of State highways under an administrative organization strikingly similar to the modern State highway departments. Other States depended to a great extent upon private enterprise to build and maintain the roads with tolls collected from travelers; but it is likely that those States, also, would in time have developed State administrative organizations had the functions of the highways not been suddenly altered by the perfection of the steam locomotive and the construction of railroads.

At once it was evident that the railroads would take the place of the highways as the arteries of communication between distant communities and States, and the latter soon ceased to be objects for the consideration of the States and Federal Government. They became of local importance only, and their administration was lodged in the county and township governments where it was destined to remain for almost 75 years. As railroad lines and branches grew into a great network covering the entire country; as the speed, comfort and safety of railroad transportation increased, and the cost decreased - the old primitive methods of highway transportation remaining unimproved - the roads lost all State and national significance and came to be recognized so distinctly as the concern of the local governments only that it has been difficult for the major governments to regain the measure of control that is necessary and proper under modern conditions.

These modern conditions are the product of the motor vehicle, the effect of which has been to increase the distance of highway travel, to greatly increase the density of traffic, and raise again the character of some of the highways to the level of inter-State and main inter-city arteries. It is the recognition of the need for the correlation of such highways on a State-wide and inter-State basis, and of the inability of local governments to provide the character of improvement required, that has brought on the modern renaissance of State and Federal control.

The motor vehicle has also been the principal cause of the final abandonment of the toll road system. In the early days of the Republic that system was perhaps more feasible than any other. Population was sparse. The distance between settlements was great. The productivity of the land was low. Rural communication developed only a very light

traffic; but the travel between the rapidly growing towns of which the highways were the only connectors multiplied fast to very considerable proportions. Through highway service was necessary and vital; but to have taxed the land through which those highways passed would have been to place the burden upon those who made the least use of them.

The resort to taxation of the traffic was the obvious solution, especially since there was as yet no sufficient development of the State community to enable the people of a unit as large as the State to recognize a general or common benefit in the improvement of the through roads.

When settlement increased and public interest in the through roads might have led to public control and the abandonment of the toll system; the fast developing railroads took over the field of long-distance transportation, and left to the highways only a local traffic. The long-distance highways remained under the control of the chartered turnpike companies whose revenues, greatly reduced by the dwindling of the through traffic, were insufficient for the proper repair of the roads. So while the toll system remained in force, largely from lack of public interest, the fine highways which had been built under it in the stage-coach days fell gradually into a state of repair but little better than that in which the local roads were kept by the inexperienced county and township overseers.

This condition remained until motor vehicle traffic had reached a fairly advanced stage. A few toll roads still exist, but all will be taken under public control in the very near future. Two causes have led to their abandonment: Primarily the irksomeness of the methods of toll collection to users of fast-moving motor vehicles; but the broader ground has been the recognition of a general or common interest in the main highways. This latter condition is the result of the wide distribution of motor vehicle ownership and the high development of the State community.

The creation of the first State highway department in New Jersey in 1891 antedated the coming of the automobile as a practicable facility by only a few years. This first step toward a revival of State participation was made in response to the demands of the cyclists as was also the creation of the Massachusetts commission in 1892 and the Federal office of road inquiry, the forerunner of the present Bureau of Public Roads in 1893.

These early State and Federal bodies, however, exercised little or no actual control over the construction and maintenance of the roads. Their functions were mainly educational and advisory; and the general condition when the rapid development of motor vehicle usage began was the same as it had been for 50 years before. The counties were in complete control. The habit of a half century was difficult to break. People had become accustomed to thinking of the highways as of local importance only, and long after the conditions justifying such control had been changed by the automobile the change was not recognized. Highway administration had become involved with the conception of local self government and the local governments were loath to relinquish their control.

For this reason the framers of the New Jersey law were careful to vest in the local authorities the initiative in drawing the State into participation. If they invited the aid of the State, the highway department was prepared to develop plans and specifications for the road improvement and to inspect and supervise the construction. But the contracts were let by the counties, and the roads, after construction, remained as county roads subject to maintenance by the local unit. More as an inducement for the counties to seek the aid of the State department than from any recognition of responsibility on the part of the State, funds were appropriated by the State legislature from which to pay a portion of the cost of the road construction.

This was the first establishment of the principle of State aid. With minor modifications it was subsequently adopted as the first step in State participation by every other State.

In some States the aid offered consisted only of advice which might be accepted or rejected by the local authorities who retained absolute control over all roads. In such States no financial aid was extended. In those States which provided for financial aid its acceptance generally implied an agreement on the part of the county to accept the supervision of the State authorities until the work of construction was completed, after which the road reverted to full county control. In still other States the joint participation of the State and county in the construction of certain classes of roads, generally the most important ones, was made mandatory; and there were still other variations which differentiated the systems adopted by the several States.

Many of the States still retain the State-aid policy for certain classes of roads in conjunction with the policy of complete State control of the principal State roads; in some States it remains as the only form of State participation except for the Federal aid roads on which complete State control is required by the Federal law as a condition precedent to the granting of the Federal aid.

But the experience of the States which have operated for the longest periods indicates that not many years elapse after the adoption of the State-aid principle before it begins to be realized that for the problem presented by the main roads there is only one adequate solution - complete State control. Not a single State that has adopted this principle has receded from it. The State-aid principle has not been entirely abandoned in these States. In practically every one it is retained and employed as a means of developing the more important lateral roads; but their experience indicates that the only hope of developing a connected system of main State arteries is for the State to assume full control and financial responsibility for the construction and maintenance.

There are several compelling reasons for this, which will eventually lead all States to adopt the plan. It has been definitely proved that complete connection of main arteries cannot be made so long as there is any dependence upon county cooperation. The sections of the roads in the various counties are not invariably the roads in which the county has the greatest interest, and in such cases it is difficult to secure county cooperation.

By their very nature the roads of the State system are the most heavily traveled roads of the State; their traffic demands a higher type of improvement than is required for most other roads. In many instances the traffic which demands the improvement is largely extra-county traffic and the county is unwilling and often financially unable to assume its share of the cost of improvement.

The heavy traffic on the main roads is made up largely of vehicles passing from city to city. Not infrequently the city origins and destinations are not included in a county through which a large portion of the route runs, and such a county almost invariably demurs to the proposal that it appropriate a goodly portion of its construction funds for the improvement of the road.

There is an insistent county demand for the distribution of the State-aid funds in proportion to the incidence of the taxes, or the mileage of road, or the area, or on some such proportionate basis which will secure to each county its full share of the State appropriation. Seldom can a system of State roads be so selected that the length of road in each county is proportioned on any such basis. The prime consideration in the location of the State roads is to serve the State needs, and county lines are ignored, or should be. Here then is another obstacle to a proper development of State roads under the State-aid system.

Finally, it has been found that the counties cannot be depended upon to maintain the roads after completion. Even if the county which lies in the path of inter-city travel can be prevailed upon to appropriate its proportion of the cost of construction it soon wearies of the burden of maintaining the road for the use of extra-county traffic.

These are the causes which, under modern traffic conditions in my country, militate against the success of complete or partial control of the improvement of main highways by the local governments; and they are the reasons which induced the Federal Congress to provide in the Federal-aid legislation that all States should have an adequate State highway department with sufficient authority and funds under its control to exercise complete jurisdiction over the construction and maintenance of the Federal-aid roads.

The first Federal-aid legislation was enacted in 1916. It provided for the improvement of roads under the joint supervision of State and Federal authorities and for the payment of any amount up to one-half the cost of the construction by the Federal Government, the roads to be maintained by the States. To administer the work for the Federal Government it designated the Secretary of Agriculture who delegated the details of administration to the Bureau of Public Roads which, by virtue of its intimate knowledge of the roads of the country resulting from its long-continued educational and investigational activities, was well fitted to assume the burden. To insure adequate State supervision it required that every State, to receive the benefits of the Federal aid, should have a State highway department equipped with sufficient authority to carry on the work efficiently.

This latter requirement had the immediate effect of causing the creation of highway departments in the 17 States which up to that time had not adopted this reform which had been proved by the experience of the leading States to be necessary for efficient control.

In 1921 this legislation was amended to provide that the expenditure of the Federal funds should be limited to the improvement of a restricted system of main inter-State and inter-county roads consisting of not more than 7 per cent of the total mileage of highways in the country, and known as the Federal-aid highway system. It also added the provision that the highway departments required by the earlier act should have under their direct control sufficient funds to insure the proper construction and maintenance of the roads; and, although the maintenance was still left with the States, it provided stringent requirements covering that important phase of the work with a penalty for their non-observance.

Against this background of historical development and principles the details of present methods of administration can be very quickly filled in.

The Federal-aid road work is administered jointly by the States and Federal Government. Projects are initiated, surveys and plans are made, contracts are let, and construction work is supervised directly by the State highway departments subject to the approval of the Federal Secretary of Agriculture who acts through the agency of the Bureau of Public Roads. The Federal approval is given force and effect through the power to withhold Federal aid for work which does not receive such approval.

The entire personnel of the Bureau of Public Roads is covered by the Federal civil service act which is designed to insure selection on the basis of merit and to prevent removal for political reasons. The headquarters office at the national capital is headed by the Chief of Bureau, under whom is a chief engineer and divisions of design, construction, bridges and research, the heads of which constitute the advisory engineering staff of the Chief of Bureau, in addition to which there is a division of control in charge of fiscal matters and minor divisions in charge of the legal work and publicity.

This part of the organization is located at Washington. There are in addition 12 district offices each headed by a district engineer who has charge for the Federal Government of all Federal-aid road work in the States which are included in his district, and under whom are engineers who represent the Bureau in each of the States. Four of these districts include the States of the far west in which, in addition to the Federal-aid road work the Bureau is also responsible for the construction of national forest roads.



The engineers in charge of these districts report directly to a deputy chief engineer whose office is on the west coast, and he in turn reports to the Chief of Bureau. All other district engineers report directly to the Washington headquarters.

A State desiring to receive Federal aid in the construction of a section of road which is included in the designated Federal-aid highway system submits to the Federal district engineer a statement of its intentions, describing the location of the road, its length, the character and amount of traffic it serves, the character of improvement proposed, the width of pavement and other general data, together with an approximate estimate of the cost of the construction and a request for a definite allotment of Federal-aid funds. The district engineer investigates the conditions surrounding the project and on the basis of his investigation transmits the proposal to the Washington office or the office of the deputy chief engineer, as the case may be, with his approval or disapproval. Meanwhile the State highway department proceeds to make the necessary surveys and to develop the detailed plans, specifications and estimates. If the project is approved by the Chief of the Bureau it is submitted to the Secretary of Agriculture and when it receives his approval a definite legal agreement is entered into between the State highway department and the Federal Government in which the portion of the cost to be paid by each party and other details of the cooperation are clearly set forth.

The plans, specifications and detailed estimates being completed by the State highway department, these, in turn, are forwarded through the district engineer to the central office of the Federal bureau, and the State highway department proceeds to let the contract for the construction work subject to Federal approval.

The immediate supervision of the construction rests with the State highway department, but the work is inspected at frequent intervals by the district engineer or one of his representatives. If the work done is satisfactory the Federal Government will make progress payments of its share of the cost to the State which deals directly with the contractor, and a final Federal inspection after the completion of the project serves as the basis for the closing of the transaction between the two governments.

Every project, after completion of the construction is periodically inspected by the Federal engineers to ascertain whether it is being satisfactorily maintained by the State. If it is not the Secretary of Agriculture so notifies the State highway department which must, within 90 days, perform the work of repair required. The State failing, the Secretary will order the work done by his own forces defraying the cost from any Federal funds remaining to the credit of the State and refusing to approve further construction until the maintenance expenditure is refunded by the State. When refund is made the amount returned is apportioned among all the States so that the offending State loses all but its pro-rata share. Fortunately it has not been necessary to invoke this authority of the Federal Government.

The State highway departments, which have immediate supervision over the Federal-aid roads and which administer also the State and State-aid road work with various degrees of authority are generally of two classes with respect to their overhead administrative control. They are headed either by a commission, board, or other elective or appointive body or by a single commissioner appointed by the Governor of the State.

Only nine States have the single-headed form of department. The other 39 States have commissions or boards with membership varying from 2 to 15. In five States the administrative body consists in whole or in part of the Governor of the State and other elective officials serving ex-officio; in two the membership is made up in part of educators holding chairs of engineering in a State engineering school; in four the members of the commission represent congressional districts or other political subdivisions of the State; and in all others the members are appointed by the Governor at his discretion.

In all States in which the administrative head is a single commissioner a salary is paid which in some cases is purely nominal considering the character of the services rendered. Commissions consisting of more than a single member in a number of States are not paid for their services, and receive only an amount sufficient to cover the expenses incurred in the performance of their duties.

Practically all States employ as the head of the engineering work of the department and generally as the chief

executive officer a highway engineer who is, in all cases, a salaried official, appointed either by the Governor or by the commission.

Under this administrative and executive direction the personnel of the departments ranges in numbers from less than 50 employees of all classes to more than 3000. Of the 48 departments, one has less than 50 employees, 4 have between 50 and 100, 10 have between 150 and 200, 12 have more than 200 and less than 500, 10 have between 500 and 1000, 5 between 1000 and 2000, 4 between 2000 and 3000, and 2 have more than 3000 employees.

The forms of organization of the State highway departments differ in detail. In general, there are two main classes: Those which, like the Bureau of Public Roads have a district organization reporting directly to the chief engineer and administrative head who are supported by a headquarters staff made up of divisions of construction, maintenance, etc.; and those in which there are main divisions of the headquarters organization with the head of each in charge of all construction, maintenance, etc. in the State, and these divisions operating through district representatives. The latter is a more highly centralized form of organization than the former.

Between the two extremes there are variations in form to describe which would require a detailed statement of the organization of each department; but the two principles can be clearly illustrated by reference to the two States of North Carolina and New Jersey.

The organization of the North Carolina department is an example of the first or decentralized form. At the head of the organization is the State highway department consisting of a chairman and 9 district commissioners representing the 9 highway districts into which the State is divided. All commissioners, including the chairman, are appointed by the Governor subject to the confirmation of the State Senate. Branches of the organization dealing with matters of equipment, accounting, purchasing of supplies, files and records, and publications come directly under the commission. All engineering work is under the direction of the State highway engineer who reports directly to the chairman of the commission, and who has under his supervision headquarters divisions of bridges, drafting, location, maintenance and construction. All surveys, plans and estimates for bridges and roads are made by the divisions of bridges, drafting and location. The

division of construction functions as an advisory organization mainly, but its construction engineers make periodic inspections of all roads under construction as a check on the efficiency of the district organization. The division of maintenance, headed by the State maintenance engineer exercises a more direct control over the maintenance of the roads, but it also functions principally in an advisory capacity. The actual work of construction and maintenance is supervised by the district engineers in charge of the nine highway districts with the aid of their subordinates. Each district organization is, in effect, a separate body with full authority, under the State highway engineer, over all work of construction and maintenance in the district, yet closely connected with the other branches of the commission. To carry on their work the district engineers have under them a force of maintenance supervisors, resident engineers, patrolmen, construction field parties, reconstruction parties and inspectors.

Compared with this organization of North Carolina, the organization in New Jersey will be found to be fundamentally different. It also is headed by a commission appointed by the Governor with the consent of the State Senate. The commission consists of a chairman and three other commissioners. There is also a State highway engineer and a business organization in charge of accounts, records, etc., reporting directly to the commission. But there the similarity to the North Carolina organization ends. Under the State highway engineer are a construction engineer, a chemical engineer, a superintendent of plant and equipment, and a superintendent of maintenance. Each of these officials is in charge of a major division of the department's work and exercises direct supervision over the field organization formed to carry on the work. The chemical engineer has charge of the testing of all materials used in the roads. The superintendent of plant and equipment has charge of all machinery and equipment used. The construction engineer supervises the making of surveys and plans for road and bridge construction, and the acquisition of rights of way, and, through five subordinate division engineers, all details of the construction work. Finally, the superintendent of maintenance has charge of the maintenance of all roads, exercising his authority through six supervisors of road and bridge maintenance who have under them the foremen, patrolmen and inspectors to perform the actual work or direct the labor of others.

Taking these two organizations as types, it may be said that the majority of the State highway departments conform more closely to the North Carolina type, although as I have previously said, there are numerous differences in detail which distinguish each department from all others. No two are exactly alike.

In the performance of the works of surveying, designing, constructing and maintaining the highways and their appurtenant bridges and structures, practically all of the State highway departments make the surveys and prepare the plans with their own engineering forces. A few of the smaller organizations employ regularly or occasionally private engineers both for road and bridge designs. The majority occasionally call in expert assistance in the design of large bridges.

As a general rule construction work is done by contract according to the specifications and plans prepared by the department. There are occasional exceptions in which the work is done by labor employed and paid directly by the department, especially in those States which so employ State convicts.

The maintenance of the roads, on the contrary, is generally performed by State labor forces, with exceptions in the case of such operations as the surface treatment of macadam roads which are in some States performed by contractors.

In conclusion, I shall add just a word with reference to the character of administrative organization in charge of the county or local road work. In certain of the States such roads, and indeed the main roads also, are improved under especially created bodies known as road district commissioners. Such bodies function only with respect to the improvement of the roads included in the districts, generally narrowly restricted, for which they are created. This is the road-district plan.

Mainly, however, the local roads are administered by boards of county commissioners or equivalent elective bodies of the counties or townships. These bodies are generally made up of one commissioner from each election district or precinct of the county; and they are the sole governing bodies of the counties. With respect to the

highways they function as an administrative body, employing labor, or entering into contracts for the construction and maintenance of the roads. In the wealthier and more progressive counties the board of commissioners employs an engineer or an engineering staff to attend to all engineering details of the highway administration, and highly commendable work is done. In hundreds of counties, however, the simple methods of road repair practiced for more than a hundred years prior to the appearance of the automobile, are still followed without the least engineering guidance.

The bulwarks of the system of road administration in the United States of North America are the State highway departments. The Federal Bureau of Public Roads is the national coordinating agency, and the leader in experimentation and research. The county roads administrations are, with conspicuous exceptions, the weak links in the chain; in form and efficiency but little improved since the days of the horse and wagon; and unreformed only because the needs of transportation have not yet urgently demanded a more effective control for the local roads of light traffic which they have in their charge.