

MAINTENANCE PERSONNEL AND EQUIPMENT

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Highway programs have attained such proportions during recent years that it has become necessary to devote careful study to administration, organization, and equipment problems, in order to insure wise and economical use of the funds provided. The users of the highways constitute practically the entire population; their demand for good highways and highway conveniences calls for an enormous yearly expenditure of public funds. The public places faith in the men charged with the spending of these vast funds and pleads that these funds be spent wisely, economically, and where returns will be greatest.

Maintenance is the branch of highway work in which the public has the greatest opportunity to observe the spending of public money. This, of course, is because the maintenance employees and equipment are evenly and widely distributed over the whole highway system and work the year round in constant sight of the traveling public.

Money properly spent for maintenance gives quicker returns on the investment than any other expenditure for highway work. Maintenance is popular or unpopular according to the scale of efficiency and inefficiency of the organization. Consequently, since the maintenance employee is ever under observation by the passing public and the efficiency of the entire highway organization is judged largely by the impression he creates, it is of vast importance that each maintenance employee be selected, trained, directed, and instructed with the greatest care.

Maintenance Defined

The word maintenance, strictly speaking, does not connote any improvement of the original existing conditions. However, the term maintenance as applied to highway work cannot be restricted in its meaning. It must be more broadly defined. As applied to highway work, maintenance is a term covering the work of repairs and replacements necessary to preserve the original investment, together with the additions and improvements to meet economically the growing demands of the traveling public for better service, and the special work necessary to satisfy the traveling public's demand for safety, convenience, and service.

Analyzed carefully, we find this definition covering a wide field of activity. To those who are engaged in maintenance work, the field is rapidly extending with no definite limit in

sight. The duties of maintenance men, or patrolmen, are many. There is the hard manual labor to be performed in all kinds of weather that requires hard muscles and the determination to stay with the job. There is the work to be performed alone on isolated sections where the patrolman is on his own honor and where he must use his own initiative. There are times when he comes into direct contact with the traveling public under trying circumstances and when self-control, tact, and diplomacy must be exercised. There are times when he must be sent on missions of diplomacy, where he, in working clothes, among his own people, accomplishes results where others have failed.

The patrolman is the department's representative in the community in which he lives and works. The State Highway Commission is judged competent or incompetent by the community according to the standing of the patrolman serving the community. Consequently, it is important that a man be selected to patrol the highways who is able not only to accomplish the necessary manual labor, but who is also able to work and conduct his personal affairs so that he creates in his community a favorable impression for the entire department.

One of the most important features of highway maintenance in this modern day of transportation is the maintenance of the highway markers and warning signs. Highways must be properly marked and hazardous places protected by proper warning signs. To be effective this marking must be uniform and in strict conformity with the U. S. standards. If marking is to render the fullest service, it must be continuous and never broken or interrupted. For this reason detours must be marked as well as maintained, and this rule applies equally in cities, towns, and rural districts. It is especially important that city, county, and state officials cooperate closely in marking detours. When it is necessary to close a marked street for repairs, it is criminal to do so without marking a detour over suitable streets for the benefit of traffic unfamiliar with the locality. No public official can afford to commit any act which will lose the public's good will but should do his utmost to create and hold the good will of the traveling public. This can be done by carefully marking detours, especially when streets are closed in cities and towns.

The question of maintenance in all its activities and problems is too great to cover in any one paper, or at any one delivery. Therefore, this paper is confined to the combined subjects of maintenance personnel and equipment. The various states have similar maintenance organizations, except for slight modifications to conform to the laws under which each operates. In discussing personnel it is necessary to include to a certain extent organization, and here the writer must

confine his observations and experiences to the Missouri State Highway Department.

Organization

The Missouri State Highway Department has been extremely fortunate in that the Highway Commission has functioned without political interference and that the Department has been allowed to operate under almost ideal conditions. The State Highway Commission of Missouri is composed of a bipartisan board of four members (two from each of the two major political parties), one member serving as chairman and another as vice-chairman. The State Geologist is an Ex-Officio member. The Commission selects the Chief Engineer, who selects all other employees subject to the approval of the Commission. Employees are selected without reference to political preference or religious belief and are promoted or discharged in the same way. Ability and past record are the sole merits for employment and promotions.

To perform the vast amount of work essential to maintain the Missouri state highway system of 7,600 miles, it is necessary to assemble a large organization. In order to insure efficiency, it is necessary that definite responsibility for the work be clearly established. For the purpose of designating this authority the state was divided into ten divisions, with a division engineer in complete charge of each. In the maintenance organization, each division is further subdivided into districts, with the roads in the districts divided into patrol sections. The division engineer, under the instructions of the Engineer of Maintenance, who works under the direction of the Chief Engineer, is assigned general supervision of all work in his respective division.

An assistant division engineer in charge of maintenance, working under the general direction of the division engineer, is assigned to the direct charge of all maintenance work in each division.

The districts within a division consist of one or more counties or portions thereof, and a district foreman is in charge of all the routine work within his assigned district. The roads within the district are divided into patrol sections of various lengths according to type, and a patrolman is in charge of each section. The patrolman may work alone, or he may have one or more helpers regularly employed and such extra labor as is necessary.

There are from ten to twelve counties and from 650 to 880 miles of road in each division. In the beginning, the county unit was the district unit, but as types of roads were changed, it was found expedient to assign a portion of the road system in one county to the supervision of another county; and gradually the districts were enlarged to include more than one county. As a rule, each district foreman is assigned from

80 to 140 miles of road, depending upon the type and character of improvement and the general layout of the road system.

Patrol sections vary considerably in length, depending upon the type of road and other features, but the following will suffice as a general guide. Team patrols on earth and light traffic gravel vary from 7 to 9 miles in length; motor patrols on earth and light traffic gravel vary from 14 to 16 miles in length; motor patrols on improved gravel and earth vary from 12 to 14 miles in length; gang patrols on paved roads from 20 to 35 miles in length.

Assisting each division maintenance engineer there is usually a division foreman, whose duties are confined mainly to directing the work on special jobs and the gang work of special crews. The division maintenance engineer is either a technically trained man or a practically trained engineer of long experience. The division foreman is usually a non-technical man, but a man who is thoroughly versed in practical road work and has the ability to direct gang and crew foremen and their forces.

Of course office help is provided in each division in the form of stenographers, bookkeepers, and clerks, but none of the district foremen are provided with office help or space.

Employment of Forces

Employment of competent and reliable men is the main secret of the success of any organization; and consequently, considerable attention and effort is directed toward the securing of capable, energetic, and reliable men to act as district foremen and as patrolmen. It is imperative that every position in maintenance work be filled by able, industrious, and competent men. The remark is often heard that an incompetent patrolman causes more adverse criticism than an incompetent employee in any other branch of highway work. The jobs of district foremen and patrolmen are really workmen's jobs, and it is very necessary that an explanation of the nature of the duties of each position be made to those seeking the position, in order that the applicant will not be misinformed and placed in positions for which he is not suited. As a rule, such men are obtained from within the communities in which they are to work. In a few instances, where local organizations attempt to designate a man for the position irrespective of the man's qualifications or where local factions are so strong as to prevent the employment of a satisfactory man, a man is obtained from another community and moved in on the job.

In employing a man, physical ability, character, alertness, judgment, past record and desire for the job are the fundamental points considered. Such men are obtained by inquiry

directed to the attention of local authorities and local people who are interested road boosters, special effort being made to avoid consulting political leaders who might be more inclined to recommend a man for his political affiliations than for his ability to meet the above mentioned requirements.

It has been found good practice to permit the district foreman to locate and interview several applicants for a particular job. He then submits the applications to the division maintenance engineer, who interviews the applicants, investigates their past records, and makes sure the applicants understand the duties expected. This personal interview generally reveals the applicants' qualifications, especially concerning their ability to keep themselves physically fit for duty.

Employment of relatives of men already at work has been avoided in the Missouri State Highway Department. This has proved to be an excellent policy and one to be recommended to any organization, particularly a public organization. Early in the beginning before this rule was adopted, a few relatives were employed, and practically ever employment of this sort resulted in trouble and grief to the Department.

All maintenance men are required to sign a working contract and furnish a personal bond. The contract insures that the men understand fully their duties and the hours of work expected prior to accepting the job. The bond is attached to the contract and covers the agreement between the Department and the applicant, and is so worded that it may be used to recover loss through negligence or intent. However, these personal bonds are used mainly to insure the employment of reliable men only. Experience has shown that unreliable men may quite readily secure letters of recommendation, but as a rule only men of good standing in their community can go to the substantial citizens and secure a personal bond for the sum of \$500.00. As a result of this policy, very little trouble has developed on account of men going wrong.

It is not necessary nor desirable that highway work be dependent on politics and subject to change with each political change in the state. Highway construction and maintenance in the last few years have grown to enormous proportions until they are among the states' and nation's largest industries. For this reason alone they should be allowed to function on strictly business principles. Furthermore, politicians must stand or fall on the records as established. Better records can be made in highway work by directing an efficient non-political highway department than by directing an inefficient political organization. The average technical man or engineer only blunders when he attempts to play the political game, and since engineers are essential in a successful highway department, the department functions far better when organized and operated free from politics.

Directing an Organization

After competent men are employed, the real problems of organization are only begun. There remains the much more difficult problem of training men to their duties, of instructing them to make reports, of familiarizing them with the policies of the department, and of instructing them in the care and operation of the equipment assigned. After a man is fully acquainted with the policies, instructions, and requirements, he becomes an asset to the department.

After being employed, the new patrolman is given a digest of the more important instructions that aid him in becoming a successful patrolman. The more important of these are as follows:

1. An employee must never appear on the work under the influence of liquor or drugs.
2. He must provide himself with proper clothing for his work.
3. It is better to be safe than sorry.
4. No one other than state employees shall ride on maintenance equipment.
5. Children must never be permitted on or near equipment in operation.
6. Missing, damaged, or impaired markers and signs must never be passed without making an effort to repair them.
7. After maintenance machinery has been driven across railroad tracks, flangeways must be inspected, and cleaned if necessary.
8. Well kept equipment and good maintenance go hand in hand.
9. Red "Danger" flags must be always properly displayed on all equipment.
10. Warning flags, and "Men Working" signs must be displayed 400 feet in advance of any work on roadway, and then only when work is in actual progress.
11. Closed roads must be properly barricaded, and barricades well lighted at night.
12. During emergencies, such as storms or floods, the patrolman must hold himself in readiness for group duty and be ready to assume the lion's share of the responsibility and work.

The average patrolman needs aid, help, and advice as to how he can best perform his various duties. The division maintenance engineer must keep in close personal contact with all his field forces, and he must be resourceful and observing in handling his men. The division maintenance engineer who can clearly explain details in language understood by working men, or who can explain a short cut method, is immediately judged by the patrolman as a first-class engineer.

The division maintenance engineer who drives up, passes out a few orders, and drives on, leaving the patrolman puzzled how, where, and when to start, wins but little respect for his actions. There is a vast difference between the work of construction and maintenance. As a general rule, the contractor wants but little advice from the construction engineer on how to proceed; all he asks is a clear understanding as to the results desired. On the other hand, the patrolman wants to know the results desired, but he often wants also to know how to proceed. From general observations, it is noted that the patrolman is always pleased to accept suggestions offered in the proper spirit.

Care must be used to avoid conflicting and confusing instructions. Road building and maintenance is a science best understood by those who are thoroughly schooled in the art. There are usually several good ways of doing any particular job. If the patrolman receives instructions from two sources, very likely he will be told two different ways of doing the work. In addition to the two sets of instructions received, very likely he has ideas of his own. Since the so-called authorities may differ in opinion, the patrolman has a perfect right to assume his own methods as sound as theirs, and will act accordingly, sometimes with questionable results.

Therefore, the division engineers have been warned to avoid giving instructions directly to the patrolmen or foremen in the field unless the division engineer and the division maintenance engineer have a thorough understanding. The division engineer should inform the division maintenance engineer of his desires. If the matter is routine work, the division maintenance engineer will pass the instructions directly to the district foreman, who in turn passes them directly to the patrolman.

Instructions should not be given as having been passed down from higher authority, but should be issued as coming direct from the immediate source. In other words, the district foreman should not inform the patrolman that the division engineer has received word that the Chief Engineer desires a certain job done. Established lines of authority must be maintained, and orders should pass direct through each source so as to strengthen each step in the organization.

Special care should be used so that too many orders are not given at one time. The average patrolman is able to absorb only a limited amount of instructions, and if several orders are issued simultaneously, it is very likely that confusion will result.

Salaries Paid

The Missouri State Highway Department has nearly 900 men in its maintenance organization, including division foremen, district foremen, gang foremen, tractor operators,

grader operators, special patrolmen, mechanics, patrolmen, and helpers. These men are all paid a monthly salary and are required to work a specified number of hours each working day. Some states prefer to pay on an hourly basis, but it is found more convenient to check time if the working hours are uniformly fixed and understood. Patrolmen understand they must be on the job during the specified working hours and that no excuses are accepted unless permission has been given previously for leave of absence, or unless it is a case of bona fide sickness.

Rates of pay have been standardized so as to avoid complaints from various parts of the state that others are receiving more for similar work. Titles have been standardized and defined, and the duties under each enumerated.

It has been necessary to adopt a standard schedule for rural sections and a separate schedule for industrial sections. The industrial schedule averages from \$15 to \$20 a month more than the rural schedule, to meet the higher local wage scale and higher living costs in industrial districts. Following is a list of salaries as paid at this time:

Division foreman—	
	\$170 to \$200 and actual expenses
Gang foreman—	
	\$140 to \$165 and actual expenses
Gradermen and tractor-men—	
	\$105 to \$125, daily allowance \$1.00
District foremen—	
	\$135 to \$160 and actual expenses
County foremen—	
	\$115 to \$135, no expenses
Head patrolmen—	
	\$105 to \$115, no expenses
Patrolmen—	
	\$80 to \$100, no expenses
Helpers—	
	\$70 to \$85, no expenses

It always has been the policy to keep the rates of pay in line with the wages paid locally for work of similar nature, making due allowances for special ability, loyalty, and length of service. As the average salaries paid gradually reach the upper limit, the schedules will be revised to avoid having any salaries fall outside the fixed limits.

Keeping up the Morale

It is not possible to pay salaries to compensate men fully for loyal and faithful service, especially in times of emergency. Instead, compensation must be derived from the satisfaction of having done the job well and from the knowledge that extra efforts are appreciated by the department and by the traveling public.

Various methods are devised and used in keeping up interest in the work of building up the morale and of creating good fellowship within the department. The strict rule of making promotions from within the organization is followed. A man without pride and ambition does not normally stick to maintenance work; and the man who has no interest in his work other than his salary check finds the duties too hard, the hours too long, and the regulations too strict to make his job attractive. However, men with pride and ambition must be afforded proper encouragement within the organization. Therefore, promotions to better jobs provided in the department must be filled from the ranks.

At least once each year every employee in the department is given consideration for a possible salary increase. The men who have shown ability and have produced results are awarded with slight increases in salary. An attempt is made to handle each case individually, and to allow increases only when they are actually earned. As the employee becomes familiar with the policies, rules, and regulations of the department and with the methods of handling the various kinds of work, he becomes more valuable to himself and to the department, and his compensation should be adjusted accordingly.

Each field employee is entitled to two weeks' sick leave annually. Ordinarily, field men in maintenance work are not entitled to an annual two weeks' vacation period, but when men have been with the department several years and have not used their annual two weeks' sick allowance, or when men have worked unusual and long hours, the division engineers may, with discrimination, allow these men leaves of absence to compensate them for their good efforts and for their overtime. Very few of the men ask permission to take advantage of this offer, except for occasional days when they may desire to attend local fairs, picnics, family reunions, and the like.

The problem of keeping the men interested is sometimes most difficult. Very often it is found that the new broom sweeps clean. New men may do exceptionally well for a time, but may suddenly lose interest, with results that are reflected almost immediately in the condition of their sections. The division maintenance engineer has a wide field in which to exercise his ability in the handling of the various problems connected with his field organization. The patrolman must be kept interested, and he must not lose his enthusiasm. He must remain content but ambitious. Every man is different; some men respond to suggestions; some need only encouragement; some need friendly interest in matters probably foreign to road work; and some need an occasional plain talk from one specially gifted along that line. The division maintenance engineer probably can do more than any other individual in keeping the men interested and enthusiastic about their work.

If the division maintenance engineer can successfully instill enthusiasm into his men, develop in them a pride in their work and a feeling of good fellowship and fraternity he has gone a long way toward successfully executing his job of maintaining the highways under his supervision.

From time to time meetings or schools of instruction are held in each division. Sometimes only the foremen are present, but at other times all the men are present. At these meetings no opportunity is lost to instill into the men loyalty, enthusiasm, interest, and good fellowship.

At least once a year each division holds a two- or three-day meeting for all employees. At these meetings the various bureau chiefs and others specialized in certain lines of work talk to the men on their problems. The men are encouraged to ask questions and enter into discussions. Every effort is made to answer the most apparently trivial questions, and to help the men with what to them are serious problems. These meetings terminate with a banquet, where none of the frills of entertainment, noise, and fun are overlooked. The banquet soon warms up to the point where the bashful hard-working men and would-be-dignified, white-collared bureau chiefs loosen up and really get acquainted. These banquets are events that provide topics for conversation for the field men throughout the following working season. Affairs of this kind pay big dividends. Here the men become acquainted, and friendships are often developed to the point where the men are reluctant to quit highway department work for other fields.

Highway work is proving to be more and more hazardous as traffic increases in speed, weight, and volume. Some of the highway work is hazardous in itself. A public employee, unlike any other, is without recourse to law for compensation. The Commission has the power to offer but little except sympathy to the injured, or killed, and the dependents.

As a result of this condition, several of the divisions have organized a mutual sick benefit association among the employees. Recently the main office canvassed insurance companies for a group accident policy that would afford the desired protection for the men at a rate which all men could afford regardless of low salaries. A policy was selected, and each division formed an association and elected its own officers. Practically all employees have adopted the plan, and they pay monthly premiums on a group accident and sick policy. As yet this plan has not been in operation long enough to justify a statement of final results, but it promises to meet the greater portion of the needs, at least.

Constructive criticism, on which progress relies, is always welcome from the traveling public, which is quick to note mistakes and is able to discriminate between efficient and inefficient work. Since criticisms made concerning employees

are sometimes prompted by selfish motives, it is necessary to investigate carefully before taking action, if the employee is to be protected and treated fairly. The patrolman must meet the criticism face to face, and this job is difficult, which makes it necessary that his superior give him strong support.

In the past, a number of criticisms reflecting against maintenance employees have been traced to persons impersonating highway employees. To protect the maintenance employee from the impersonator, and also to provide a means of positive identification of employee by the public, all must now wear a badge which bears a distinguishing number and is displayed conspicuously on the front of hat or cap. Since regular employment with the department is not attainable by all and there is a growing pride of organization, these badges are displayed by most patrolmen with considerable pride.

Equipment

Last but not least is the matter of equipment and the part it plays in building an organization, as well as the part it plays in maintaining roads. In purchasing equipment for the men to use, special consideration is given to equipment that can be operated with a reasonable amount of comfort and safety. Also, equipment should be designed for the purpose for which it is to be used. The patrolman has trouble and difficulties enough at best without being burdened with inadequate equipment or with equipment that is improperly designed and poorly made. Poor equipment discourages the user.

Equipment should be sturdy, reliable, simple in design, convenient to use, easy to operate, and comfortable. The equipment should be so designed that wearing parts are readily and cheaply replaced. Equipment companies should give special consideration to the design of their equipment, to see that the wear on a certain portion does not necessitate the replacement of the entire part, or even the entire machine. Very often road graders are so designed that a small portion wears, which causes play in the working parts and thus affects the workmanship, but the design is such that repairs cannot be made at a reasonable expense. Consequently, the machine must be continued in use under difficulties until the value has been worked out.

At the beginning of our maintenance work there was on hand a large supply of government equipment, and like other states Missouri was without sufficient funds to purchase more suitable equipment. Consequently, government trucks, tractors, and equipment were used wherever possible, although it was not strict economy to do so. As rapidly as possible the government equipment has been replaced with more suitable units, until now only a very limited number of government

trucks are in use, and most of these are kept in reserve as emergency units and for heavy hauling purposes.

On gravel roads the modern motor graders are being used extensively—both the push and pull types. The operating expense of the one-man units is considerably less than that of the old government trucks. In many cases the saving in the operating expense, plus the cost of frequent overhauling necessary on the old, worn government trucks, plus the salary of the extra man required, practically offsets in one season the purchase price of the more modern unit.

In the beginning, a large number of team patrols were used. These units are cheap, and until traffic becomes heavy are the most nearly ideal unit obtainable, especially if supplemented occasionally with heavier outfits. Also, until a maintenance organization can be trained in the use and care of the more expensive maintenance equipment, it is folly to use other than the most simple and fool-proof outfits. After the organization and the men become trained and skilled in the use and care of equipment, it is fairly safe to buy and provide the more complicated and expensive machines.

The motor graders as now manufactured are not yet ideal. but big improvements have been made in recent years. The machines should be heavy and weigh not less than 10,000 pounds, including the weight of the tractor. The moldboard should be positively controlled without play in the working parts or torque in the connecting shafts and arms. The frame should be heavy enough to be practically rigid. Portions subject to wear should be subject to adjustment and replacement.

When motor graders are used, it is necessary to supplement them at least a portion of the time with hauling units, such as one-ton or two-ton trucks. Very often a light truck is made available to two motor-grader patrols. Where two or more motor graders operate out of a central point, the two patrolmen use the truck together.

Paved roads are maintained by the gang method, and one and one-half or two-ton speed trucks are provided for transportation of men, supplies, and tools. These trucks are equipped with low mounted dump beds and underbody hoists. The large army trucks are used for the heavy hauling work. The usual number of tar kettles of 100 gallon capacity, pouring pots, hand tools, etc., are provided.

The major repairs and the concrete patching are done by a floating division gang. Air compressors mounted on trucks are used for operating drills and paving breakers. One-sack concrete mixers with automatic water measuring devices are mounted for ready transportation from point to point.

It is very desirable to mark the centerline of all pavements. A machine has been designed and built specially for marking the centerline of concrete pavements. The machine consists

of a 250 gallon heating kettle mounted with burners and fuel tanks on an old truck chassis. The machine is equipped with rotating brush that sweeps ahead of the nozzle that applies the liquid asphalt. Following the nozzle is a controlled sand chute that delivers the sand covering from the one cubic yard supply box on rear. The entire machine is towed behind a truck and is steered by a man seated at the rear of the machine who sights forward at centerline over specially adjusted sights.

On dirt roads, team patrols, or wheel type tractors are used. These tractors are provided with steel wheels and small spade lugs. On certain dirt roads, motor graders with solid rubber tires are being used successfully. A motor grader equipped with 40" x 8" pneumatic tires on rear has been used for the past year with good results and with no appreciable wear of tires.

The problem of mowing shoulders, ditches, and back slopes is real. Power drawn mowers are used to considerable extent, but their use is restricted. Team mowers are more satisfactory, but teams are difficult to hire when most needed. As a consequence of this condition, much hand work is necessary. The highway mower field offers an open field to equipment manufacturers of inventive ability.

The equipment problem of the maintenance organization is broad and could be discussed at length. Vast sums can be wasted quickly by using poor judgment in buying equipment. It pays to proceed with caution when investing money in equipment. Be sure of the equipment, be sure the need for it is real, and buy only as men can be developed to operate it and to care for it.

Competent men and good equipment are essential. If choice must be made, choose the competent man first. A competent and resourceful man will maintain his section even though handicapped by lack of equipment, but an incompetent man will succeed only in spoiling both equipment and road.

It pays to insist upon the men keeping their machinery clean, well oiled, greased, and properly sheltered. Care of the equipment and care of the road section go hand in hand. The man who takes pride in his equipment, takes pride in his road.

It requires much labor, time and effort to keep a maintenance organization functioning, the men contented, and the desired results accomplished. However, the results are well worth the effort, as there is much satisfaction in the results obtained.

On many occasions during floods and disasters, the men have worked long, hard hours without relief and without rest. During the past two years the state has experienced some extreme high waters when highways were flooded, washed out, and impassable. During these times the men have stuck

to their jobs night and day, placing sand bags, removing drift, guarding and directing and helping traffic. Cases are on record where men have worked without relief 36 to 48 hours. This service cannot be paid for except in the satisfaction of having done a duty well and of having the effort appreciated.

During the spring floods of 1927, when the Mississippi reached a new high water mark in southeastern Missouri, the value to the state of a well organized force of trained men was very remarkably demonstrated. During the floods highway forces worked on the levees, assembled labor, transported men, troops, food, and supplies, and assisted the Red Cross and local organizations wherever needed. The men remained on the job day and night, eating food when available, and sleeping on seat cushions as opportunity to do so was present. When the men could do nothing further to protect and to preserve the highways, or when the protection and rescue of lives and personal property became paramount, the organized highway forces and equipment were used where most needed until local organizations could be perfected and put into operation. As soon as local organizations began to function, the highway forces were shifted to other points as needed, or were held in waiting to act in case of any emergencies. As a result of this unusual service, many very favorable comments were received from the United States District Office, from the Adjutant General, from the press, the Red Cross, and others. Similar, but lesser results are accomplished almost daily throughout the state because of the loyalty, enthusiasm and good cooperation of the maintenance forces of the State Highway Department. **Competent men and reliable equipment are the backbone of any maintenance organization, and both respond to good treatment.**

COUNTY ROAD PATROL ORGANIZATION

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When I became Highway Superintendent of Allen County on January 1, 1928, I saw at once that what the county needed was organization for best results in maintaining county roads. At that time the county had 29 assistant superintendents. I endeavored to put in the motor patrol system immediately and so recommended the introduction of this system to the County Commissioners, but instead, 11 more assistant superintendents were added. I was forced to continue under the old system for some time.