THE IOWA STATE HIGHWAY COMMISSION

A STUDY IN ADMINISTRATION

Since its creation in 1904, the Iowa State Highway Commission has had an increasing influence upon the road-making program of Iowa, and it has progressively received more and more control, either direct or indirect, over the roads of the State. During this period, the Commission has, at times, been the object of a good deal of criticism from those opposing its road programs, the method of administration, or the organization of the Commission. Now, when the Commission has received complete control of the primary road system of the State, it seems that a critical study of the organization, the system of administration, and the functions of the Iowa State Highway Commission should be of interest.

LEGISLATIVE BACKGROUND

A brief study of the laws relating to the Commission shows the gradual increase in the powers granted to it and leads to a better understanding of the present organization.

Experimental work conducted by the Division of Engineering of the Iowa State College of Agriculture and Mechanic Arts in 1902 attracted wide attention and contributed in no small degree to the enactment of the law creating the Commission.[1] It was not until 1904, however, that the question of creating a State Highway Department at Iowa State College and providing an appropriation came before the General Assembly. Public sentiment was not favorable at that time, and it soon became clear that a separate department could not be established.

[1] Brindley's *History of Road Legislation in Iowa*, p. 217.

In order to save something of the plan, Representative F. F. Jones of Montgomery County introduced a bill providing that Iowa State College should act as a State Highway Commission.[2] This bill was passed by the General Assembly and the money for the support of the highway work was included in the regular college budget for experimental purposes, subject to the control of the Board of Trustees.[3] The following powers and duties were specified in the law.

1. To devise and adopt plans and systems of highway construction and maintenance, suited to the needs of the different counties of the state, and conduct demonstration in such highway construction, at least one each year at some suitable place, for the instruction of county supervisors, township trustees, superintendents, students of the college, and others.

2. To disseminate information and instruction to county supervisors, and other highway officers who make requests; answer inquiries and advise such supervisors and officers on questions pertaining to highway improvements, construction and maintenance, and whenever the board of supervisors of a county adjudge that the public necessity requires a public demonstration of improved highway construction or maintenance in said county, and so request and agree to furnish necessary tools, help, and motor power for same, the commission shall furnish as soon as practicable thereafter, a trained and competent highway builder for such demonstration free to the county.

3. To formulate reasonable conditions and regulations for public demonstrations; and to promulgate advisory rules and regulations for the repair and maintenance of highways.

4. To keep a record of all the important operations of the highway commission, and report same to the governor at the close of each fiscal year.[4]

[2] *Journal of the House of Representatives,* 1904, p. 578.

[3] *Laws of Iowa,* 1904, Ch. 156.

[4] *Laws of Iowa,* 1904, Ch. 105.

The deans of the divisions of agriculture and engineering were appointed by the Board of Trustees to serve as the Commission, and T. H. McDonald was engaged as an assistant, giving all his time to the work. This statute of 1904 marks a very important step in the road legislation in Iowa, and from this time on, the good road movement has made steady progress. The work of the Commission, though limited by lack of funds, was well planned and was carried out along scientific lines. A program of constructive reform along the line of road legislation and administration was outlined. Road conditions were investigated in different sections of the State and road maps prepared for about twelve counties. A preliminary investigation was made in regard to the amount of road funds raised and expended in the different counties. An investigation of road materials in Iowa was also made and published.[5]

In 1905, the Commission published a manual for Iowa State highway officers. This contained a summary of the road laws with interpretations as to their meaning, the procedure in the consolidation of road districts on the basis of civil townships, the method of appointment of a township road superintendent, the summary of the work of the Commission itself, directions for the construction and drainage of permanent highways, and instructions for locating and maintaining these roads.[6]

The first annual report of the Commission gives a clear conception of the work done by it during this period. This report was presented in four main divisions: (1) investigations; (2) experiments; (3) plans and publications; and (4) the road school. The report included also a discussion of the topography of the State, an account of the road and

[5] Brindley's *History of Road Legislation in Iowa*, p. 221.

[6] Iowa State Highway Commission's *Manual for Iowa Highway Officers*, 1905.

bridge work carried on in various counties, the expenditure of different road funds, and the results of certain experimental work along the line of traction resistance, gravel roads with clay binder, stone roads, and certain problems in concrete.[7]

In 1913 the forces in favor of centralized control of highway administration succeeded in placing a more comprehensive law on the statute books, and a new Commission was formed, to be composed of three salaried members. The Dean of Engineering at the Iowa State College was made *ex officio* a member of this board. The other two members were to be appointed by the Governor for a period of four years.

The increase in the powers and duties of the Commission is clearly shown by a comparison of the statute of 1904 given above with the following provisions of the new law:

1. To devise and adopt plans of highway construction and maintenance suited to the needs of the different counties of the state, and furnish standard plans to the counties in accordance therewith.

2. To disseminate information and instruction to county supervisors and other highway officers, answer inquiries and advise such supervisors and officers on questions pertaining to highway improvements, construction and maintenance and of reasonable prices for materials and construction.

3. To keep a record of all important operations of the highway commission and to annually report the same to the governor by the first day of December, which report shall be printed as a public document.

4. To appoint such assistants as are necessary to carry on the work of the commission, define the duties and fix the compensation of each, and terminate at will the terms of employment of all employes; provide for necessary bonds, and fix the amount of same.

[7] *Annual Report of the Iowa State Highway Commission,* 1905, p. 6.

5. To make investigation as to conditions in any county, and to report any violation of duty, either of commission or omission, to the attorney general, who shall take such steps as are deemed advisable by him to correct the same.

6. The state highway commission shall have general supervision of the various county and township officers named in this act in the performance of the duties here enjoined, and shall have full power and authority to enforce the provisions of this act.

7. To perform all other duties required by law.[8]

In addition to this extension of power, the Commission was placed in a much better position in regard to finances, for it was given, as a maintenance fund, eight per cent of all the money paid into the State Treasury for the registration of motor vehicles.[9]

The Commission was also given the power to pass upon plans for permanent road improvements throughout the State, and its approval was necessary for the validity of any contract for the construction or the repair of any bridge or culvert the cost of which exceeded $2000. The Commission was thus placed in a position to make its influence more effective in the actual work of improving the roads. The same law also provided that the board of supervisors of each county must employ a competent engineer or engineers to supervise the building of permanent roads in the county.[10] This law marked the beginning of the transfer of road control to the State.

In 1917 the Thirty-seventh General Assembly passed an act that still further increased the powers of the State Highway Commission. This act provided for the acceptance by Iowa of the provisions of the Federal Road Aid Act and for the expenditure of the money through the coöperation

[8] *Laws of Iowa*, 1913, Ch. 122, Sec. 3.

[9] *Laws of Iowa*, 1913, Ch. 133.

[10] *Laws of Iowa*, 1913, Ch. 122, Secs. 4, 12.

of the boards of supervisors and the State Highway Commission.[11]

The law of Iowa in regard to the administration and distribution of the Federal aid money was in harmony with the demands of the Federal aid law when the acceptance was made in 1917, but in 1921 the Federal law was revised in such a manner as to make the Iowa law conflict with the United States law in two important details: first, the new Federal law required that the maintenance of primary roads assisted by Federal aid must be under the direct control of a State highway authority and not under the control of county boards as the Iowa law provided; second, the new law required that Federal highways should be surfaced in a manner suited to the traffic on such highways, and that the State Highway Commission must have the power to determine and select the type of surfacing for such highways and to initiate improvement projects. Under the Iowa law the county boards of supervisors had sole power to initiate improvements and to determine what the surface should be. The Federal government allowed the States a five-year period of grace — or until November 9, 1926 — to comply with these provisions.[12]

The Forty-first General Assembly, which convened in January, 1925, rewrote the Iowa primary road law in such a way as to bring it into harmony with the Federal Aid Act, and while the powers of the Commission were not increased to the point hoped for by some, there was, of necessity, considerable increase in both its powers and its influence.

The law of 1925 includes the following provisions:

[11] *Laws of Iowa*, 1917, Ch. 249.

[12] *United States Statutes at Large*, Vol. XXXIX, Pt. 1, p. 355, Vol. XL, Pt. 1, p. 1201, Vol. XLII, pp. 212, 661; *Annual Report of the Iowa State Highway Commission*, 1922, pp. 14, 15.

1. The highway commission shall have general authority and supervision over the maintenance of the primary roads outside of cities and towns and along the corporate limit lines thereof, and are hereby instructed to cooperate with the various county boards of supervisors. . . . In case of disagreement as to policy . . . . the decision of the highway commission as to policy shall be final.

2. Road machinery purchased by any county out of the primary road fund, and government trucks or tractors used by any county for maintaining primary roads shall be available for use by the highway commission in maintaining the primary roads of said county.

3. Before the primary road fund is allotted among the counties each year, there shall be set aside the federal aid road fund and an amount equal to the amount received from the federal government as road aid during the year, to constitute a primary road development fund, which primary road development fund shall be expended under the jurisdiction of the state highway commission for the improvement of primary roads. In the expenditure of the primary road development fund the commission shall have the power to receive bids, award and execute contracts and proceed with the construction work and all the provisions of the primary road law so far as applicable, shall apply to the work done and the expenditure of said fund. . . .

4. The highway commission is authorized to purchase road material and machinery for primary roads after receiving competitive bids and to pay for same out of the primary road development fund.

5. The state may purchase or condemn any corporate or private personal property, including manufactured or processed commodities that may be needed for the construction, maintenance or repair of the highways of the state.[13]

The most important gain for the Commission under the act of 1925 was the grant to it of absolute control of the primary road development fund. This fund was to be ex-

[13] *Laws of Iowa*, 1925, Ch. 114.

pended by the Commission *upon its own initiative* for the improvement and construction of the primary roads. Before this time the Commission had been forced to depend upon the boards of supervisors to initiate improvement projects, a limitation which often resulted in delay and lack of continuity in the road improvements. The Commission now had available a fund that could be used to complete the gaps in the improvement of the cross State primary roads.

The law was indeed a victory for the centralizing forces and this increase in powers pointed out the advisability of placing in the hands of the Commission complete control over the primary roads. This final step was taken by the Forty-second General Assembly in 1927. The act passed at this time placed complete control of the primary roads in the hands of a reorganized Highway Commission, consisting of five appointive members.

The forces of centralized control had at last gained their point. With the Iowa State Highway Commission in complete control of the primary roads of the State it has remained for the Commission to prove itself equal to the task of carrying out the work efficiently and economically.

PERSONNEL AND ORGANIZATION OF THE COMMISSION

At the head of the highway organization of Iowa is the State Highway Commission, composed of five members appointed by the Governor with the approval of two-thirds of the Senate in executive session.[14] A temporary provision was made for the appointment of the first Commission under the act of 1927. Under this temporary provision, the Governor appointed three members of the Commission, with the approval of two-thirds of the Senate in executive session. One of these was to serve from July 4, 1927, until

[14] *Laws of Iowa*, 1927, Ch. 102, Sec. 1.

July 1, 1929, and the other two from July 4, 1927, to July 1, 1931. The two remaining members were to be the appointive members of the former Commission, who were to serve out their terms, one going out of office on July 1, 1929, and the other on July 1, 1931.[15] Clifford L. Niles, Carl C. Riepe, H. A. Darting, H. E. Dean, and T. J. O'Donnell constitute the present Commission.

The number of members on a board or commission is, of course, always a subject for debate. It is agreed, however, that it should be large enough to secure various points of view and debate on matters of policy and that it should not be large enough to interfere with efficiency of administration. The Iowa State Highway Commission, with its five members, is well within these limits. Its work being of a policy determining nature, a multiple executive is desirable. It is true that under this type of organization policies must be discussed and debated before decisions can be made and more time is required than would perhaps be necessary with a single executive. This discussion by the members, however, usually leads to better and more clearly defined decisions.

Although it is not compulsory or even suggested in the law, the different members of the Commission as a rule come from different parts of the State and have, through personal knowledge, a better understanding of the road problems of the different sections than a single executive could have. The only specified qualifications are of a political nature, the law stating that not more than three members shall belong to the same political party.[16] This provision was intended to remove the Commission from party politics by providing members of both parties on the

15 *Laws of Iowa*, 1927, Ch. 102, Sec. 2.

16 *Laws of Iowa*, 1927, Ch. 102, Sec. 1.

Commission. Such a board, however, is bi-partisan rather than non-partisan.

The term of each Commissioner is four years, two members being appointed during one biennial period and three members during the following biennial period. Since the Governor serves for only a two-year term, it would seem that partisan influence has been reduced to a minimum. No board or commission, however, should be entirely removed from political control or responsibility to the people. In the case of the Iowa State Highway Commission, a Governor who serves two terms is able to change the personnel of the Highway Commission if he cares to do so. Thus the Commission is subject, indirectly, to popular control.

Members of the Highway Commission may be removed from office for cause under the so-called Cosson Law and, like other appointive officers of the State, they are also removable, for cause, by the Executive Council. The matter of removal, however, has not been raised in Iowa, so far as the State Highway Commission is concerned.[17] Each member of the Commission must give bond in the sum of five thousand dollars. Vacancies are filled by the Governor subject to the approval of two-thirds of the Senate, within thirty days after the convening of the General Assembly. Each member of the Highway Commission receives a salary of four thousand dollars a year. They also receive their actual and necessary expenses.[18]

It is not the function of the five Commissioners to perform the detailed engineering and routine duties, "but to act in the capacity of a governing board or board of directors, to determine questions of policy, to hire and develop into a working organization a staff of engineers and assist-

[17] *Code of 1927*, Secs. 1091, 1114; Patton's *Removal of Public Officials in Iowa* in *Applied History*, Vol. II, p. 399.

[18] *Code of 1927*, Secs. 1063, 4624; *Laws of Iowa*, 1929, Ch. 27, Sec. 1.

ants, and in general to perform such functions as fall naturally to the governing board of any large business organization."[19]

The State Highway Commission deals largely with engineering problems. It establishes standard plans for road and bridge work. It constructs and maintains primary roads and the bridges thereon. It furnishes engineering assistance to the counties in solving their road and bridge problems and it checks and approves certain road and bridge contracts after they have been awarded by the county supervisors.[20] This work is under the direction of trained engineers appointed by the Commission, but in deciding what policies are to be followed and in matters of dispute, the Commission makes the decision. The Commission is at all times the final authority on any question.

The law places the entire control of the administration, with the exception of the finances, in the hands of the Commission. In no place in the act is the form of organization specifically determined, although in several places the existence of an organization is implied. An example of this is the requirement that all engineers give bonds.[21] The first act of the Commission in 1904 was, of necessity, one of organization. The organization was at first rather limited, as was the work that the Highway Commission was to perform.

As the powers and duties of the Commission were expanded, the organization expanded and departments were created and changed to meet the new demands. The ability of the organization to develop and change to meet the ever-increasing duties, without complete reorganization, has

[19] *Annual Report of the Iowa State Highway Commission,* 1916, p. 51.

[20] Iowa State Highway Commission's *Service Bulletin,* Vol. X, 1922, Supplement to March number, p. 6.

[21] *Laws of Iowa,* 1927, Ch. 101, Sec. 14.

been of untold value in the work of the Commission. No administrative system is at any given time perfectly adapted to its work, but it is in a continual process of becoming better adapted to it.[22] As an example of this we find that, in the beginning, road design and bridge design were of such prime importance that each was established as a separate department, but later when much of this work was finished, the two departments were combined into the department of design. The Highway Commission's organization is highly centralized as to control and responsibility, though in its practical workings this feature is often modified. In actual practice every effort is made to eliminate unnecessary official red tape.

The Commissioners meet regularly once a week on Monday afternoon, though press of work may result in special meetings being called at other times. As a rule all members are present, but at times this is impossible and the work is carried on by those present. The Commission follows the ordinary procedure for the conduct of business. A quorum consists of three members and a majority vote rules, but, as a matter of fact, action is never taken on any important matter until the full Commission is present. The chief engineer is usually present during part of the time to advise, present plans, and to explain work already done, but as the meetings are sometimes long, he may not be present all of the time, being called in if the Commission so desires.

The Commission makes an effort to secure all the information possible, to enable it to make the best possible decisions. The heads of departments are often called to give expert information as to what has been done or what is best to be done under existing circumstances. In fact

[22] Mathew's *Principles of American State Administration*, p. 19.

the Commission constantly makes use of the entire organization for technical information and advice.

District engineers may be present on request to present in detail certain problems involving their districts and of which they have direct and personal knowledge. In addition to the above sources of information, which are directly under the control of the Commission, there is another group of individuals eager to give their point of view on certain problems. This group is composed of county supervisors, county engineers, road boosters, good roads organizations, voters' leagues, and citizens affected by certain road plans. Each individual or party is given full opportunity to state his or their views, and to present certain facts. After all possible information is obtained, all questions are fully discussed and debated before the final decision is made. The decision may or may not be by formal ballot depending upon the question that is under discussion.

The decision made must be carried out. This is the work of trained engineers. The work is left entirely in the hands of the chief engineer. A number of people object to placing so much authority in the hands of one man and claim that he is the real Commission and that the five Commissioners are only figureheads. This system, however, conforms to the principle of efficient administration. In matters requiring deliberation and the interchange of opinions and views, the participation if not the control of the board or commission is desirable, but the actual management and direction of the affairs of the department should be largely in the hands of the executive officer.[23]

The Commission has placed in the chief engineer's hands authority sufficient to carry out its policies, but it has also placed upon him entire responsibility for the execution of

[23] Mathew's *Principles of American State Administration*, p. 167.

these policies and he can be removed from office by the Commission any time his work proves unsatisfactory. The criticism of undue authority seems, therefore, to be based on a misunderstanding of the relation of the chief engineer to the Commission.

THE CHIEF ENGINEER

The chief engineer is the head of the entire organization. The executive department, composed of a consulting road engineer and certain assistant engineers, is under his immediate direction.[24]

The Commission selects the chief engineer after careful investigation and consideration. In this connection it should be noted that the Commission has seldom exercised its appointive power — F. R. White, the present chief engineer, having served since 1919. His predecessor served from the creation of the Commission in 1904 until 1919.[25] While there is no set list of qualifications, the importance of the position, with its responsibilities and duties, demands that the individual must have many outstanding qualifications in order to carry out the work properly. He must have executive ability, he must possess managing ability of high order, he must be able to carry out the orders and policies of the board, he must be able to see and formulate policies to meet future problems. The salary of the chief engineer is now $10,000 per year.

The chief engineer works directly with the Commission and furnishes expert knowledge when necessary, either through his own knowledge or through one of the departments. He aids the Commission in forming policies, and sees that the Commissioners are properly informed on all matters pertaining to the administration, but his chief duty

[24] *Iowa Official Register*, 1929-1930, p. 143.

[25] *Annual Report of the Iowa State Highway Commission*, 1919, p. 17.

is to provide an adequate organization and to carry out the policies of the Commission.

Regular meetings of the heads of departments with the chief engineer are held on Saturday afternoons. At these meetings the best methods of procedure in carrying out certain problems are discussed; possible future problems are suggested, with plans for their solutions; and information is presented that might aid the Commission in its work or in the formation of future policies. The discussions are general but the chief engineer may call for a vote upon certain matters when he so desires. These meetings often provide valuable material for the organization and the Commission and result in a more harmonious working of the organization.

The chief engineer personally or through his assistants carries out a number of miscellaneous functions. He has charge of all litigation to which the Commission is a party and aids the Attorney General in preparing each case. He aids the Commission in the modification of the county road system, as well as of the primary road system, the law providing that the primary road system may be changed to provide: (a) for more efficient service; (b) for more economical construction; (c) to afford access to cities, towns, and villages; and (d) to afford access to State parks and recreation centers.

It is frequently necessary to make an extensive investigation to determine whether a change shall be made, and if so where the new road shall be located. At the same time proper consideration must be given to all individuals involved as well as to the traffic. This work is under the direction of the chief engineer.

An educational exhibit is maintained at the State Fair comparing the construction work of railroad beds with the old time up-hill and down-hill dirt roads and with the new

methods used in the construction of the primary roads. This is a part of the educational program made use of by all organizations interested in good roads to show the public the need and advantage of good roads and the proper methods to use in obtaining them.[26]

The most important duty of the chief engineer is, however, to perfect an organization that can carry out the policies of the Commission as they are given to him. The Highway Commission reported on December 1, 1930, that their employees at that time numbered 1004 persons, exclusive of the Commissioners themselves and temporary and part-time help. The success of the chief engineer depends upon the success of this organization.

DEPARTMENTAL ORGANIZATION

The main organization is divided into six departments — administration, design, materials, construction, maintenance, and purchases and accounts.[27] All six departments are coördinate, that is, no department is subordinate to another, but all work in harmony. Each department is notified in time to take care of its part of the work when the time comes and each department sees that its work does not delay the other departments. The smooth and efficient working of the organization is a tribute to the ability of the executive who controls it.

The heads of these departments are appointed by the chief engineer with the advice and consent or knowledge of the Commission but as the chief engineer assumes responsibility for the acts and work of each department, it is absolutely necessary that he have subordinates who are answerable directly to him, will coöperate with him, and

[26] *Annual Report of the Iowa State Highway Commission*, 1926, p. 11.

[27] *Annual Report of the Iowa State Highway Commission*, 1929, p. 13. See also blue print of the organization.

in whom he has confidence. He must likewise have the power at any time of removing any subordinate whose work is unsatisfactory so the term of office of these department heads is indefinite. In these positions, as heads of departments, are found the technical experts of the organization, although they must have considerable managing ability along with their technical knowledge.

The head of each department usually has an assistant to aid him in the work. This assistant is appointed by the chief engineer, usually with the consent of the Commission, and with the approval and advice of the head of the department. The head of the department must have full authority over his assistant if the work of the department is to be carried out properly. Each department head is held personally responsible for the work assigned to his department and is given complete control under the supervision of the chief engineer. In fact all down the line the administrative principle of the superior appointing his subordinates is carried out as much as possible with final control always in the hands of the chief engineer and through him in the hands of the Commission.

Department of Administration. — The head of this department must have exceptional ability as an organizer and administrator. The work of the department of administration is divided among three divisions: improvement programs, railroad crossing negotiations, and general administration.[28] All the work of the department is, however, of an administrative nature.

It is the chief business of this department to arrange and carry on all negotiations leading up to the establishment of road improvement projects, to see that surveys, plans,

[28] From a blue print of the organization, furnished by the Highway Commission.

and specifications are prepared and completed on time, letting dates set and lettings properly advertised, lettings held in proper form, qualifications of successful bidders determined, contracts executed, and bonds supplied.

The administration department investigates and approves all projects involving the improvement and extensions of the primary road system including extensions and connecting links within the limits of cities and towns.[29]

An important function of the department is that of designating what projects are to be handled as Federal aid projects. Not only must these projects be investigated as to their merit as primary road projects, but they must also meet additional Federal requirements. If it is decided that the project is to be a Federal aid project plans must be prepared and submitted to the Bureau of Public Roads, with specifications and estimates of the project. If these are approved, agreements are executed with the Secretary of Agriculture whereby Federal aid funds are set aside as the Federal government's share of the cost of the construction. All these negotiations are carried on by the administration department.[30]

It is the policy of the Commission to eliminate railroad crossings upon the primary roads wherever possible, and to cross where necessary by means of subway or overhead crossings. The negotiations with the railroads to secure the necessary agreements to this effect are carried on by this department. The department of administration also acts as a unifying agent for the work of the other departments.

Another important duty of the department is arranging for and taking care of the many details of administration

[29] *Annual Report of the Iowa State Highway Commission*, 1926, p. 22.

[30] *Annual Report of the Iowa State Highway Commission*, 1926, p. 22.

necessary to the letting and approving of contracts for construction work upon the primary roads. Forms must be arranged, notifications sent out, bids received, lettings held, and contracts awarded. This calls for a great deal of important administrative work.[31]

Department of Design. — The head of the department of design, like all the others, is selected by the chief engineer with the approval of the Commission. The work of the department is of such a highly technical nature that the chief engineer must make the most careful investigation before the selection, and must have absolute control over the head of the department if he is to be assured of the successful carrying out of his program.

The qualifications for the office are of an extremely technical nature and demand engineering ability of a high order, as well as executive and managing ability.

Two assistants are provided in the department — an engineer of bridge design and an engineer of road design.[32] These assistants are appointed by the chief engineer with the consent of the Commission and the head of the department. Positions of this kind are of such importance in the organization that every effort is made to secure not only competent men but men who are acceptable to their superiors.

Upon this department rests the first step in the actual construction of the primary roads. It must provide the surveys, plans, and blue prints necessary for the construction work. This work is divided into four divisions — surveys, railroad crossing plans, bridge and road plans, and drafting.[33]

31 *Annual Report of the Iowa State Highway Commission*, 1926, pp. 23, 24.

32 From a blue print of the organization.

33 From a blue print of the organization.

The department makes surveys of the primary roads and prepares field notes from which the plans are made. The survey work is usually carried out by a seven-man survey party though special survey parties are sometimes used. It is often necessary to make surveys of several possible routes in order to determine the final location of the primary road. Further improvement of a primary road may also call for additional surveys.[34]

The question is sometimes raised as to the necessity of certain surveys and resurveys of roads. It is not unreasonable to suppose that some mistakes have occurred, and that certain surveys might not have been necessary, but when we consider that the improvement of roads is always progressive, advancing usually from one type to the next higher, from the "king" drag to blade grading, from permanent grading and graveling to hard surface, it can be seen that it is necessary to run numerous lines of engineering stakes as the improvement progresses from year to year and from type to type.

Constant study is made of existing structures to determine how well different types of construction and materials meet certain conditions, and how improvements might be made in them. Fabricated material for bridge construction is frequently inspected[35] in the shop in order that the department may know that the proper material is used and how it is constructed.

After agreements have been made by the administrative department with the railroads in regard to crossings, it is necessary for the design department to make the special surveys and designs necessary for the work.

The greater part of the work of this department is bridge

[34] *Annual Report of the Iowa State Highway Commission,* 1926, p. 34.

[35] *Annual Report of the Iowa State Highway Commission,* 1926, p. 17.

and road designing. In designing a bridge it is necessary to know the height of the grade level from the water level, the length of the bridge, the area of the territory drained by the stream, the flow of water with necessary flood allowances, besides numerous other details, before the work can be completed.

Standard designs and plans for construction have been issued by the department for certain classes of bridges, culverts, and road construction. Copies of these are supplied to all county engineers.[36]

There are, however, specific and unique locations that demand special designs to meet conditions and these are prepared from field notes secured by the engineers of the department or from notes sent in by county engineers.[37]

The wide knowledge and experience of the department is made available to the counties in solving their bridge and drainage problems. And when the county so requests, the department will give direct assistance in determining the type and character of drainage structures and in the preliminary work in large bridge projects. In addition, the department also checks and approves secondary road plans. These plans, when made for work that is to be paid for wholly out of county funds, are prepared by county engineers, but they are checked and approved by district engineers, and copies are filed with the department.[38]

After the plans are finished, they go to the drafting rooms where the tracings are made for the blue printing process.

[36] *Standard Specifications for Road Construction* in *Service Bulletin,* Supplement to Vol. XV, No. 5; *Standard Specifications for Highway Bridges, Culverts and Incidental Structures* in *Service Bulletin,* Supplement to Vol. XIII, No. 5; *Standard Plans, 1916, Iowa State Highway Commission,* Concrete Box Culverts C series, Concrete Slab Bridges J series, Concrete Deck Girder Bridges H series.

[37] *Annual Report of the Iowa State Highway Commission,* 1926, p. 15.

[38] *Annual Report of the Iowa State Highway Commission,* 1926, pp. 35, 36.

The blue prints are made on the latest type of blue printing machinery. All plans, tracings, and field note books, together with copies of the blue prints, are filed in a fireproof vault. The contractors and inspectors on each project are also provided with sets of blue prints. It is not easy to realize the enormous amount of work and expense that has been required to accomplish the surveys and produce these records.

Department of Materials. — The work of the department of design is but a part of the necessary preparation before the construction work can be done. In addition to plans and designs, the materials to be used and the specifications to be followed must be worked out. This is the work of the materials department.

The same system of selecting the head of this department and his assistant is employed as in the other departments. The qualifications demand wide experience in engineering problems, and a thorough knowledge of materials and the means of testing them. The work of the department is divided into four divisions — material resources, road and bridge specifications, inspection of materials, and research.[39]

Inspectors are sent out to locate and determine the extent of the material resources of the State available for road work. Estimates are also made as to the cost of making the material available. Particular attention is paid to gravel deposits or any rock deposits such as lime rock that might be used in surfacing roads. There are two important reasons for locating the material. The first and more important reason is that it may be used in road work. A second reason is based upon the fact that there are certain deposits of lime rock and other materials which are not especially desirable but which might be used if the cost of

[39] From a blue print of the organization.

other materials reached a certain point. Knowledge of the availability of such material tends to keep the price of road construction at a reasonable level.

Tests are made by the department of materials, and standard specifications for the use of materials are issued. For example, the fine aggregate for concrete shall consist of sand having durable grains, free from injurious amounts of silt, shale, coal, organic matter, or other injurious substances. The shale and coal particles must not exceed one per cent by weight, the silt must not exceed two and one-half per cent by weight, and the sand must not contain any organic impurities. In regard to size of particles one hundred per cent of the sand must pass through a ⅜ inch sieve and not more than five per cent through a No. 100 sieve. These standards provide uniformity and secure the best possible work all over the State.[40]

Special tests are made of bridge and culvert materials, and agreements are made with the manufacturers whereby they agree under an indemnity bond system to maintain certain specifications in material manufactured under stated brands for shipment into or for use in this State. The department places material so branded on an approved list that is available to all persons interested in road materials. This material may be used for road work so long as it is kept up to the agreed specifications. Tests of all material used in the road work are made frequently, however, to determine if it is being kept up to standard.

Close watch is also kept on the prices of materials and upon the trend in prices, and this information is available to the counties upon request. This reliable information as to the fair price of material should result in a considerable saving to county authorities. Although approval by

[40] *Standard Specifications for Road Construction* in *Service Bulletin,* Vol. XV, 1927, No. 5.

the Commission of material contracts for bridge and culvert materials awarded by counties on the basis of bids received at public letting is not required by law, many of the counties voluntarily submit such contracts for review. The department checks and returns them with the decisions and recommendations of the State engineers.[41]

A very important part of the work of the department is that of testing materials used in road work. These materials are not only tested as to quality or grade but tests are also made in order to determine just what materials are best for certain purposes. All classes of materials used on the primary and secondary roads are tested in various ways. The following list gives some idea of the nature of the material tested but is not all inclusive: cement, aggregate, combined aggregate, drain tile, reinforcing steel, metal culvert pipe, bituminous materials, water, stone, posts, guard rail cable, paint, soil, and concrete pipe.

This service is also available to the counties and tests are made for them upon payment of the actual cost of the work. Arrangements have also been made whereby tests are made for highway commissions of neighboring States and they in turn make certain tests for the Iowa Commission. Tests of deposits, manufacturers' samples, and other materials are likewise made for other State departments. The actual testing is done in the laboratories of the department at Ames, Des Moines, Davenport, and Mason City.[42]

The heads of the laboratories are selected by the head of the materials department with the approval of the chief engineer and the Commission. They are responsible to the head of the department. The laboratory heads must have special training for their work. They are usually selected

[41] *Annual Report of the Iowa State Highway Commission*, 1926, pp. 18, 19.
[42] *Annual Report of the Iowa State Highway Commission*, 1926, pp. 100, 102, 105.

from the members of the organization. The assistants in the laboratories are usually college or high school boys trained for the work. They are selected by the laboratory heads.

Information from the laboratories may be secured directly from the nearest laboratory, but as a rule this is handled through the head of the department of materials in order to divide the work among the laboratories. A great deal of information is always available at the Ames offices of the department and the work of the laboratories is regulated from that point. Work is done in the order received, as the importance of the work demands, or according to the necessity for immediate action. Work may be done for other States, but the work of its own organization is never allowed to be delayed or interfered with for the benefit of other States.

In order to determine the best methods, the best materials, and how best to use them, a number of research projects are carried on in connection with road work and road materials. The United States Bureau of Public Roads and the Highway Research Board of the National Research Council sponsor a part of the research work and bear a part of all the expense involved in the projects sponsored.[43] The importance of this work can not be over estimated, for upon it depends, in large measure, the progress in the building of more permanent and less expensive roads.

Department of Construction. — With the proper preparation made, the next step is the actual construction work on the roads. The work of construction is carried out under contracts entered into by the Commission with construction companies. In order to be sure that the specifications of

[43] *Annual Report of the Iowa State Highway Commission*, 1925, pp. 133-135, 1926, p. 101.

the contracts are fully carried out and that the work is properly done, the department of construction provides a complete system of inspection and supervision.

The head of the department of construction is also assistant chief engineer.[44] He and his assistant general inspector are selected in the same manner as the heads of other departments. The whole aim of the Commission and of the entire organization is the construction of the primary roads. The construction department, having the supervision of the actual construction work, is the most prominent if not the most important of all the departments.

The head of the department and the general inspector must have a complete knowledge of road engineering and an extensive experience in the actual building of roads and bridges. The subordinates in the department are appointed by the head, with the approval of the chief engineer.

Resident engineers, selected by the chief engineer with the approval of the head of the construction department, are placed in charge of each project. They work under the direction of the department of construction, and must possess the special engineering ability necessary to the job which is under their supervision. They must also have a good deal of managing ability and a knowledge of human nature, in order to see that the specifications are properly carried out and that the contractor is at the same time satisfied. An engineer may be an excellent man as resident engineer on a gravel project and not so good on paving or he may be a good engineer and yet have a personality such that he will be unable to secure the coöperation of the contractor with whom he works.

In connection with the construction work, there are three divisions — purchase of right of way, contractual relations, and supervision of construction.

[44] From a blue print of the organization.

Due to the fact that in many cases the primary roads had to be relocated for various reasons, and that in many cases the original road, if located in the right place, was too narrow to carry the traffic, it has been found necessary to purchase an additional right of way for many primary roads. All the negotiations involved in this work are carried on by the construction department, and, if it becomes necessary, court action is resorted to in order to secure the proper right of way.[45]

In order that the public, the Commission, and the contractor himself shall be protected against bids for which the contractor does not have the funds or the equipment necessary to complete the work properly, the department requires certain reports to be filed at stated intervals by all road building contractors. These reports are made upon special forms provided, and show both the financial standing of the contractor and a complete list of his equipment as well as his experience in that line of work. Records are also kept of the work of each contractor showing the work done, the time taken, and the grade of work done, as well as his general efficiency in completing road contracts.[46]

The only way the Commission has of being sure that its plans and specifications are being carried out properly is through its supervisors and inspectors of construction. This work is of vital importance, for upon its proper execution depends the final success of the Commission in the construction of primary roads.

All projects are fully supervised, not only by a resident engineer but by other special inspectors, from the time they are begun until they are completed and accepted. These

[45] *Laws of Iowa*, 1927, Ch. 101, Sec. 30.

[46] Iowa State Highway Commission's *Contractor's Financial Statement*, Form No. 380, and *Statement of Contractor's Experience and Equipment*, Form No. 380-A.

inspectors make tests of the materials used and see that the proper methods are employed in the construction work. Full reports are sent daily from each project while the work is being carried on, showing just how the work is progressing. These reports are filed and give a complete record of the work at any time.

Department of Maintenance. — In addition to the construction work the Commission must provide adequate maintenance for all primary roads of the State. This is an important function, for the life and efficiency of the roads depends upon their proper maintenance.

The maintenance engineer at the head of this department and his assistants are selected in the same manner as in the other departments. He must be an able road engineer with organizing ability. His assistant must likewise have the technical knowledge necessary to carry out the work of the department. This work is somewhat diversified as is indicated by the four divisions of the department — road signs; traffic surveys; machinery, building, and grounds; and maintenance of roads and bridges.[47]

In addition to its work on the roads the department has charge of the buildings, grounds, and machinery of the Commission. These include both the automobiles, trucks, and machinery bought by the Commission for the use of the organization and thousands of dollars worth of trucks, machinery, and material received from the Federal government. This material, a part of the surplus war material that was issued to the States, is stored, repaired, and overhauled, if necessary, and then issued to the counties to be used in road work.[48] This government material has been a real help to the State and to the counties and has enabled

[47] From a blue print of the organization.

[48] *Annual Report of the Iowa State Highway Commission*, 1926, p. 58.

the Commission to equip an excellent machine shop for the repair of machinery.

The real purpose of the department, however, is to facilitate traffic on the roads. A system of uniform permanent signs has been adopted, in harmony with those selected by the American Association of State Highway Officials. The numbers assigned to interstate roads have, whenever possible, been made to correspond with the numbers of the roads as they enter the State. The signs, indicating the number of the road, have been installed and a large number of warning signs, pointing out curves, bridges, or dangerous crossings, have been put up. In accordance with the law making it necessary for all cars entering primary roads to come to a full stop, "stop" signs are being placed on all roads intersecting primary roads.[49] The object of all signs is the welfare of the traveler: they inform him of the road he is on or warn him of possible danger. To be effective, however, their warnings and advice must be heeded.

Inasmuch as the department has charge of the maintenance of the roads, it is in position to aid in deciding upon the proper surfacing of the primary roads. If the traffic is large it does not pay to use gravel, since the cost of maintenance is too great. Comparison of the figures for maintenance depreciation between graveled and paved roads indicates that when traffic exceeds 500 cars per day it becomes economical to pave a road. Moreover, on the basis of tire wear alone, graveled roads bearing a traffic of 500 vehicles per day should be paved for economy's sake. To determine the amount of traffic, surveys are made wherein an actual count is made of the number of vehicles

[49] *Service Bulletin,* Vol. XIV, 1926, Nos. 10-11-12, pp. 7, 8; *Annual Report of the Iowa State Highway Commission,* 1926, p. 60; *Laws of Iowa,* 1927, Ch. 105, Secs. 3, 4.

that pass certain points between five o'clock in the morning and eleven o'clock at night. From these counts some idea can be gained as to the advisability of using gravel or concrete as a surface for that road.[50]

The most vital work of the department is the maintenance of the primary roads and the bridges thereon. The aim of the department is to keep all roads open for traffic if possible. Bridges are maintained and repaired, roads are dragged, and mud holes drained or filled, and in winter the snow is removed.[51]

The actual work of maintenance is carried out by patrolmen who spend full time upon the roads. These patrolmen are under the direct control of the maintenance superintendents who hire them for the work.[52] County engineers were at first used as county maintenance superintendents, the primary road fund paying part of the engineer's salary. As the maintenance work increased from year to year, it became impossible for the county engineers to attend to both jobs, and it is now the policy of the Highway Commission to combine from two to four counties in a maintenance district and put a competent maintenance superintendent in charge.[53] The district engineers or the assistant district engineers in charge of maintenance have general supervision over the work in each district, and see that the plans of the department are carried out.[54]

[50] *Service Bulletin,* Vol. XIV, 1926, Nos. 4-5-6, p. 10, Vol. XV, 1927, Nos. 10-11-12, p. 12; *Annual Report of the Iowa State Highway Commission,* 1926, p. 60.

[51] *Annual Report of the Iowa State Highway Commission,* 1925, p. 110, 1926, p. 56.

[52] Iowa State Highway Commission's *Instructions to Patrolmen,* Form 520.

[53] Letter from J. W. Eichinger, Bulletin Editor, State Highway Commission, dated December 23, 1930.

[54] For an account of the district engineers and their work see below, pp. 74, 75.

Letters of instruction in regard to the various phases of maintenance are issued by the department to the district engineers and to the maintenance superintendents for guidance in their work. They in return make reports on the condition and needs of the roads under their control. From this data the department prepares a map showing the condition of the primary road system on December first of each year.[55] From the reports of the district engineers and the maintenance superintendents the weekly road condition maps are prepared. Any complaints in regard to the maintenance of primary, county, or township roads is investigated and adjusted by this department.[56]

Department of Purchases and Accounts. — The one exception to the highly centralized system of control is found in the department of purchases and accounts. A resident auditor who has supervision over the accounting work of the department is independent of the control of the chief engineer or of the Commission. He is appointed by the State Board of Audit and works under its direction and supervision. He may be removed from office by the Executive Council for failure to comply with the directions and instructions of the State Board of Audit in the performance of his duties. It is the duty of this auditor to pass upon and certify the bills of the Commission before they are paid. In addition to this supervision by the State Board of Audit, the State Budget Director in connection with a certified public accountant makes an annual audit of the books and accounts. It appears that an honest effort has been made to secure efficient supervision of the expenditures of the Commission.[57] With the accounting sys-

[55] *Annual Report of the Iowa State Highway Commission,* 1926, pp. 58, 59.

[56] *Annual Report of the Iowa State Highway Commission,* 1925, p. 110.

[57] *Laws of Iowa,* 1927, Ch. 103, Sec. 3, 1929, Ch. 28, Sec. 1.

tem constantly under the supervision of the State Board of Audit there is reason to believe that an adequate check is maintained on its accounts.

The head of the department of purchases and accounts, who is the auditor of the Commission, and his assistant, the chief clerk, are appointed by the Commission with the advice of the chief engineer. The auditor must be a trained accountant with the ability to carry out the work of the department and must give bonds in the sum of fifty thousand dollars for the faithful performance of his duties.[58]

The work of the department is primarily of a financial nature, with the exception of the division of publications. These are classified under this department but they are actually handled under the supervision of the chief engineer.

The department issues weekly reports of road and bridge lettings. These reports take the place of all other notices as to lettings and are mailed to construction and contracting companies upon the payment of two dollars per year.[59] Maps showing the condition of the roads and the progress made in road construction are also issued weekly. These are copied widely by the newspapers of the State and are of great value to those who use the roads.[60] Standard specifications and all blank forms and printed matter for the organization are issued through the accounting department.

This department audits and approves all vouchers for material or services and thus has a direct check on the expenditures of the Commission. To provide for a proper

[58] *Laws of Iowa,* 1927, Ch. 103, Sec. 3.

[59] See copies of the Iowa State Highway Commission's *Weekly Letting Reports.*

[60] See road maps in various papers, for example, the *Des Moines Sunday Register.*

accounting of all expenditures, each department is required to keep a complete set of books. These books are audited by the accounting department giving it a close check on the expenditures of each department as well as those of the entire organization.[61]

The department also keeps complete records of all financial transactions and makes the necessary financial statements and reports at regular periods.[62] Expenditures are classified in accordance with the requirements of the legislative acts under which the Commission acts and in order to keep accounts properly. Expenditures from the Highway Commission support fund are classified under four heads — supervision of county and township work; engineering work for other State Departments; building and grounds; and construction, engineering, inspection, and administration. Money from the primary road fund is listed under the two heads — construction and maintenance.

In connection with the finances of the Commission, the question most often asked is: what per cent of the expenditures goes for engineering, inspection, and administration. The report of the Commission for 1930 gives a direct answer to this question — 5.25 per cent.[63]

DISTRICT DIVISIONS

To bring the Commission into more direct contact with the road problems and road work, the State is divided into nine districts. At the head of each district is a district engineer selected by the chief engineer and responsible to him, although much of his work is actually done through the construction department. This district engineer must

[61] *Annual Report of the Iowa State Highway Commission*, 1926, pp. 110-117.

[62] *Annual Report of the Iowa State Highway Commission*, 1929, p. 16.

[63] *Annual Report of the Iowa State Highway Commission*, 1929, pp. 7, 16.

be an engineer of high order and must become familiar with his district and know its conditions, needs, and problems in regard to roads, in order to give information through personal knowledge to the chief engineer or to the Commission. He has general supervision of the work of the Commission in his district, and acts as a link between the Commission and the county supervisors. He has direct charge of the survey parties whose duty it is to make the necessary surveys in his district. He also has control of the material inspectors in his district. He is responsible for all work done in his district and must see that it is properly supervised. He is also at the head of the maintenance work in his district and supervises the work of the maintenance superintendent.[64]

Depending on conditions, one or two assistant district engineers are provided. They are appointed by the chief engineer with the approval of the district engineer. These men must be experienced in the work they are to do. The assistant district engineer in charge of the construction has supervision of all construction projects and of the resident engineers in charge of the work. The assistant district engineer in charge of maintenance has supervision over the maintenance of the roads in the district, and approves the patrolmen appointed by the superintendent of maintenance. It is through the district engineer and his assistants and subordinates that the chief engineer has a direct personal check upon the work of the organization.

COOPERATING AGENCIES

No study of the organization of the State Highway Commission would be complete without mention of two closely related organizations both of which are working for road

[64] *Annual Report of the Iowa State Highway Commission,* 1929, pp. 13, 14; blue print of the organization.

improvement and both of which are directly connected with the work of the Commission.

The Federal Bureau of Public Roads. — The Federal aid, granted to the States for road construction and maintenance, has been a matter of prime importance in road legislation since 1916. The question of meeting the Federal requirements has led to a number of laws granting the State Highway Commission various powers. The latest provisions of the law are as follows:

> The state highway commission is empowered on behalf of the state to enter into any arrangement or contract with and required by the duly constituted federal authorities, in order to secure the full coöperation of the government of the United States, and the benefit of all present and future federal allotments in aid of highway construction, reconstruction, improvement or maintenance. The good faith of the state is hereby pledged to cause to be made available each year, sufficient funds to equal the total of any sums now or hereafter apportioned to the state for road purposes by the United States government for such year, and to maintain the roads constructed with said funds.[65]

This makes the Federal Bureau, for all practical purposes, a part of the State organization, and in order to understand how the Federal Bureau exercises its functions of aid and inspection, it is necessary to know something of its organization.

It is composed of a headquarters staff of eight divisions, at the headquarters office in Washington, operating directly under the chief of the bureau in the Washington office. Three of these — the divisions of design, construction, and bridges — constitute the staff which under the chief engineer and chief of bureau are responsible for the conduct of the Federal aid and forest road work. The division of

[65] *Laws of Iowa*, 1927, Ch. 101, Sec. 1.

control is responsible for all accounting, for statistics and records, and for the investigation of the economy and efficiency of road construction. The division of tests and research carries on all physical researches and makes routine tests of highway materials. The division of highway transportation and economy conducts research along economic lines with particular reference to the economics of highway transportation. In addition, there are legal and editorial divisions performing obvious functions.

In addition to the headquarters staff, there is a field force through which direct contact is maintained with the several States in all matters relating to the Federal aid and forest road work. This work is headed by eleven district engineers with offices in Troy, New York; Washington, D. C.; Montgomery, Alabama; Chicago, Illinois; St. Paul, Minnesota; Omaha, Nebraska; Fort Worth, Texas; Denver, Colorado; Ogden, Utah; Portland, Oregon; and San Francisco, California. Iowa is in the Omaha district.[66]

It is through this organization that the Federal aid work is planned, the plans approved, and the work carried out and accepted. All communications of the State Commission are sent to the Federal office at Omaha which, in turn, sends them on to Washington. All plans and estimates must be approved by the Bureau, and rigid inspection of construction is maintained by Federal inspectors, who are entirely independent of the Iowa State Highway Commission and under the direct control of the Federal office at Omaha. These inspectors make periodical inspections, arriving without warning and remaining as long as they find it necessary. They must have personal knowledge of the work they report on both during and after construction. Their reports are made directly to the Omaha office,

[66] *Service Bulletin,* Vol. XIV, 1926, Nos. 10-11-12, p. 11.

although if the work does not meet with their approval they may also notify the proper representative of the Commission.

All Federal aid work must be approved and accepted by the Federal Bureau of Public Roads, with the signature of the Secretary of Agriculture, before payment is made. In addition to approval and acceptance of construction work, the Federal Bureau also checks up all Federal aid accounts through the Omaha office. They not only make sure that the construction work is of the necessary type and properly carried out but they demand that there shall be no undue waste or expense in getting it done.

County Boards of Supervisors. — The work of the State Highway Commission is also closely related to that of the county boards of supervisors. The supervisors have, at present, no control over the primary roads but their relationship with the Commission in matters pertaining to secondary road work and road improvement projects is such that it must be considered in any study of the Commission. The Commission acts as a check and as an expert advisory body to the supervisors in road construction and maintenance and it has compulsory, supervisory, and associate powers in relationship to them. This is of additional importance since the supervisors have now been given control of the township roads as well as the county trunk lines.

It might seem that this would result in conflicts or strained relations between the State and county highway authorities, but on the whole the Commission has so satisfactorily carried out its work that supervisors and county engineers, recognizing the value of its work, are voluntarily asking for the advice and approval of the Commission on road problems over which it has no control. There are

several ways in which the supervisors may communicate with the Highway Commission. Since the county auditor is the official secretary of the board of supervisors,[67] reports between the two bodies are usually sent through him. If, however, it is a rather technical matter, the county engineer may take charge of the correspondence. As a general rule communications are made through the district engineer of the Highway Commission. He knows the conditions and problems of the county and acts as the "go-between" for the Highway Commission and the supervisors, but the board of supervisors or the county engineers may, if necessary, communicate directly with the chief engineer or the heads of departments. The supervisors often meet with the Commission at Ames in order to discuss more fully certain important problems.

The county engineer often acts as a resident engineer for the State Highway Commission on primary road construction projects, and during that time he becomes an employee of the Commission and not of the board of supervisors. In the regular course of his duty, however, he acts as inspector of work done on the secondary roads for the Commission and makes certain reports to them.[68] Though he is selected by the supervisors, a county engineer may be dismissed by the Commission if they find him incompetent to carry on the work properly.[69]

FUNCTIONS AND DUTIES OF THE HIGHWAY COMMISSION

The main function of the State Highway Commission is the maintenance, improvement, and construction of the primary roads, but a number of powers and duties relative

[67] *Code of 1927*, Sec. 5141.

[68] *Code of 1927*, Sec. 252; *Annual Report of the Iowa State Highway Commission*, 1927, Pt. 2.

[69] *Code of 1927*, Sec. 4641.

to secondary roads have been added to the responsibilities of the Commission. Before studying the more important functions relative to both primary and secondary roads, a brief account of the classification of roads in Iowa may be worth while.

Classification of Roads. — According to the Iowa highway act of 1927, all roads of the State are to be divided into two systems.[70] The primary road system includes "those main market roads (not including roads within cities and towns) which connect all county seat towns and cities and main market centers". The Forty-third General Assembly defined secondary roads as all public highways except primary roads, State roads, and highways within cities and towns. Primary roads upon which Federal aid funds are expended are marked as United States highways. All other primary roads are State highways. The secondary roads are now classified as county trunk roads and local county roads. These local county roads were formerly township roads.[71]

The mileage of the present county trunk roads may not be materially increased until the construction work thereon is substantially completed, except that the board of supervisors may, with the approval of the State Highway Commission, modify, relocate, or make additions to the system.[72]

The State Highway Commission and the Secondary Roads. — The powers of the State Highway Commission over secondary roads may be divided into three classes: compulsory, supervisory, and associate. The purpose is to prevent extravagant and unwise improvement programs,

[70] *Laws of Iowa,* 1927, Ch. 101, Sec. 2.

[71] *Laws of Iowa,* 1929, Ch. 20, Sec. 5.

[72] *Laws of Iowa,* 1929, Ch. 20, Sec. 6.

to act as a unifying agent giving some semblance of uniformity and coherence to the road work throughout the State, and to provide for the highest possible efficiency and economy in road plans and construction.

The Highway Commission furnishes free of charge to the counties and railroad companies standard specifications and plans for all bridges and culverts, railroad overhead crossings, or subways, and the work must be done in accordance with these plans.[73] This not only gives more uniformity to the work in the State but gives assurance that these structures when completed will be of correct design for the purpose and meet all the requirements of their location.

In order to secure uniformity and continuity in the road building program of the State, all plans for connecting inter-county roads and for improving and bridging county boundary roads are subject to the approval of the Commission. If the supervisors of the counties involved refuse or fail to agree on a program, the Highway Commission may, on its own motion, notify the auditors of the counties, hold a hearing, and decide on a proper program. The decision made by the Commission is final and its program must be carried out.[74]

The object of the supervision of the Commission is not to interfere with the work of the supervisors, but by making available the wider engineering skill and knowledge of material and road building possessed by the Highway Commission to prevent unwise programs of road building and unduly high contracts for the work. Thus the county engineer, after making his surveys of each section of the county road system, must submit the survey notes with

[73] *Code of 1927*, Sec. 4671.

[74] *Code of 1927*, Secs. 4661, 4662.

his report upon the work and the plans for the improvement of the section. The engineers of the Commission go over these reports, notes, and plans, pass upon their thoroughness, feasibility, and practicability, and, if it is found necessary, modify or change them before giving approval.[75]

The secondary road law, passed by the Forty-third General Assembly, also required that the board of supervisors of each county prepare and submit to the Highway Commission for approval a definite program of road and bridge improvement in advance of the expenditure of funds. This must insure to all of the county equitable treatment. The plans may be for one year or for a maximum period of three years.[76]

To prevent contracts at exorbitant prices, the law provides that whenever the county engineer's estimate of cost exceeds one thousand dollars, the contracts or plans for carrying out culvert or bridge construction, grading, drainage, or repair work, and contracts for materials therefor must be publicly let, or if privately let or built by day labor, must be approved by the Commission.[77] For the same reason, any contract for any one bridge or culvert or repairs thereon which exceeds two thousand dollars shall first be approved by the Highway Commission before it shall be effective as a contract, and a record of the final cost, with any change of plans, must be filed with the Commission on completion of any such highway bridge or culvert.[78]

In the establishment of assessment districts the board of supervisors shall file with the Highway Commission a

[75] *Code of 1927*, Sec. 4645.

[76] *Laws of Iowa*, 1929, Ch. 20, Sec. 25.

[77] *Code of 1927*, Sec. 4647.

[78] *Code of 1927*, Secs. 4672, 4674.

copy of the order, and a copy of the engineer's plat. The plans for the improvement are made by the county engineer but he must use the standard specifications of the Commission for the class of the improvement contemplated. If the contracts involved in the work exceed the sum of five thousand dollars they also must be approved by the Commission. The Commission also approves plans for bridges and culverts on city boundary lines whose specifications have been agreed to jointly by the council and the board of supervisors.[79]

If the supervisors desire they can make application to the Commission for changes or modification of the established county trunk road system. The Commission has the power to approve such changes or modifications if they are for the purpose of eliminating dangerous crossings or curves or when such change would materially decrease the cost of improving or maintaining the road.[80]

The supervision by the Commission is not irksome and has, for the most part, been welcomed by the supervisors, for it gives them a source of valuable and reliable information. In fact, supervisors often consult the Commission in matters over which it has no legal control.

The State Highway Commission and Primary Roads. — The State Highway Commission has been given general supervision and control of all primary roads in the State. The power of the county supervisors relative to such roads was eliminated in 1927 both as to construction and maintenance, except that a county may vote bonds to secure money to be used on such roads.[81]

[79] *Code of 1927,* Secs. 4666, 4747, 4748.

[80] *Code of 1927,* Sec. 4637.

[81] *Laws of Iowa,* 1927, Ch. 101, Secs. 2, 8, 1929, Ch. 23; *Code of 1927,* Secs. 4753-a10, 4755-b2.

The Commission prepared complete plans for the paving and graveling of the primary roads and these plans were adopted by the Forty-second General Assembly as a part of the act authorizing a State bond issue.[82] These plans have formed the basis for all improvement of the primary roads, though the bond issue itself was declared to be unconstitutional.

The plans were of a general nature stating only the kind of surfacing to be used. The selection of the particular section of the road to be improved at a given time rests with the Commissioners. Their power to initiate improvements and to decide what roads shall be improved is complete. However, due to the fact that much of the work is carried on by means of county bond issues, the supervisors have had a great deal of influence in selecting the type of surface and the roads to be improved. The plans, of course, must meet the approval of the Commission.

In making their decision the Commissioners consider the needs of the State rather than the desires of the local communities, and in planning improvements the Commission endeavors to carry out a program that will result in improved roads across the State.[83] In deciding what roads shall be improved the Commission consults the supervisors of the counties involved and secures their coöperation, for as a rule county supervisors are eager for the Commission to improve the primary roads of their county.

Before tentative plans can be made by the Commission to improve a certain section of the primary road, it is necessary to make an inspection of the road. This work is usually done by a field engineer from the headquarters of the Highway Commission and the district engineer. The engineers take note of the condition of the road, the

[82] *Laws of Iowa*, 1928, Special Session, Ch. 2, Sec. 1.

[83] *Service Bulletin*, Vol. XIII, 1925, Nos. 7-8-9, p. 1.

amount of work to be done, the difficulties that may arise in construction, the amount of traffic on the road, and the importance of the road as a connecting link for through roads.

From this information the department prepares a project statement setting forth the location of the road, the type of improvement proposed, an estimate of the cost of the proposed improvement, a statement as to funds available for the work, and any other information necessary to enable the Commission to pass upon the merits of the proposed project. This is submitted to the State Highway Commission for its consideration and approval. The chief engineer presents the plans to the Commission and often the county supervisors or other interested groups of citizens meet with the Highway Commissioners in order to discuss the project more fully. The Commission, after extensive investigation and consideration, makes its final decision in regard to the project and if it is approved a time is set when the project may be undertaken.

The plans are then turned over to the department of design which makes the preliminary survey. These preliminary surveys involve an enormous amount of work. The notes of the surveys must be complete enough to enable the office force to make drawings which will show the condition of every foot of the road to be improved. They must show the drainage area for each bridge and culvert, and indicate the portion of the road which will need special drainage. The plans will necessarily depend upon the nature of the proposed improvement but the first step is always the same, that is to bring the road up to standard grade and provide subsurface drainage wherever needed. In primary road improvement, the policy of the Commission is to eliminate sharp curves, corners, and railroad grade crossings wherever possible. Such proposed changes

must all be indicated in the plans and specifications. In the matter of curves it is necessary to determine the length of the curve and the necessary bank, in order to maintain a certain speed in turning the corner in safety.

The survey notes are sent to the office men of the department of design who prepare complete plans for the roads. These plans show every detail of the work and give a complete picture of the road. The detailed plans must be approved by the chief engineer and the Commission.

If the Commission decides that the project is to be a Federal aid project, the plans must be sent to the Federal district engineers at Omaha. They in turn send them to Washington to receive the approval of the Chief of the Bureau of Roads and the signature of the Secretary of Agriculture.

In order to avoid unnecessary work and delay in negotiations with the Federal Bureau of Roads the Iowa Highway Commission has drawn up a set of standard specifications for all classes of work. These have been approved by the Federal Bureau and all that is necessary in seeking approval of a new project is to send in the variations from these plans, or supplementary plans as they are called, citing the standard specifications for the remainder. This lessens the time necessary for approval and is much more efficient, since it saves needless duplication of work.

While this work is going on, the administration department prepares the way for the letting of the contracts. By the time the necessary approval has been secured, the administration department is ready to set a date for the letting and to notify contractors to send in their bids. This is done by means of a weekly letting report that is issued by the bulletin division of this department. This letting report carries a calendar of lettings scheduled, a complete description of all contracts to be let, the date of the letting,

the place where it is to be held, as well as where additional information is available, and the results of previous lettings held. The administrative department plans to have the notice in at least one issue of the report. This report is sent to all subscribers upon the payment of two dollars per year, and takes the place of all other forms of notice.[84]

The contractors send in sealed bids on special forms provided by the administrative department for that purpose. Each bid must be accompanied by a certified check for five per cent of the amount of the bid, in order to insure the good faith of the bidder. Because certain contractors are likely to bid on more work than they can handle, due to lack of capital or equipment, the Commission requires that contractors file reports of their financial standing and equipment at intervals and a record is kept of their work in filling their contracts. In this way the public, the Commission, the bond companies, and the contractors themselves are protected from failures in completing the work. All proposals are filed with the auditor of the State Highway Commission.

When the date arrives, the Commissioners meet in a special room in the office building at Ames, the chief engineer and other engineers of the organization meet with them, and often a number of contractors are present if the letting is important. It is not unusual for an important letting to be attended by from 200 to 300 persons.

The administration department has entire charge of the proceedings. The proposals are brought in by the auditor and they are opened and inspected one at a time. They are passed through the hands of all the Commissioners and to the chief engineer. In this way any mistake in form or omission is sure to be detected. The bids are then turned

[84] For illustrations of this see Iowa State Highway Commission's *Weekly Letting Reports.*

over to engineers who take them to their offices and make the extensions necessary for a comparison of the bids. After they return the bids and make their report, the Commission discusses the bids and awards the contract or decides to reject all proposals.

If a proposal is accepted, the contractor is notified that he is the successful bidder, but his five per cent deposit is held until he furnishes the project bond guaranteeing the completion of the work, when it is returned to him. All other certified checks are returned at once. The construction department is notified and appoints a resident engineer and the necessary inspector. If it is a Federal aid project the Omaha office is notified and a copy of the contract is sent for their approval. Until this is received, the work can not be started.

The resident engineer must see that the stakes are set for the contractor, and that he makes reasonable progress in the work. He must also prevent friction with the local community. The work of the inspectors is also very important, for they must be reasonable and able to secure the coöperation of the contractor and at the same time see that the work is carried out in accordance with all specifications. If an inspector incurs the ill will of a contractor it is difficult thereafter to secure the coöperation which is essential to the best work.

There is at least one construction inspector with each "mixer" crew on a paving job. It is his duty to see that the sub-grade work is carried out in accordance with the specifications, the mixer operations properly carried out, the reinforcing metal properly placed, the finishing done in accordance with specifications, and the curing process in accordance with the prescribed practice. His word is law. If the crew is not doing its work in accordance with the instruction, and the inspector orders a shutdown, the

work stops until he says it may continue. He works directly under the resident engineer.

In addition there are inspectors at whatever plants the contractor may have for preparing or supplying his material. For example, an inspector is placed at the central mixing plants to see that the aggregate and cement are dumped in the proper proportions into the trucks for hauling to the mixer on the job. These inspectors make frequent tests of the material as it goes into the bins and hoppers. Much of the gravel and cement is tested first in the car at the plant of the producing company before shipment. Samples are tested either by an inspector who stays at the plant and has testing equipment set up in a small laboratory of his own or the sample material is sent for testing to one of the regular laboratories of the Commission. By the time the car of material arrives at its destination the information as to its acceptability is at hand.

Daily reports are made to the construction department and any delay in the work is noted. So detailed are these reports that if a mixer is stopped for an hour the Ames office knows of it together with the cause and how it was corrected.

In the meantime the maintenance department has been notified of the beginning of construction and it must see that proper detours are marked out where necessary and that such detours are properly maintained during the construction period.

The department of materials is also notified in order that it may be ready to take care of the necessary tests. The department not only tests the material that is used but samples are cut from the completed slabs after the pavement is finished, showing the material actually used in the construction and these are subjected to tests at the

end of different periods of time. Every effort is made to secure the best possible work.

When the work is completed the contractor must maintain the road until the work is approved and accepted by the Commission. If it is a Federal aid project it must also be approved by a representative of the United States Secretary of Agriculture. Final inspection is made and surveys taken to determine the exact amount of work done, for payment is based on the amount of work that was actually done. When the inspectors have completed the final inspection and reported the work satisfactory, the work is accepted by the Commission, the final payments are made, and the contractor is released from all responsibility, with the exception that his bond protects the State against defective materials and workmanship for a period of five years.[85]

The contractor is paid by warrants issued by the State Auditor upon the primary road fund in the hands of the State Treasurer, upon the presentation of vouchers sworn to by the contractor, certified by the engineer in charge of the work, and approved by the auditor of the Commission.[86]

The bridge and culvert work upon the primary roads is now entirely under the control of the Commission, and is handled in the same manner as any other construction work on the primary roads.

After the road is accepted it is the duty of the maintenance department to see that it is properly maintained. This duty at one time rested with the supervisors but it is now in the hands of the Commission.[87] The maintenance work is very important, inasmuch as the life and efficiency

[85] *Service Bulletin*, Vol. X, 1922, Supplement to March number, pp. 11-13.

[86] *Laws of Iowa*, 1927, Ch. 103, Sec. 2.

[87] *Laws of Iowa*, 1927, Ch. 101, Sec. 8.

of all road construction depends a great deal upon its maintenance.

The maintenance department carries out this work through patrolmen who are employed for full time and are equipped with the most efficient means of keeping the roads in shape. Tractor graders are used, and improved methods and machines are worked out at Ames in order to do this work in the best possible manner and in the least possible time. The maintenance superintendent may give the patrolmen the power to employ other aid in case of blocked roads due to snow or other exceptional conditions.[88] The aim of this department is to keep the roads open and the traffic moving.

The final judgment as to the efficiency of the Highway Commission must be based upon the work done under its

DATA SHOWING CONDITION OF PRIMARY ROADS OF IOWA AS OF DECEMBER, 1919, TO DECEMBER, 1930

YEAR	UNGRADED EARTH	BROUGHT TO PERMANENT GRADE	GRAVELED	PAVED	TOTAL
1919	4833.3	879.0	683.6	25.0	6421.0
1920	4739.0	1021.0	792.0	67.0	6619.0
1921	3775.6	1447.8	1156.6	236.0	6616.0
1922	2961.8	1761.1	1558.0	334.4	6615.3
1923	2337.9	2001.2	1888.4	419.1	6646.6
1924	2058.6	1934.4	2164.4	502.3	6659.7
1925	1848.7	1796.0	2460.8	568.6	6674.1
1926	1451.8	1732.3	2819.4	650.2	6653.7
1927	1083.4	1416.8	3225.5	939.7	6665.4
1928	801.0	1114.3	3221.3	1624.5	6761.1
1929	601.7	714.8	3136.6	2317.2	6770.3
1930	593.9	512.8	2863.3	3271.9	7241.9

[88] *Code of 1927*, Ch. 243; Iowa State Highway Commission's *Instructions to Patrolmen*, Form 520.

direction and control. The condition of the primary roads and the work of transforming ungraded dirt roads to paved highways is shown in the table above.

These figures give an idea of how fast Iowa has forged ahead in the matter of highway improvement. At the beginning of the year 1920 about 10 per cent of the primary road system was graveled or paved, and an additional 13 per cent had been brought to permanent grade. On December 1, 1930, over 86 per cent of the primary road system of the State was surfaced with gravel or paving and about 92 per cent had been brought to permanent grade, including surfaced roads. By the close of 1930 Iowa had more than 6000 miles of hard surfaced highways.

At the close of the year 1919, Iowa had approximately 25 miles of paved roads, outside cities and towns. In 1926 Iowa stood seventeenth among the States in the mileage of concrete highways. Indeed it was not until 1928 that Iowa passed the first thousand mile mark in paved roads. In the last three years, however, her construction program has been noteworthy — 741 miles built in 1928, 739 in 1929, and 1029.7 miles in 1930. These figures include paving laid on extensions of the primary roads inside cities and towns.

At the beginning of the year 1930 Iowa had 2317 miles of paving on its primary road system and was outranked by only five States — Illinois, Pennsylvania, New York, Wisconsin, and Michigan. By the close of the year, Iowa reported 3271.9 miles of paving, exclusive of that laid on extensions of primary roads inside cities and towns. Its rank at the close of 1930 can not be given until final reports on the road building work of the other States have been published.

Seven roads crossing Iowa from east to west and three roads crossing the State north and south have been either paved or graveled. Two of these roads — No. 34 and No.

65 are entirely paved the width and length of the State. Two other east-west roads are paved across the State except for short stretches of gravel — 3 miles on No. 30 and 14 miles on No. 32. It is now possible to travel on a paved highway from every county seat in Iowa to the capital of the State.

Such road construction has, of course, involved an enormous expenditure of money and labor. It has been done, in Iowa, without the issue of bonds by the State, although many of the counties have issued bonds. During 1930 the State Highway Commission of Iowa spent $46,073,658 on the primary roads of the State. For this money the Commonwealth received 1029.7 miles of additional paved roads, 247.1 more miles of graveled roads, 551.65 miles of road brought to grade but not graveled or paved, and the maintenance of the entire 7241.9 miles of primary roads.[89] It should be kept in mind that 471.6 miles were added to the primary road system late in 1930, but these were not maintained through the year with primary funds.

Interstate Roads. — The question of bridging or improving an interstate road or roads along the border between two States is one that requires considerable negotiation because of the numerous organizations involved and the question of a just distribution of the expense. This matter is handled through the coöperation of the State Highway Commission, the county boards of supervisors, and the highway authorities of the neighboring States.[90]

Authority of State Highway Commission Within Municipalities. — The State Highway Commission has jurisdiction, "subject to the approval of the Council", to construct or improve a street or road which is a continuation

[89] *Des Moines Sunday Register*, October 26, 1930, Iowa Sec., pp. 1, 2.

[90] *Code of 1927*, Sec. 4663.

of a primary road within the limits of any town or city having a population of less than twenty-five hundred, and within that part of any other city where the houses are not less than two hundred feet apart. The cost of hard surfacing such a street with paving twenty feet wide is paid from the primary road fund. The phrase "subject to the approval of the Council" was construed by an act of the Forty-third General Assembly to authorize the council to act "only in its relation to municipal improvements" such as sewers, water lines, grades, and streets. "The location of such primary road extensions", the new highway law provides, "shall be determined by the state highway commission".[91]

The Commission is required to furnish and place along the primary road extensions in all cities and towns suitable standard signs showing the districts, whether business, school, residence, or suburban, which a vehicle is entering and the speed limit. In cities and towns having a population of less than four thousand the council must have the approval of the State Highway Commission for ordinances regulating the traffic at intersections of primary road extensions and boulevards or heavy traffic streets. Such municipalities may not erect any stop and go signals without the approval of the Commission nor may they, without the consent of the Commission, close or obstruct any street or highway used as an extension of a primary road within such city or town, except at times of fires or for the purpose of doing construction or repair work. These provisions apply to all cities within the State with the exception of the business district in cities having a population of four thousand or over.[92]

[91] *Code of 1927*, Sec. 4755-b26; *Laws of Iowa*, 1929, Ch. 159.

[92] *Laws of Iowa*, 1929, Ch. 161.

FINANCES AND ACCOUNTING

The proper administration of the finances of any governmental agency is an important matter; and when that agency expends large sums of money the sources of that money and adequate checks on its expenditure become a matter of prime importance.

The administration of the finances of the Highway Commission is under the supervision and control of the State Board of Audit, and not under the sole control of the Commission.[93] The money in all funds is held by the State Treasurer and is paid out by him upon warrants issued by the State Auditor. These warrants are issued upon the receipt of vouchers approved by the auditor of the Commission, sworn to by the person presenting the claim, and certified to by the engineer in charge of the work.[94]

The State Auditor, the auditor of the Commission, and each department keeps a full record of its financial transactions and detailed financial reports are made and published each year.[95] This makes available a reliable source of information in regard to all expenditures.

To understand these reports it is necessary to be familiar with the different funds provided for the use of the Commission, with the sources of revenue for each, and the expenditures for which each may be used.

Three separate funds are provided for the Commission: the primary road fund, to be used exclusively for construction and maintenance work; the maintenance or support fund, to be used for the support of the Commission itself; and a contingent fund to be used for emergency purposes. In addition to these three funds the receipts from the sale

[93] For a description of accounting methods see above, pp. 72-74.

[94] *Laws of Iowa,* 1927, Ch. 103, Sec. 2.

[95] *Code of 1927,* Sec. 4626; *Annual Report of the Iowa State Highway Commission,* various years.

of county bonds have become an important source of revenue for construction work upon the primary roads.

The Primary Road Fund. — The primary road fund is the fund which has been created for the construction and maintenance of the primary roads. This fund is used directly in surveying, grading, bridging, and surfacing the primary roads of the State or in repaying funds so used. The fund is derived from four sources: license fees paid on motor vehicles, taxes levied on the sale of gasoline, grants of aid from the Federal government, and surpluses from the maintenance funds of the Highway Commission and the Motor Vehicle Department.[96]

This fund receives approximately 93 per cent of all the money paid to the State for licenses, penalties, and transfers on motor vehicles. In other words ninety-three cents out of every dollar derived from the annual registration of motor vehicles is expended directly in the construction and maintenance of the primary roads. The remaining amount, approximately 7 per cent, is used as follows: 2½ per cent to maintain the State Highway Commission, 3½ per cent to maintain the Motor Vehicle Department, and ½ of one per cent for the reimbursement of overcharges in registration. In addition to these amounts a fee of fifty cents for each motor vehicle registered is retained by the county as a collection fee.[97]

The original law levying the two cent per gallon tax on all gasoline imported and used in the State provided that one-third of the revenue so derived should be used on the primary roads. In order to obtain a larger revenue from this source to reimburse counties for money expended on bridges, culverts, and new rights of way on roads later

[96] *Annual Report of the Iowa State Highway Commission,* 1927, p. 26.

[97] *Code of 1927,* Sec. 4999.

taken into the primary system the Forty-second General Assembly in 1927 levied an additional one cent tax on gasoline. Any surplus from this source was to be added to the primary road fund. Under the provisions of the present law the primary road fund is accredited with one-third of the original two cent tax and the entire revenue derived from the additional one cent tax.[98]

The primary road fund is assigned the money allotted to the State by the Federal government under the Federal law granting aid to the States in the construction, improvement, and maintenance of roads.[99]

The fund is also credited at the close of each calendar year with any unexpended balance remaining in the maintenance fund for the State Highway Commission, in the maintenance fund for the Motor Vehicle Department, and in the reimbursement fund for the payment of refunds, which have accrued from the motor vehicle license fees paid in for that period.[100]

As stated above, this money is expended directly by the Commission in the improvement, construction, and maintenance of the primary roads or in the repayment of funds so used.

Before the Commission can use any of this fund for improvement or construction purposes it must set aside an amount sufficient for the proper maintenance of the primary roads of the State during the year. This assures the proper care of the roads already constructed before additional work is undertaken.[101]

The larger part of the primary road fund is expended

[98] *Laws of Iowa,* 1927, Ch. 101, Sec. 3, Ch. 103, Sec. 1; *Code of 1927,* Ch. 251-A1.

[99] *Annual Report of the Iowa State Highway Commission,* 1927, p. 26.

[100] *Code of 1927,* Sec. 5002.

[101] *Code of 1927,* Sec. 4772.

for construction purposes. This includes such work as grading, graveling, paving, providing drainage for roads, bridge and culvert work, erecting guard rails, purchase of right of way, purchase of machinery and equipment, and engineering work.[102]

The primary road funds are also used to retire and pay interest on county bonds issued for the purpose of improving the primary roads.[103] The county bond issue relative to the improvement of the primary roads will be discussed later but it is necessary to point out at this time that in using the primary road fund to retire bonds so issued is but an indirect method of expending it for construction work on the roads.

Maintenance or Support Fund. — In order to maintain a separate account for the support of the Commission an entirely separate fund is provided. This is known as the maintenance or support fund of the Commission and is used to pay salaries, office expenses, heat, light, and the other necessary expenses of maintaining the organization.[104]

The revenue for the support of the Commission is of two types, the first directly from the State, the second indirectly through some other fund as payment for work done.

The support fund has but one source of direct revenue. The law provides that 2½ per cent of the gross fees, and penalties collected for the registration of motor vehicles in the State shall be set aside as a support fund for the Highway Commission.[105]

[102] *Annual Report of the Iowa State Highway Commission,* 1927, p. 15.

[103] *Annual Report of the Iowa State Highway Commission,* 1927, p. 50; *Code of 1927,* Sec. 4755-b32.

[104] *Laws of Iowa,* 1927, Ch. 101, Sec. 34.

[105] *Laws of Iowa,* 1927, Ch. 101, Sec. 34.

The support fund derives considerable indirect revenue from machinery repairs made in the Commission's shop at Ames and from rentals of equipment but this revenue is more than balanced by expenditures in the same line of work.[106] The deficit resulting from this situation is paid from the revenue derived from the State.

The remaining sources of indirect revenue are from miscellaneous sales and refunds such as sales of government war surplus material, instrument rentals, and the sale of maps, road guides, weekly letting reports, and proposal forms.[107]

The purpose of this fund is to provide a separate account of the expenditures of the Commission for its maintenance and to keep the funds that are to be spent on the roads for that purpose alone. The support fund is used to pay salaries, provide heat and light, to purchase office supplies, and to pay all necessary overhead expense in maintaining the Commission.

The Emergency Fund. — A primary road contingent fund of three hundred and fifty thousand dollars is set aside by the State Treasurer from the primary road fund. This fund is used to pay claims upon the primary road fund or upon the maintenance fund for labor, freight, or any other claims which must be promptly paid. It is an emergency fund to be used by the Commission when the delay necessary in the regular system of payment would result in serious difficulties or inconveniences. When the need arises the Commission may direct warrants to be drawn on this fund in payment of the claim. These warrants, when signed by the auditor of the Commission, are

[106] *Annual Report of the Iowa State Highway Commission,* 1927, p. 14, 1929, p. 18.

[107] *Annual Report of the Iowa State Highway Commission,* 1927, p. 15.

paid by the State Treasurer from the contingent fund. Any expenditures from this fund must, however, be paid back to it by warrants issued by the State Auditor, recorded by the Commission, and redeemed by the State Treasurer from the proper fund.[108]

County Bond Issues. — These three funds provide the money for the Commission to use in the construction and maintenance of the primary roads, the support of the Commission and for financial emergencies when they arise. No study of the funds used on the primary roads would be complete, however, without considering county bond issues as a source of money to be used in the improvement of the primary roads. This source becomes of added importance when the law provides as it does in Iowa for the payment of such bonds from the primary road fund when the road programs and the amount of bonds issued are approved by the Highway Commission. That is, if a county has voted or in the future votes to issue bonds to improve the primary roads, the Highway Commission each year must set aside from the primary road fund sufficient money for the proper maintenance of the primary roads and then an amount equal to the interest and principal of the bonds maturing that year. The total amount, however, for maintenance, interest, and payment of bonds can not exceed the amount the county would have received had the primary road fund been allotted among the counties in the ratio that the area of each county bears to the total area of the State.[109]

The above ratio was that used to distribute the primary road funds among the counties prior to the passage of the road control law in 1927 whereby the primary road fund

[108] *Laws of Iowa*, 1927, Ch. 101, Secs. 18-20.

[109] *Code of 1927*, Secs. 4753-a10—4753-a18 and Ch. 242.

was placed at the disposal of the Highway Commission.[110] In effect the bond retirement law secures to the counties voting bonds a continuance of the old system of apportionment of the primary road funds. The law also makes it possible for each county to have its primary roads improved without waiting for the money to be available in the primary road fund and at the same time assures the county that the bonds will be paid when due from the revenues of that fund.

Proposal for State Bonds. — In this connection it should be noted that the Forty-second General Assembly, in special session, passed an act authorizing the State to issue bonds to retire the county bonds issued and to complete the surfacing of the primary roads in a period of six years. On November 6, 1928, the voters of the State, by a vote of two to one, approved the State road bond issue of $100,000,000. On March 5, 1929, however, the Supreme Court of the State held this proposed State road bond act to be unconstitutional and invalid. The General Assembly then in session immediately adopted a resolution which has for its object the amending of the Constitution of the State so as to provide, in the most expeditious manner possible, for the authorization and issuance of $100,000,000 of State road bonds.

The General Assembly also passed an act raising the legal limit of bonded indebtedness of counties for primary road purposes from three per cent to four and one-half per cent of the assessed valuations of the property within the county. This enabled counties that had previously reached the limit of their bonded indebtedness to vote additional bonds. It might be well to state that eighteen counties took advantage of this opportunity and eighteen additional

[110] *Code of 1924*, Sec. 5001; *Laws of Iowa*, 1927, Ch. 101.

counties voted bonds for the improvement of the primary road system, mostly paving. These bond issues made it possible to speed up the paving program that resulted in the completion of 1029.7 miles of paving in 1930.[111]

Expenditures of the Highway Commission. — Some idea of the magnitude of the business handled by the State Highway Commission may be gathered from statistics of expenditures compiled from published reports. Comparisons are somewhat difficult to make, however, for the duties and the funds of the Commission have increased so rapidly that the reports represent different conditions with each biennial fiscal period.

EXPENDITURES OF COMMISSION ON PRIMARY ROADS

YEAR	CONSTRUCTION	MAINTENANCE[112]	ENGINEERING INSPECTION AND ADMINISTRATION	NET COST OF MAINTENANCE OF ORGANIZATION
1919	$ 741,313.73			$120,894.07
1920	4,906,404.96	$ 614,296.71		181,280.77
1921	15,500,523.64	2,264,692.51		131,877.87
1922	13,324,555.14	2,444,664.54		173,041.15
1923	12,662,680.79	2,420,900.25		166,903.29
1924	10,479,315.42	2,722,076.89	$ 746,168.15	231,617.01
1925	6,889,023.72	3,021,003.93	548,890.18	190,414.35
1926	8,402,786.44	3,100,675.07	644,404.85	163,109.83
1927	16,341,641.76	3,743,210.10	1,133,761.09	179,916.60
1928	29,946,607.01	3,809,954.81	1,774,028.74	177,958.68
1929	28,250,410.49	4,621,701.78	1,826,559.72	203,988.05
1930	42,621,993.43	3,311,620.31	2,420,982.21	209,602.02

111 *Annual Report of the Iowa State Highway Commission,* 1929, p. 3; *Laws of Iowa,* 1929, Chs. 23, 400.

112 The figure for maintenance in 1920 covers only one-half the year. Primary road funds first became available for the maintenance of the primary road system on July 1, 1920.

The preceding table sets forth the chief items of expenditures on the primary roads of the State through the agency of the State Highway Commission. "Construction" represents all money expended in building the roads including bridges, grading, purchases of rights of way, engineering services, guard rails, and surfacing. "Maintenance" includes snow removal, weed cutting, and repairs, in addition to the maintenance of the road surface. Under the heading, "Engineering, Inspecting and Administration", the reports include every item of engineering and overhead expense incurred by the Commission in connection with the primary roads. Some of this expense is also included under cost of construction and is, therefore, duplication of some of the expense reported under the head of "Construction". "Net Cost of Maintenance of Organization" represents the cost of maintaining the organization. It is evident that certain items might be included under this heading or under "Construction" or "Engineering". It includes invested capital, such as the construction of the Highway Commission's building at Ames.

The table indicates that Iowa, through its Highway Commission, is spending millions of dollars annually on the improvement of its roads. The efficiency of the Commission can be judged only by results. A comparison of this table of expenditures with the preceding table showing the condition of the primary roads for each year of the past ten years will indicate that the results are commensurate with the cost. Iowa, indeed, has concrete proof that the work of the Highway Commission has been successful.

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