MAINTENANCE AND OPERATION OF EQUIPMENT

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In our present highway system of Kentucky, we have approximately 16,000 miles of state maintained highways and 13,000 miles of state maintained rural roads. There are over 4,200 state maintained bridges of various types. Each year many additional miles of roads are added to the highway system, which means additional mileage to be maintained. Since the Department of Highways, operating on a very limited budget, must assume the responsibility of maintaining all of its highways, it is very essential, especially in the Maintenance Division, that every means available be employed to effect an efficient job of highway maintenance. The proper quantity and type of road equipment are important factors in doing the tremendous job the Maintenance Division is called upon to do in maintaining the highways of Kentucky.

We are living in a mechanized age. Practically everything that is done depends on some type of machinery or equipment. Gone are the days of the old pick and shovel crews. Mechanization has made possible mass production in all phases of American industry. It has made possible the daily production of thousands of automobiles. 1953 March schedules called for 701,000 cars and trucks to be built. Airplanes, tanks, guns, and various other equipment and supplies for the Defense program, as well as for civilian use, are rolling off the production lines at an enormous rate each day. The construction and maintenance of highways in Kentucky have not escaped this trend toward mechanization, but have benefited as much as, or more than, any other industry in our state.

The Kentucky Department of Highways has eleven divisions, and each depends to a great extent on equipment of various types to perform its particular function within the Department. The Maintenance Division is the largest user of equipment, as they use about 85 percent of all equipment owned by the Department.

For the entire Department of Highways to function as it should, it is very important that it be supplied with enough equipment of the proper type at all times. To help do this immense job, the Department owns and operates 4,201 units of equipment. This fleet consists of trucks from one-half ton to seven ton capacity, including jeeps, pickups, dump trucks, transport trucks, and electric magnets. It also includes sedans, ferry barges, motor boats, sand blasters, steam boilers, air compressors, belt conveyors, rock crushers, joint cutters, bituminous distributors, gravel dredges, stone driers, core drills, pile drivers, drilling equipment, hoisting equipment, pneumatically operated equipment, paving breakers, rock drills, tampers, motor graders, pull-type graders, bituminous heaters, tank car heaters, impactors, speed loaders, truck mounted bucket loaders, bucket loaders, front-end loaders, maintainers, center-line markers, bituminous mixers, concrete mixers, retread mixers, power mowers, concrete pavers, bituminous storage plants, concrete batching plants, snow plows, water pumps, bituminous pumps, mud pumps, power rollers, saws, scales, scarifiers, scrapers, power shovels, aggregate spreaders, mechanical sweepers, power sweepers, tractors, angle-dozers, bull dozers, and power units. The value of this equipment is ten and one-half million dollars.

The value of equipment to the Department is determined primarily by the service it gives. Regardless of the quantity of equipment available, it is of very little value to the Department unless it is kept in good mechanical condition. To
keep its equipment rolling, the Department has 23 district repair garages and
two central garages. Each is equipped with up-to-date facilities which make pos-
sible repairs to the equipment from the installation of a spark plug to a major
overhaul. Most of the garage supervisory personnel, as well as many of the
mechanics, are men who have been with the Department several years. Many
of these men are trained specialists in their particular line of work, which adds
to the efficiency of equipment repair.

The procurement of repair parts and supplies is an important factor in the
maintenance of equipment. Each repair garage has a stock supply which averages
from $14,000.00 to $60,000.00 in value. A central warehouse, located in Frank-
fort, has an average stock value of approximately three-quarters of a million
dollars. The average stock value of the entire Equipment Division is one and
one-half million dollars. This stock consists of repair parts, maintenance tools,
and miscellaneous materials and supplies.

A Master Kardex system is used in controlling inventory and as a guide for
the purchasing of materials. This system gives a perpetual inventory of all stock
and makes it possible to ascertain the stock availability of each of the storerooms.
This information makes possible the transfer of parts from one garage to another.
Most of the major equipment parts are purchased as needed by contract from
various equipment dealers in Kentucky. This system eliminates the necessity of
carrying a larger supply of parts; of which some naturally would become obsolete.
It also provides quick service; as the parts are ordered from the vendor the same
day the requisition is received in the Equipment Office at Frankfort, and most of
the vendors carry a large stock of parts for which they have price contracts.

The Division of Equipment is always on the lookout for new equipment and
new methods which would add further to the economy and efficiency of construc-
tion and maintenance of our highways and to the servicing of our equipment.
For example, prior to April 1, 1950, all diesel engine fuel injection pumps were
repaired by outside concerns, the cost ranging from $172.50 to $300.00 for each
pump. On April 11, 1950, a diesel fuel injection pump service department, lo-
cated at Frankfort, was organized and equipped with the very latest repair
equipment. Since that time, the Department has repaired its own pumps. This
work being highly specialized, it was necessary to have personnel trained for this
job. Since the diesel repair department has been in operation, 175 fuel injection
pumps have been completely rebuilt at an average cost per pump of $34.54. The
saving to the Department of Highways in fuel injection pump repairs alone,
during this period, has been approximately $35,000.00. Not only has the Depart-
ment saved a considerable sum in actual pump repair, but also, through an ex-
tensive diesel engine preventive maintenance program, many costly repairs have
been eliminated; thus resulting in greater savings to the Department. Fast service
is the motto of the diesel repair department, and its personnel is striving to live up
to that motto.

Great strides have been made in the modernization of equipment in the
Department of Highways during the past thirty years. Ditching is an important
job of the Maintenance Division. A few years ago, ditching was done by the pick
and shovel method. The material was loaded into a Model T Ford dump truck
and was unloaded by means of a hand operated mechanical dump body. Then
came the pull-type grader. This was a big improvement over the old pick and
shovel method; yet this operation was very expensive, as it required a tractor to
pull the grader, two operators, and still called for a good deal of manual labor.
The elevating grader was next in line for ditching. This machine was able to cut
a very nice ditch, elevate the material from the ditch to the opposite side of the
highway, and load it into dump trucks. This constituted a great advancement
over the pull-type grader; yet it, too, had its faults. Two operators were neces-
sary, a large tractor was required to pull it, and it created a traffic hazard; since
both lanes of the highway were blocked during its operation. The most modern method of ditching is done by the heavy duty motor grader which is operated by one man and is able to do an excellent job of ditching, as well as shoulder and bank sloping. The material from the ditch is picked up by means of speed loaders which are designed to pick it up from the front of the machine and elevate it to the rear into modern dump trucks. This method blocks only one lane of traffic on the highway. Recently some of our District Engineers have been using a front-end loader, or high lift, to load the material after it is pulled from the ditch line.

Pneumatically mounted shovels and cranes have replaced to a great extent the crawler type shovel and crane formerly used by the Department of Highways. Especially is this true in maintenance work. The pneumatically mounted units are highly mobile and cost less to move from job to job. Each year the Department replaces several old crawler type shovels with pneumatically mounted units. However, the crawler shovel still has its place in construction work; and, in some instances, is used in heavy maintenance work. The pneumatically mounted four wheel drive front end loader, or high-lift, has proven to be one of the most efficient units of equipment owned by the Department. This unit is capable of moving at a speed of approximately fifteen miles per hour on the highway and makes possible a quick removal of slides, and performs other emergency work which often occurs.

The old crawler type bucket loader, which created a problem in transportation, has been replaced in the Department with the modern truck-mounted loaders. This type of unit will move from one job to another at the speed of an ordinary truck. It is operated by one man and will load various types of maintenance material.

I have mentioned the improvements and changes in only a few of the units of equipment used by the Highway Department; however, almost every type of road equipment is constantly being improved by its manufacturer.

Preventative maintenance of equipment is a major factor in reducing the number of breakdowns and repair costs. To carry out the preventative maintenance program in the Department, some districts use Equipment Inspectors, who make regular inspections of equipment to determine if it is being regularly lubricated, if the proper type of lubricant is being used, and if the operator is taking reasonably good care of the equipment. The inspector fills out an inspection form that shows the mechanical condition of the unit. One copy of this report is submitted to the garage foreman, and it is the foreman’s responsibility to see that the recommendations of the inspector be complied with in so far as is possible.

The trend in the Department for the past several months has been to use roving mechanics to make regular inspections of equipment. These mechanics carry a small supply of fast moving parts and do minor repair work at the time of inspection. We have found this method to be very effective in reducing the number of equipment breakdowns and repair costs. We hope to continue this procedure in all of our districts when qualified personnel is available.

In the maintenance of highway equipment, I am entirely convinced that good operators are the greatest assets the Department has, and this would also be true of any city or county road system or contractor. During World War II, when it was impossible to purchase new equipment, and it was practically impossible to obtain parts, a good many units owned by the Department had to be taken out of service for lack of necessary repair parts. However, I have personally observed, during that period, that although a unit was in poor mechanical condition, it continued to operate if it was being used by an efficient operator. A few years ago, fifty percent of the equipment breakdowns could be attributed to the neglect and carelessness on the part of the operator; however, the percentage has been decreasing constantly, and is continuing to decrease. This past year I visited one
of our repair garages and found seven highway mowers awaiting repairs. This was during the season when weed cutting needed to be done. Five of these mowers had been turned over and damaged, apparently through carelessness on the part of the operators. Not only should an equipment operator be qualified to operate the equipment, but also, he must have the right attitude toward his work and his organization. Regardless of his qualifications, if he is careless and indifferent, it is impossible for any group of mechanics to keep his equipment operating.

The Department has many good operators. I would like to mention one that I consider to be outstanding. This man is assigned to the Somerset District, has been with the Department for several years, and has operated practically all types of state owned equipment, taking the same care of each unit as if it were his own. He has a splendid attitude toward his work and his organization. For the past few years he has been operating oil distributors. His equipment is always clean and properly lubricated, and it looks just like it did the day it was purchased. Some operators claim that if they kept their equipment clean they wouldn't get much work done. However, this man’s record shows that his distributor has put down more oil than any other distributor in his district. We have found in the Department that if equipment is kept painted and clean it gives the operator an incentive to take better care of the equipment and that he is also able to do more work.

In the Department of Highways, since 1934, an equipment rental system has been used to distribute equipment costs. It is commonly recognized that a good rental system is vital to efficient management of mechanized maintenance. Without the information compiled in connection with the rental system, it would be almost impossible to develop the control records and indicators which play such an important part in the actual management of a large aggregation of equipment. For example, when equipment costs threaten to overrun the accrued rental, it is not a foregone conclusion that rental rates should be raised. What is actually needed may be merely a tightening up on preventive maintenance activities, a more intensive operators’ training, or a boost in the morale of shop mechanics. Equipment rental rates are based on liquidating the entire cost of equipment. Charges are made on an hourly or mileage basis for most of the major equipment. On equipment having an hourly rate, rental is charged for the time it is attended by operating personnel during working hours. It is the policy of the Department to rent, rather than to purchase, types of equipment for which it has only occasional or limited need, except for certain items which might be termed insurance equipment. Insurance equipment is defined as that which is essential to the satisfactory operation of the Department, but that which is not readily available on a rental basis. An example is snow removal equipment.

To prevent the Department’s being overstocked on certain types of equipment and to avoid its having an idle surplus in any district, the Department set up a schedule of minimum use of equipment on March 1, 1951. The official order setting up this regulation authorizes the Director of Equipment to transfer from any district any piece of equipment not used for the minimum number of hours as set up in the schedule. Idle equipment costs any road or street department money. We have found that if equipment is used the minimum amount, according to the schedule, it will pay its own way from rental. Of course, we do not expect equipment to be reported as used when not in use; nor do we want equipment to be idle in one district when it is needed in another. We do insist that the use of equipment be so arranged and planned that there will be a minimum of idle equipment in any of the districts. It is the policy of the Equipment Division for some standby units to be available if possible at each of our repair garages to replace other equipment which has been made idle because of breakdown. This practice permits maintenance crews to continue their work without interruption.
The Division of Equipment is responsible for the procurement of all Highway equipment. We try to standardize on makes and types that are recognized by the highway industry to be the most suitable for highway work. To simplify local stockage of parts and to facilitate the servicing of equipment in so far as is possible, we try to group the units in the field according to make. Following World War II it was evident that the Department's equipment was badly in need of replacement. Since March 1, 1949 the Department has disposed of 1,041 obsolete and worn out units and has replaced them with 1,787 new units of modern equipment at a cost of $4,023,357.04. We have found that this up-to-date equipment creates efficiency in maintenance and construction of the highways in Kentucky.