TRAINING OF HIGHWAY MAINTENANCE PERSONNEL

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The training program presently employed in the Oklahoma Highway Department includes the training of all maintenance employees on a mass basis using the Maintenance Manual as a text. Lectures supplemented by film strips, slides and audio tapes covering every chapter and section of the Manual are presented to the employees in groups of 25 to 60. In addition special short courses are provided.

Training of maintenance personnel has been going on since we first began to use the "split log" drag. Supervisors and foremen have always taught their men how to obtain desired results and there has been continual improvement in teaching methods. Improved standards of grade, drainage, bridges and surfaces have demanded improved maintenance procedures. As the evolution in highway standards and equipment has proceeded the "hand-me-down" method of training maintenance personnel has tended to become obsolete and inadequate to meet modern needs. Training on a mass basis is now required. The most often repeated error is a supervisor's assumption that a certain person knows how best to perform a certain job.

Oklahoma Highway Department subdivisions are listed, showing miles of road responsibility per unit.

Central Office	12,000 miles
Field Divisions	1,500 miles
Maintenance Districts	100 to 200 miles
Interstate Maintenance Districts	50 to 60 miles

Field divisions are staffed with engineers and maintenance districts are supervised by foremen, most of whom have been promoted from the crews of workmen. The district foremen are under the direct supervision of the division office. Special project superintendents are assigned division wide to heavy maintenance projects and are under the direct supervision of the division office.

The Oklahoma Highway Department changed from the section patrol practice to the organized maintenance district in January 1950. This integral operational unit provides flexibility and efficient operation throughout the district. Maintenance of Interstate highways in Oklahoma is provided by maintenance districts with personnel and equipment completely separated from the districts responsible for maintenance of the regular State Highway System.

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Oklahoma sent about one-third of its better foremen to a special maintenance school for one week in 1951 and again in 1952. The results of this training were apparent ten years later. This, together with the urgent need to upgrade the quality of maintenance operations, prompted the administration to appoint an educational director in 1960. The duties of the educational director covered both construction and maintenance personnel. Curriculum for construction personnel includes academic courses granting university credits, and practical training for project engineers and individuals under their supervision. The result of this training is much improved construction and a lessened demand of the Maintenance Division for construction type activities. The academic courses are available to maintenance personnel; unfortunately few can quality and none have applied

In order to extend practical training to maintenance personnel, the Standards and Requirements Branch was created in the Maintenance Division. The first duty of this branch, headed by the Standards and Requirements Engineer, was to prepare a Highway Maintenance Manual. Next it prepared a Highway Inspection Manual then installed and supervised a highway maintenenance rating system. The Oklahoma Highway Maintenance Manual stresses fundamentals. It details the recommended methods for repairing most conditions encountered in our state and presents methods for preventing deterioration. This manual is addressed to the workmen though it is equally applicable to professionals.

As the program developed it was realized that a powerful incentive for improvement in maintenance conditions should be created. It was decided that a measure of performance should be devised. Later a system creating competition between districts and divisions was added. To accomplish this the Maintenance Inspection Manual was supplemented with inspection and data processing forms that produce a numerical rating of the quality of maintenance for every subsection in the state. From this, weighted averages are obtained for maintenance districts, divisions and state wide.

Districts and divisions are given a rating position state wide and District Foreman and Division Supervisors are listed by name. Two inspections, rating and summary reports are made each year. The spring inspection reflects the amount of deterioration that occurred during the winter, the fall inspection reflects the amount of improvement made during the year's maintenance season.

These summary reports are very helpful administratively since they show maintenance conditions throughout the state and give an accurate, factual comparison from one period to another, and from one district or division to another.

The inspectors selected were top grade, experienced, maintenance foremen. Special training was provided as a supplement to the Maintenance Inspection Manual. The maintenance foreman, whose district is being inspected, accompanies the inspector during the inspection. An association of inspectors with the foremen is of great value from a training point of view. We use two inspectors and they alternate on the inspections of the districts. In this way each inspector spends a considerable amount of time with every district foreman in the state, thus providing continual training at the foreman level through an exchange of ideas, methods and experience on a common level.

The inspectors are directed to obtain pictures of machines, methods, opera-

tional details, etc. and we now have a library composed of approximately 2000 pictures. From this catalogued and cross indexed library we can select illustrations for most of our training lectures and public relations talks.

After each inspection is completed, summary reports are prepared showing percentage and miles in each classification rated Good, Fair, Poor and Very Poor, for each maintenance district, division and for the state. A weighted average for the maintenance rating of each unit is also reported. Each maintenance district and division is given a position state-wide showing the relative efficiency of each organizational unit.

A plaque and dinner is given for all the employees of the district rated in the first position. The foremen of the maintenance districts in second and third places are invited to attend the recognition dinner. Local officials and publishers are also invited to attend. This method of rating, positioning and recognition has created excellent morale and a very effective competitive spirit.

In January 1961, 62, 63 and 64, we conducted maintenance schools for six days in each division for maintenance district foremen and special project superintendents. Usually the Maintenance Manual was used as a text with lectures being given by Division Engineers and a few selected Maintenance Foremen. In addition, lectures on special subjects were delivered by Central Office personnel and by representatives of Asphalt, Portland Cement and Lime Associations and chemical manufacturers.

At the same time the schools for supervisory personnel were underway, maintenance inspectors were showing slides and giving explanatory talks to employees from two or three districts. We realized that training of district foremen was producing very acceptable results yet we were not reaching a majority of the maintenance employees with a majority of the instruction. Replacements for the district foremen were not receiving any special instruction at all.

Beginning with the maintenance schools of January 1965 and following a similar schedule for 1966, the instruction was designed for and given to all maintenance employees. This was accomplished completely within the field division. Most of the divisions gave the instruction to all of the employees of two or three maintenance districts at a time, on a four day schedule for each group. Both engineers and foremen were used as instructors, utilizing in their instruction film strips which had been prepared to illustrate each section of the Manual and lectures recorded on audio tapes for instruction in public relations and planning.

In addition to lectures on highway maintenance, one-half day was devoted to lectures to all employees on the use and maintenance of equipment. Instruction was given by the Equipment Supervisor from the Central Office, a former equipment operator and shop foreman, who knew how to instruct operators, mechanics and shop foremen.

Instruction on maintenance of equipment was first attempted in 1964. Even though we taught only basic fundamentals the results are already apparent and very gratifying. It is surprising, even astonishing, to find out how many

reasonably good operators are completely ignorant of fundamental items of equipment maintenance. The appearance and overall operating efficiency of the equipment is improved and a decrease in emergency shop work is apparent.

Special courses are available in supervision and management for the field engineers and this year a special version of it is available to shop foremen. In the past, special supervision and management courses have been available to a few selected maintenance foremen at irregular periods and the results have been apparent. It is planned to re-establish the supervisors courses on a regular basis and to include all maintenance foremen and their probable replacements in the training group.

An analysis and study of the Iowa Report 1/ and its application to Oklahoma indicated that one of our most urgent needs was for maintenance training in planning. We unsuccessfully tried to find a planning text suitable for use by maintenance front line employees. After considerable research and preparation, we have made a start on planning instruction. For the training schools in 1962 and 1963, we made a beginning. In 1964 a more intensive effort was made. In the first two years, twenty to thirty minute lectures were prepared and given by personnel from the Central Office to the maintenance foremen and special project superintendents assembled in each field division. For the maintenance training schools of 1964, two lectures on planning, including several charts and illustrations, were prepared and delivered by personnel from the Central Office. Each of these lectures required approximately ninety minutes and was given to maintenance foremen and special project superintendents assembled in each of the field divisions. Personnel from the Central Office could not be spared for the time required for the 1965 maintenance training schools, including all maintenance employees in two or three different school periods in each division, so one lecture was prepared in the Central Office and recorded on audio tape. Each Division was furnished a copy of this tape and it was thus transmitted to all employees at all schools held during the winter sessions of 1965. The tape was supplemented by lectures and discussions at the maintenance district and division level.

We have observed that men like to produce satisfactory results by their work. They will produce, if they are properly equipped, trained, supplied and supervised. But good planning and close detailed supervision is required. It also requires closer supervision than can be provided by the district foremen alone. Planning and supervision must also be furnished by subforemen, key men and operators. These men must be included in the schools and special instruction in planning and supervision must be provided at that level. Oklahoma has made a beginning but further development of the courses and more intensive instruction and training must be provided.

Special lectures in addition to regular lectures on highway maintenance are provided on such subjects as:

Soils, their use and treatment
Agronomy as applied to soil erosion
Chemicals as applied to soil erosion and right-of-way beautification

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1/ Iowa State Highway Maintenance Study. Highway Research Board Special Report 65, 1961

Reports on maintenance research
Discussion of special memoranda
General information on new materials
New equipment and new methods

Special courses of instruction in addition to the regular courses in highway maintenance are given to special classifications of employees.

Shop Foremen are given a special one week course in "Maintenance of Commercial Vehicles." Manufacturers provide instructors at the University of Oklahoma for the course.

Shop Foremen and Mechanics are given special courses of two to four day training in ignition, fuel injection, automatic transmissions, air conditioning, hydraulic motors, etc.

Operators are given special one day courses in general care and maintenance of equipment plus special instruction in the operation of their own units of equipment.

Selected Personnel from each division headquarters and at least two persons from each maintenance district are given one day instruction courses in radiological monitoring each half year, (two days per year). During these courses special instruction in radio communication is also included. This instruction does not improve the quality of highway maintenance, however, communications instruction does improve efficiency. Our radiological monitoring instruction and exercises contributes to the Federal Government civil defense program.

Traffic Engineers, superintendents, foremen, sign crews, and traffic lane marking crews are given one day special instruction each year. This includes lectures, pictures and demonstrations pertaining to uniform traffic control devices.

Safety committees composed of selected division headquarters personnel, division wide superintendents, maintenance district foremen and their clerks meet one-half day each month for special instruction and exercises in safety.

Training methods used in the school sessions involve:

a. Primarily lectures based on the contents of the Maintenance Manual, chapter by chapter and section by section.

b. The lectures are supplemented by film strips and, in some cases, by slides.

c. Lectures recorded on audio tapes were furnished to the divisions covering public relations and planning and tapes were supplemented in each case by lectures and discussions by division and district personnel. This method will be extended to additional subjects.

d. Special lecturers from materiel associations assisted and appropriate slides and/or motion pictures were used when available.

During 1961 to 1963 inclusive, maintenance training to supervisory employees was provided for approximately seven hundred fifty man days per year. During 1965 maintenance training, given to all maintenance employees, amounted to approximately 6800 man days. The special training given to limited classifications of employees amounted to six hundred forty five man days, making an overall total of 7445 man days per year. This is almost ten times the amount of training formerly given to supervisors only. You will note from an examination of Fig. 1, that beginning with the change in instruction, the poor classification almost disappeared from the Maintenance Rating and the number of miles rated good more than doubled.

Summary and Results

All basic components, such as equipment, supplies, heavy maintenance, new construction, weather, supervision and training are reflected in the quality of maintenance. During the past five years most of these components, except the weather, have received some improvement yet maintenance training is the component that percentage-wise has received the most improvement, has cost the least and produced the most.

Even though standards were raised between 1962 and 1963, and again between 1964 and 1965, you will note a continual improvement in the maintenance condition of the Oklahoma State Highway System (Fig. 1). A complete elimination of the Very Poor classification within the first three years and a reduction of ninety percent in the Poor classification is noted. A continued improvement in the number of miles in the Good classification is shown and can be projected into the future. It may become necessary to establish the additional classification of Very Good.

There is no royal road to any type of education. A large amount of detailed work is required but no other effort or expenditure can produce as large a rate of return as training for maintenance employees.

STATE OF OKLAHOMA - DEPARTMENT OF HIGHWAYS

MAINTENANCE DIVISION

STATEWIDE SUMMARY

ROADWAY MAINTENANCE RATING

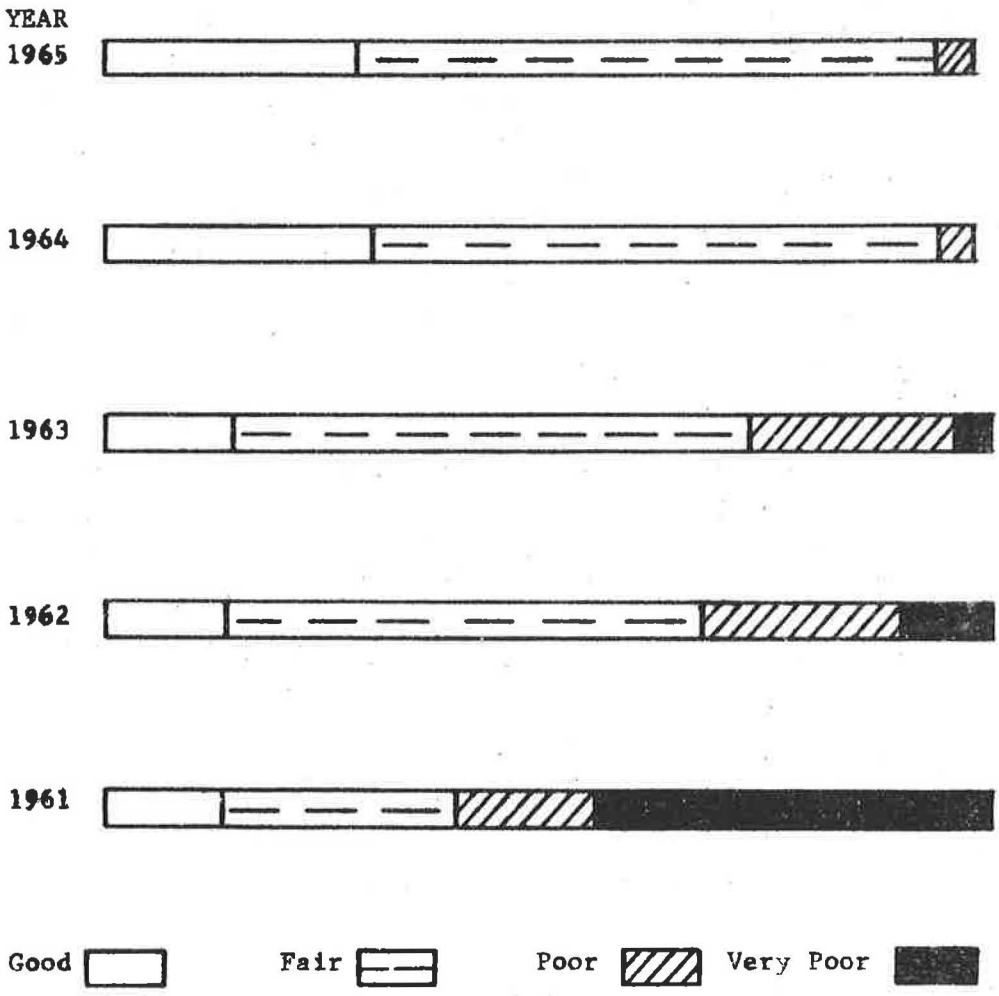

Figure No. 1