

RATING SYSTEM FOR NEW MEXICO'S MAINTENANCE MANAGEMENT PROGRAM

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The New Mexico State Highway Department developed a method to rate the use of its Maintenance Management System. This paper describes the reasons for developing the system, defines the system, explains what is rated and how the system was developed, gives an overview of how the rating can and has been used, and describes problem areas associated with the use of this rating.

During the final stages of implementation of the Maintenance Management System, the New Mexico State Highway Department developed a method to rate the use of that system.

- Our discussions of this rating system will attempt to:
- + outline the reasons for developing the system,
 - + define the system,
 - + explain what is rated and how the system was developed,
 - + give an overview of how the rating has been used,
 - + cover additional areas where the rating could be used, and
 - + describe the problem areas associated with the rating as experienced by the New Mexico State Highway Department.

Why was the Rating System Developed

The rating system was developed at the request of the Chief Highway Administrator. He wanted an objective indicator that would show how field managers were using the new management system.

What is the Rating System

The management rating system is an analytical performance index for maintenance managers. Each management unit is rated quarterly. The rating scheme ranges from 0 to a maximum score of 10. As originally developed, it was anticipated that the ranges of scores shown in Figure 1 would indicate how a manager is performing.

Figure 1. Interpretation of Rating

<u>Range of Scores</u>	<u>Rating</u>
10 to 8.5	Excellent-deserves special recognition,
8.4 to 7.0	Good-deserves recognition,
6.9 to 5.5	Acceptable-shows reasonable management capability,
5.4 to 4.0	Fair-needs additional attention, and
3.9 to 0.0	Poor-unacceptable, requires immediate management attention.

What is rated and how was the System Developed

Two separate ratings are computed to form the management index--plan compliance and use of standard crew sizes.

The plan compliance portion of the management index is based on how well maintenance managers are able to perform work on their work plan. This rating uses routine work activities---those activities which the manager has been told should be done regardless of staffing. By limiting the rating to these activities, over or under staffing should not penalize a manager. Only work activities which require significant resource commitment are used in this analysis.

The numerical value is computed in the following manner:

- Step 1 - Select routine work activities to be used for plan compliance rating. These activities may vary from season to season.
- Step 2 - Compute ratings at the crew level for each percent of plan range using the following formula:

$$\left(\frac{\text{Percent of Evaluated Activities within specific Percentage Range of Plan}}{\text{Percent of Plan Ranges}} \right) \times \frac{\text{Weighted Value}}{\text{Value}} = \text{Rating}$$

<u>Percent of Plan Ranges</u>	<u>Weighted Value By Range</u>
90-110%	10
80-90% and 110-120%	7
70-80% and 120-130%	5
More than 30% away from plan	0*

Step 3 - Compute the average rating for the ranges using the following formula:

(Ratings for each Percent Range) = Average Rating

Step 4 - Calculate average plan compliance rating for higher management levels by averaging the ratings for all subordinate managers. For example, the average plan compliance rating for all foremen reporting to an assistant superintendent becomes the plan compliance rating for the assistant superintendent.

*(Not computed-only to ensure 100% of activities are considered)

The second part of the management index is based on how often maintenance managers assign the recommended number of workers to do a specific work activity. This rating uses only those activities for which productivity is measured in units other than man-hours and which have a recognized optimum crew size. By limiting the rating to these activities, crews which do betterment, special projects and/or other maintenance (for which standard crew size is not meaningful) are not penalized.

The numerical value is computed in the following manner:

Step 1 - Select work activities to be used for standard crew size rating. These activities may vary from season to season.

Step 2 - Compute ratings at the individual crew level for each crew size range using the following formula:

(Percent of Evaluated Activities within Crew Size Range) X $\frac{\text{Weighted Value}}{\text{Value}}$ = Rating

Crew Size Range	Weighted Value
Standard Crew Size	10
Standard Crew Size +1	7
Standard Crew Size +2	5
Standard Crew Size + More than 2	0*

Step 3 - Compute the average rating for the ranges using the following formula:

(Rating for each Crew Size Range) = Average Rating

Step 4 - Calculate average crew size rating for higher management levels by averaging the ratings for all subordinate managers.

*(Not computed-used only to ensure 100% of selected activities are considered).

The final management index is computed by averaging the ratings computed for plan compliance and use of standard crew sizes. A sample work sheet used to derive a crew's rating is shown in Figure 2.

The rating was originally computed manually and required approximately three man-days to complete for all management units. It was programmed to run directly from the management system reports during the last year substantially simplifying the procedure.

How has the System been used

The rating system has been used as an indicator to locate areas of the departments' maintenance operation where in-depth analysis will provide a better understanding of how work is being accomplished. Analysis of very high rated or very low rated crews provides insight to problems that can effect plan compliance and/or use of standard crew sizes. The factors that cause low ratings can often be controlled or improved by first-line managers. It must be realized, however, that some lower ratings can result from conditions that a foreman has little or no control over.

The rating has been used to identify areas where the work plan does not meet the needs of a group of management units or a particular management unit. Analysis of low plan compliance in several instances resulted in a determination that the procedures used in developing the work plan did not provide for an acceptable level of service for particular management units.

An important area where the rating can focus on needs is in training. Reporting problems have been highlighted by exceptionally low or high ratings. Areas have also been identified where managers need additional support in the scheduling process. Emphasis in the area of improving scheduling procedures and improving communication between first and second line managers have resulted in improved plan compliance ratings. A few isolated cases of slightly lower ratings have resulted when emphasis was placed on identifying work that needed to be done that was not included in the work plan. This information has also been used in evaluating the work plan for future improvements. Very low ratings in use of standard crew sizes have isolated a few cases where incorrect reporting was a problem.

A statewide average has been monitored since the base year of 1977-78 to determine if our crews are raising the rating or if we are moving further away from plan compliance/use of standard crew sizes.

Figure 3 shows the average crew rating for 1977-78, 1978-79 and the current rating for this fiscal year as of March 7, 1980. The lower rating for 1979-80 has been effected partially by a required reduction in the work program due to a short fall in revenues beginning last October. Critical work on routine activities was delayed because our department had a cash flow problem and reduced materials purchases to provide only for emergency work. The cash flow problem improved late this spring and our crews have been completing routine work that had to be delayed and it is expected that the overall rating will improve slightly.

To date, our use of the management rating system has been as an indicator to direct us to areas that need more analysis and field review. The rating is used to supplement the more detailed reports that are part of the management system. The rating by itself does not answer questions, but it can indicate where we should be looking to determine a cause and effect that will help us better understand how, why, and where we are using our maintenance resources.

What additional uses can be made of the rating

Several additional items have been discussed for possible use of the rating including:

- + evaluation for merit or extra merit raises,
- + as part of a performance rating, and
- + to provide special recognition to managers that maintain high standards of plan com-

Figure 2. Management System Rating Worksheet

INDIVIDUAL MMS MANAGEMENT SCORECARD

MANAGEMENT LEVEL _____

DISTRICT _____ MGT UNIT _____

I. PLAN COMPLIANCE

		<u>THIS PERIOD</u>					
Percent of Plan	Number of Activities	x	Percent of Activities	x	Value	= Rating	
90 - 110%	_____	x	_____	x	10	= _____	
80 - 120%	_____	x	_____	x	7	= _____	
70 - 130%	_____	x	_____	x	5	= _____	
<70 >130%	_____	x	_____	x	0	= 0	
Overall Rating						_____	_____

II. USE OF STANDARD CREW SIZE

		<u>THIS PERIOD</u>					
	Percent of Activities	x	Value	=	Rating	Rating Last Period	
Standard Crew Size	_____	x	10	=	_____	_____	
Standard Crew Size +1	_____	x	7	=	_____	_____	
Standard Crew Size +2	_____	x	5	=	_____	_____	
Standard Crew Size +2	_____	x	0	=	0	_____	
Overall Rating						_____	_____

III. MANAGEMENT INDEX

Index This Period	Index Last Period
_____	_____

pliance and standard crew size usage.

What problems have been associated with the rating

The major problem the New Mexico State Highway Department had with the rating system was the controversy that developed at most levels of management when the rating was originally introduced.

Many maintenance supervisors look upon the rating as a report card and will still identify it as the major item that caused many people to resist the changes required to utilize the new management system. There has been concern that the rating system will encourage field managers to report planned work rather than actual accomplishment.

The information generated by an effective maintenance management system makes all levels of management more accountable as to why, where, when, and how work is being performed. Our field managers were in the early stages of adjusting to this new accountability when they became aware of the rating system. Apparently this was a case of moving too rapidly in a sensitive area and a very

definite negative reaction erupted. As a result, the rating has not been widely distributed and has basically been used by the maintenance management staff as discussed earlier in this paper.

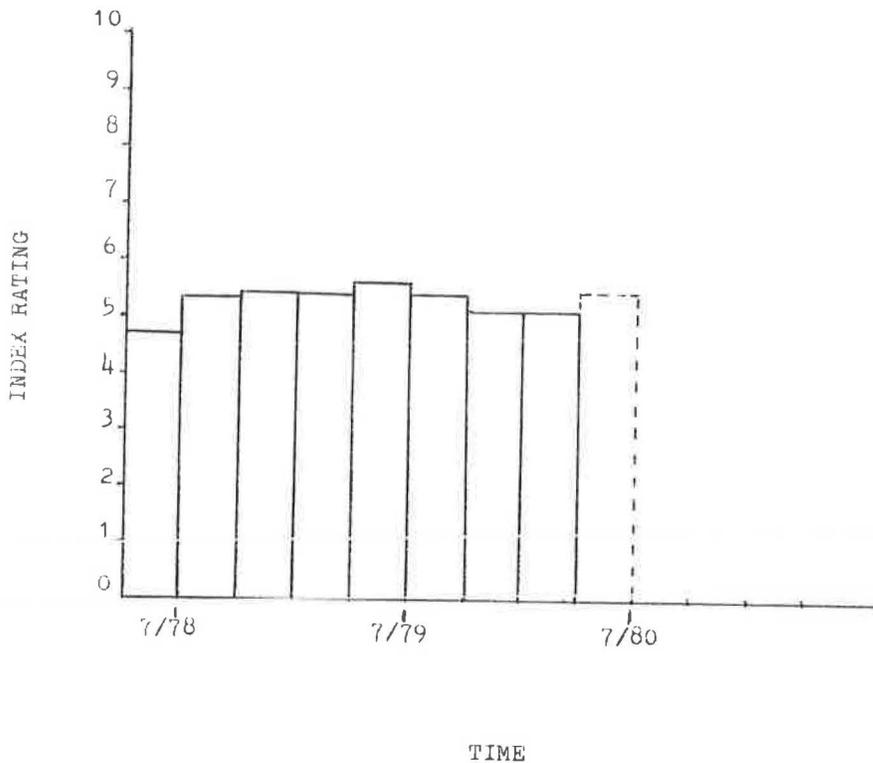
We learned how this type of system should not be introduced to our maintenance personnel. I do not believe I can give any expert advice on methods that would provide for successful implementation. Conditions probably vary greatly depending on agency and how the rating system is presented.

We have discussed why and how this rating system was developed, what it measures, how it has and can be used, and problems that have been associated with its use.

In conclusion, this type of performance index is an additional tool that maintenance managers can use as an indicator to focus on areas that need in-depth analysis. It provides an objective measure of two of the basic elements of any successful maintenance management system--plan compliance and use of standard crew sizes.

The most effective use of any maintenance management tool usually results from acceptance and utilization by all levels of management. It can

Figure 3. Management System Rating/Statewide Average



be expected that an effective selling job will be required in many situations to get first line managers to accept and use this type of information.

Implementation of a rating system in an environment where there is resistance to changes required for systems management can result in strong negative reactions and increase the overall resistance encountered.

It is anticipated that the New Mexico State Highway Department will continue to use this management rating system as discussed. In addition, we hope to find ways to provide the information in a format that is acceptable to and usable by field managers. It is believed that the information provided by the rating system is viable and useful if an agency can use it effectively.