

MAINTENANCE MANAGEMENT

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It is a pleasure for me to take part in this Operations Session of the 22nd Annual Kentucky Highway Conference. The theme of my remarks is maintenance management. This is one of the most significant aspects of highway operations, and in my opinion is one that deserves more serious attention than it has had.

Back in the summer Mr. John Spurrier, Assistant State Highway Engineer for Operations, asked me to attend a maintenance management workshop at the University of Illinois. The workshop was most stimulating and my time was well spent. I am still not sure what I learned, but I was inspired to do a lot of thinking about maintenance management. About 25 or 30 papers were presented during the three-day period and all of them were interesting. But, as you can imagine, it is literally impossible to absorb so much information in such a short period of time.

Before I went there I foresaw the need for retaining all I could. Highway programs of the future will make many new demands on us, but none, I am convinced, are more important than the need to develop improved maintenance management techniques.

As we look back over the past decade, we all take pride in the construction programs of the Department of Highways. It is reasonable to expect even greater accomplishments will come out of the 1970's. If we are to cope with maintenance problems that follow these vast construction programs, it is time for us to take stock of our maintenance operations. The Illinois conference gave me a chance to do just that.

I have always been a firm believer in planning and management. In my opinion, you cannot have an effective program, no matter how you try, no matter what field you are in, without proper planning.

During my 21 years with the Department of Highways, I have been privileged to work in many areas of responsibility. I may have held more positions in the Department than anyone here.

I have had the opportunity to participate in, or at least observe, most operations of the Department. It has been my observation, especially during the past 10 years, that most functions of the Department require and receive a great deal of advanced planning and management. For instance, during the past year, the Department of Highways developed a five-year program for pre-construction and construction activities. This did not just happen. It was in the making for several years.

The five-year program is broken down for scheduling purposes into phases such as planning, design, and right-of-way. Without going into greater detail, I remind you that these phases in turn are broken down into specific activities outlined in the project status report.

This is not the case with maintenance. As District Engineer for the past year-and-a-half, I have had a chance

to oversee maintenance operations in District Nine. In my opinion, our maintenance operations are just as efficient as those in any other district. I have able assistants who do an outstanding job. But my opinion remains that the highway maintenance operations in Kentucky are not as well planned and managed as they might or should be. I daresay each District has different ways of going about its maintenance activities and every method that is used has some merit and some problems.

Why do we have so many? Why is there so little uniformity? Because the maintenance function is probably the most difficult highway operation to manage. In my opinion there are several reasons for this, some of which are:

1. The great number of separate operations performed every day
2. The events - mostly damaging - that cannot be anticipated, for example the weather.
3. The frequent need for quick decisions after on-the-spot evaluation of a particular problem, decisions which in most cases cannot be found in a handbook.

For these reasons, it is hard to write formulas for routine maintenance. But even so, we should be able to develop a maintenance management system for such functions as ditching, shouldering, surface blading, surface patching, sealing, etc. We all agree, I believe, that these maintenance functions can be anticipated at least one quarter or perhaps one year in advance.

In order to develop a maintenance management system, the workshop showed me two things must happen:

1. We must define our objectives.
2. We must devise a method or procedure for reaching these goals.

The most important element, one that must be considered at the very beginning, is people. It is an absolute necessity that qualified people be employed at all levels, from the supervisory to the pick and shovel level. It is not enough to have qualified people, because they must be willing to produce to the extent of their ability, and they must be under control of a properly designated supervisor who has the skill needed to direct them to productivity.

The Commonwealth needs a uniform system of maintenance to insure a state-wide level of service. This uniform system should be developed at the Central Office and then policies and procedures should be developed to see that it is, in fact, applied uniformly throughout the State. Our maintenance operations, as they now stand, have evolved over the years in much the same manner as cobblers in Old England handed down their profession to their

sons and grandsons. A certain amount of tradition is desirable, I admit, however, if we stick too devotedly to old procedures, then new ideas and techniques will never be proposed or tested.

Recently, I heard someone refer to a RC factor, meaning "Resistance to Change." It is my observation that maintenance in the Department of Highways has probably had a higher RC factor than most other operations.

Whether we resist or not, maintenance management has to come. This technique has been in operation in some states for years. Each year that passes sees fresh starts in other states. All states report favorable results though they admit many problems still exist. None of the states that have implemented maintenance management systems feel that this approach is a failure and should be abandoned.

This is the message I bring home from the Workshop. Changing from nonmanaged maintenance procedures to managed maintenance procedures would be a major undertaking, largely because of the "Resistance to Change" factor.

We are all creatures of habit. I daresay that 90 percent of the work each of us does on a day-to-day basis is done as a matter of habit. Change does not come easily.

If Kentucky decided to implement a maintenance management system, we should start from the beginning expecting problems to be encountered. For instance, we still have the patronage system of hiring nontechnical maintenance people. Either this system would be changed or we should recognize it as a fact-of-life and develop training programs to smooth the transitions we encounter.

Our reporting and feedback of information would have to be improved. More advanced and greater use of the computer cannot fail to help us improve in this respect.

In order for a maintenance management program to succeed, complete support from top management would be required. In other words, we would have to sell it to the Boss first. And this requires the total commitment of the Department's career professionals.

I learned at the Workshop that many states are now in the developmental stage of a maintenance management system. We can learn from them. Generally speaking, their systems are composed of a number of major components: quality standards, activity and unit identifications, work standards, work programs, and budgeting and reporting systems. Within the system, priorities must be established for each item of maintenance. It was the feeling of the maintenance people I met that traffic control, safety devices, emergency repairs, and removal of debris should have first priority.

The work necessary to preserve the public investment in the highway system should have second priority. This includes preventive maintenance, the preservation of landscaping, etc. Third priority should be given general housekeeping; that is, litter pickup, sweeping, vegetation and erosion control, etc.

A maintenance management system should include efficiency improvement tools, such as formal scheduling, methods studies, and continuing analyses of time, materials, and other essentials. The Workshop included some discussion of detail. One efficiency move considered was restriction of maximum travel distance for maintenance crews to twenty-five miles. There were reports that some states were equipping snow and ice-control vehicles with radios and were limiting their crews to one man per vehicle. Crew specialization is being practiced by many states. Admittedly, there are good and bad features associated with crew specialization. Its advantages include:

1. greater mechanization potential,
2. ease of training, and
3. longer time-span assigned to the same type of work.

Some disadvantages are:

1. greater travel time, and
2. reduced crew association and familiarity with a given area.

But development of the budget is the important element in developing a maintenance management system. The maintenance budget should be based on need.

I have participated in the preparation of two annual maintenance budgets for District Nine, however, I am not at all satisfied with the method we now use. We begin with an allotment, assigned by the Central Office, then determine what to do with it. It seems to me we should begin by identifying our needs.

This is not to say that top management must grant all of the money that a district might request, based on its need. It is most unlikely that they could, but it certainly would provide an opportunity to review total needs and compare them with funds available. Then, if the budget could not meet all needs, the items which could not be financed would be deleted. The level of service could be deliberately appraised and chosen, then maintenance funds could be allotted accordingly. The way we operate now, the Central Office allots the money, then, the District Office determines the level of service.

In summary, I must say that I was favorably impressed with the maintenance management workshop. To me, it seems advisable for the Department of Highways to give consideration to the idea of implementing a maintenance management system. I sincerely believe the advantages to be gained far outweigh the disadvantages. The difficulties we would meet along the way are apparent. In fact, some of them are you and me, the RC factor again. But I am convinced the end-product would be safer, swifter, cleaner highways for the Commonwealth.

MAINTENANCE MANAGEMENT

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I believe it is safe to say that each of us realize the importance of effective maintenance as related to the entire transportation system. I think also we are well aware of the rising cost of materials, labor and equipment rental rates involved in maintenance operations. These facts should impress upon us the need for change to bring about increased efficiency of the maintenance functions. Change toward modernization of maintenance efforts has been made during the past 20 years, but the needs for tomorrow have not been reached. Change has been slow and needs to be accelerated.

Of the 32 or more States represented at the Management Seminar at the University of Illinois, seven States have gone to some form of total maintenance management. Several other States have made some start toward such programs and all others expressed a sincere interest. Those having a total maintenance management program now in effect, without exception, reported increased efficiency and satisfaction with the program.

When analyzing any proposed or new program, one must ask the questions: what good will become of it, or what can be accomplished by installing the new program?

A maintenance management program is certainly not to be established (a) as an exercise in reporting detailed data, or (b) a prestige plan to use data processing equipment and terminology within the maintenance program, or (c) as a system aiding engineers to harass first-line Supervisors or Foremen.

Quite a few people (particularly in the lower ranks) seem to believe these are some of the objectives of a maintenance management program. As Maintenance or Operations Engineers, we must search out and believe in the real values to be obtained from such a program. Furthermore, we must do our best to minimize the added burden of extra paper work and unnecessary planning procedures for all concerned.

A maintenance management system, to be worthwhile, must be designed and implemented to: (1) produce an operational plan for carrying out maintenance activities for a period of time, such as a month, a quarter or a year, for all members of management to understand and analyze; (2) to produce a plan with a dollar value including, of course, the necessary manhours, equipment hours and material to accomplish the various tasks; (3) to provide a reporting system so all managers can periodically see how the plan is doing; and (4) to have a plan good enough that it can be used as a basis for budget allocation request and as an operating budget.

A token approach to maintenance management, such as the work schedule we are presently using, will not and can not accomplish these objectives. According to reports from Sister States that have had experience with a management program, some for as much as five years, it takes

a lot of ground work, training and preparation to accomplish all this, even though the four objectives just described are clear, direct and potentially valuable.

The basic elements of a good maintenance management system are:

1. A physical inventory. In other words, a measurement of the highway system to be maintained.
2. Measurements of the variables that act upon the highway system causing it to require maintenance. These include traffic, climate, terrain, adjacent land use, design and construction characteristics. These variables must have values or factors developed for them so they can be used with the inventory to produce total workloads for the parts of the highway system.
3. Standards or levels of maintenance should be established. These should be based on the level of service to be provided to the user and probably will vary for different classes of highways.
4. Performance standards, describing standard crews, equipment, materials, procedures and productivity for most important work activities.
5. A simple work reporting system. Used by field supervisors to report work accomplished and labor, equipment and materials used.
6. A management information system in which the work report data is assembled, summarized, compared with schedules, budgets and standards and brief reports issued for each management level.

Now let us consider the benefits of an effective maintenance management program which provides for all the basic elements just mentioned.

From the standpoint of a first-line supervisor, such as a Superintendent or Foreman, he would be able to analyze his own feedback results. In fact, this system may allow him for the first time in his career to self-study his own planning as compared to his actual work accomplished, as well as his efficiency. Furthermore, he can compare all of this with similar information for the neighboring crews managed by his colleagues and competitors. The spirit of competition and the means of measuring the work accomplished, against productivity standards, are established.

For the managing engineer, at any level, such a system provides all the information necessary for him to determine the operating efficiency of each crew under his supervision. In other words, he can readily determine whether a dollars worth of work is accomplished for a dollar spent. It also provides him with the means of justifying a budget request: X number of work units can be accomplished for X number of dollars.

When we speak of efficiency, I think most of us think inefficiency is the result of unwilling or lazy workers. This is not necessarily true. Inefficiency may very well be the result of an improperly equipped crew, the lack of adequate supervision or an overstaffed crew. A properly designed and implemented maintenance management program may not point out the specific cause, but it will certainly spot the crews that are constantly operating at a level of efficiency below the established productivity standards or other crews performing the same task. Once the inefficient crews are spotted a study of their organization and activities would reveal the cause, and indicate remedial action needed.

When considering the benefits of a maintenance management program to Administrators of State Government, and more specifically the Highway Commissioner, we are reminded that we are now experiencing a time of very severe attitudes and reactions toward organized government. Dissatisfaction with government results when the public witnesses unfilled promises, proliferation and overlapping of efforts, illogical responses and even incompetency. With a properly designed and implemented maintenance management program and fallibility of the Department would be reduced greatly. I wish I could state here that the need for funds for maintenance purposes would be

diminished greatly by such a program, but I can't honestly make such a statement. I can say that the planning and reporting which is a necessary part of any management system would provide the Administrator of the Department of Highways with the means of monitoring the activities of the maintenance organization, assure him of increased efficiency, reduce legitimate public criticism and provide an increase in the quality and quantity of work accomplished with the funds available for maintenance purposes.

It has been demonstrated by other States and by Management Consultants that maintenance work can be quantified and measured. It can also be planned and scheduled in the most economical way, controlled to meet specified levels of service and standards, and reported and accounted for in terms useful to managers.

I believe the benefits to be realized from a total maintenance management program are great and worthy of serious consideration by top Administrators of the Department. Because a program must be designed to serve a specific organization and because of the many complexities of an effective program, I believe the use of an experienced Consultant for making a study of our organization and designing a program that will meet our needs is desirable. We are spending about 50 million dollars annually for maintenance of highways in Kentucky. The estimated cost of a complete study and the design of a total maintenance management program for our maintenance function by a consultant is 0.2 percent to 0.3 percent of this amount, approximately 125 thousand dollars. If our efficiency were increased by only 1 percent over a two year period, the cost of the study will have been more than offset.