WEST VIRGINIA DIVISION OF HIGHWAYS
ADMINISTRATIVE OPERATING PROCEDURES
SECTION V, CHAPTER 6

SECTION TITLE: HIGHWAY OPERATIONS
CHAPTER TITLE: MAINTENANCE PLAN

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I. INTRODUCTION

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Planning is the first step in the practice of management. Planning is the orderly arrangement of a course of action designed to permit the most efficient and economical performance of a task or group of tasks. Without planning in the highway maintenance area, we resort to "Brush Fire Maintenance."

II. OBJECTIVE

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The overall objective in highway maintenance planning is to establish an adequate maintenance program capable of accommodating all highway travel in an orderly, safe and efficient manner. All planning must take into consideration the available funds and resources. The principle objective is to maintain roads and structures as nearly as possible, in their originally constructed or improved condition, with the least amount of inconvenience to the traveling public and the greatest degree of safety.

Planning highway maintenance is not an exact science be− cause so many variables are involved in performing the necessary field operations. Often, these factors such as weather conditions, are beyond the control of the persons responsible for planning the program. Weather is taken into consideration to some extent by making advance plans on a seasonal basis. Other factors that can be controlled are: having the correct materials at the job site when needed; scheduling the type and amount of equipment, and having the necessary labor available to perform the required tasks.

The purpose of making a plan is to utilize controllable factors and resources in the best way possible and at the same time attempt to reduce the adverse effects of those factors over which the planner have little or no control. With careful planning it is possible to know, in advance, what work can be accomplished with the allocated resources.

III. IMPORTANCE

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The importance of planning all maintenance operations, and of performing the work in accordance with these plans, cannot be over-emphasized. Because of the increased work- load placed on maintenance organizations and the increased cost of materials, equipment, and labor, each maintenance dollar must return the maximum in results. Effective planning is a major factor in the preventing of waste, duplication and excessive expenditures of maintenance funds.

The Maintenance Plan is goals, needs and utilization of resources. The Maintenance Plan gives direction to everyone, Supervisors as well as the work force. Worker productivity and efficiency will both be increased by a good plan. The Maintenance Plan should be tailored for the specific organization and the organization's Supervisor. The organizational Supervisor should be involved with the planning process both in the development of the plan and throughout the period covered by the plan. This chapter will describe the managerial tools available to the Supervisor and how these tools are utilized in preparing a plan.

IV. BASIC EXPENSE STANDARD (BES)

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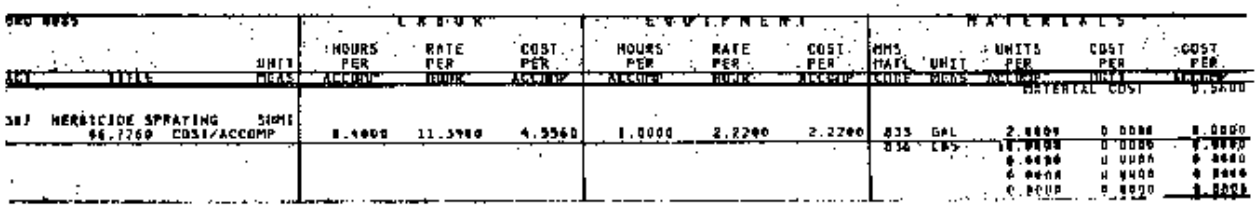
The purpose of the Basic Expense Standard (BES) is to enable the manager to determine the approximate number of man-hours and dollars he will need to complete the plan. In the BES, a cost is assigned to each resource (Labor, Equipment, and Material) for each activity contained in the Maintenance Performance Standards.

Following is a line entry for Activity 307, Herbicide Spraying, as it appears in the BES.



The report basically has four sections as follows:

1. Activity Title/Unit of Measure
2. Labor Costs
3. Equipment Costs
4. Material Costs

ACTIVITY TITLE/UNIT OF MEASURE

This column lists the Activity number, description and unit of measure. Directly beneath the description a 'Total' Cost Per Unit is listed. This cost includes the sum of Labor, Equipment and Material costs. Therefore, the units of accomplishments planned can be multiplied by this figure to determine the total cost of the activity.

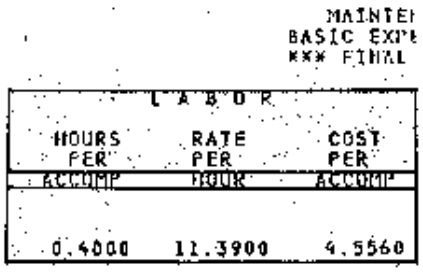
LABOR COSTS

This column has three headings:

1. Hours Per Accomplishment
2. Rate Per Hour
3. Cost Per Accomplishment

"Hours Per Accomplishment" is the number of hours that is required to perform one unit of accomplishment or productivity as found in the Maintenance Performance Standards. The number of accomplishments planned can be multiplied by this number to determine the estimated man-hours that will be required to complete the accomplishments.

"Rate Per Hour" is the average rate of pay for the job classifications contained in the activity. This figure multiplied by the "Hours Per Accomplishment" results in the third column "Cost Per Accomplishment". In the following example the total labor cost for one shoulder mile of Activity 307 is $4.556.

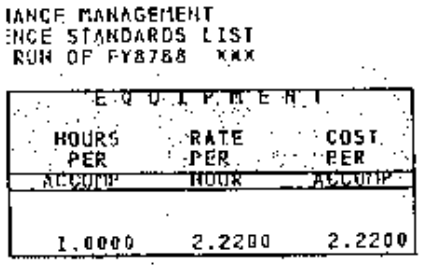


EQUIPMENT COSTS

This column has three headings:

1. Hours Per Accomplishment
2. Rate Per Hour
3. Cost Per Accomplishment

"Hours Per Accomplishment" under the Equipment Section will always be one. The Equipment costs are calculated and updated by Highway Operations Division Staff. This calculated cost appears in column 2, 'Rate Per Hour'. Similar to Labor costs the "Hours Per Accomplishment" multiplied by the "Rate Per Hour" results in column 3, "Cost Per Accomplishment". In the following example the total equipment cost for one shoulder mile of Activity 307 is $2.22.



MATERIAL COSTS

This column has five headings:

1. MMS Matl. Code
2. Unit Meas
3. Units Per Accomp.
4. Cost Per Unit
5. Cost Per Accomp.

In the material section of this report there is enough space for five different material codes if needed. The individual headings for each material code are as follows:

MMS Matl Code - lists the Material Code number.

Units of Measure	- lists the unit of measure such as gallons.
Units Per Accomp.	- lists the number of material code units required to do one (1) unit of measure for the specific activity as in the following example of Activity 307, Herbicide Spraying.
Cost Per Unit	- lists the cost for one (1) unit of the measured Material Code.
Cost Per Accomp.	- lists the total cost of the Material Code for one (1) unit of accomplishment for the specific activity. This is de− termined by multiplying the "Units Per Accomp." by the "Cost Per Unit".

EXAMPLE

MATERIALS

MMS MATL CODE	UNIT MEAS	UNITS PER ACCOMP	COST PER UNIT	COST PER ACCOMP
835	GAL	2.0000	30.9000	61.8000
836	LBS	10.0000	4.5600	45.6000
		0.0000	0.0000	0.0000
		0.0000	0.0000	0.0000
		0.0000	0.0000	0.0000
		MATERIAL COST		107.4000

Material Codes 835 and 836 are listed for this particular Activity 307, Herbicide Spraying. Note it takes two gallons of Material Code 835 to complete one shoulder mile of Activity 307. Two gallons multiplied by $30.90 (Cost Per Gallon) equals a total cost of $61.80 for Material Code 835 to accomplish one shoulder mile of Herbicide Spraying.

Material Code 836 requires 10 lbs. to complete one shoulder mile of the same activity. Ten multiplied by $4.56 (Cost Per Pound) equals a total cost of $45.60 for Material Code 836 to accomplish one shoulder mile of Herbicide Spraying.

The Total Cost Per Accomplishment for each material code is then added for a "Total" Material Cost per Accomplishment. In the above example the "Total" Material Cost for one shoulder mile of Activity 307 is $107.40. This method allows the manager to know how much each individual material code costs or how much the lump sum of all materials will cost per accomplishment.

As a general rule before the beginning of the new Fiscal Year each organization may update material costs as deemed necessary for the new year. These updates are processed by Highway Operations Division and new updated hard copies of the Basic Expense Standard are returned to the Districts for distribution.

V. **ANNUAL PLAN WORKSHEET**

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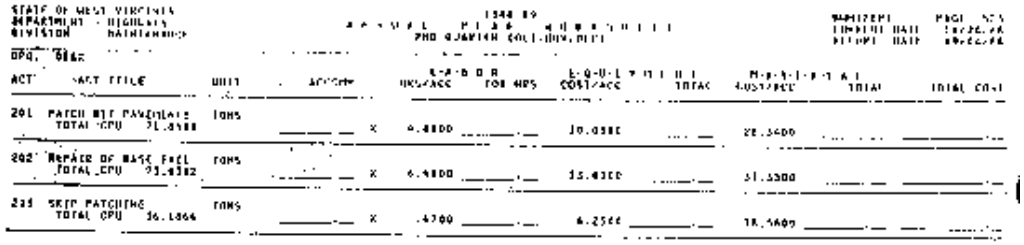
Prior to the beginning of a planning period, each organization is provided an "Annual Plan Worksheet". This worksheet lists all activities found in the Maintenance Performance Standards with the corresponding BES costs for the particular organization. However, the BES costs on the Annual Plan Worksheet are not as detailed as found on the Basic Expense Standard Listing. The

following BES costs are found on the Annual Plan Worksheet:

1. "Total" Cost Per Unit
2. "Equipment" Cost Per Unit
3. "Material" Cost Per Unit

Labor Cost Per Unit is not listed but instead "Hours Per Accomplishment" are listed. This procedure is necessary to enable the manager to track the planned man hours with the organization's available man hours or Man Power Quota (MPQ).

Following is a sample of the Annual Plan Worksheet.



To begin development of the plan:

STEP 1 Enter the number of desired accomplishments in the blank provided for "Accomp".

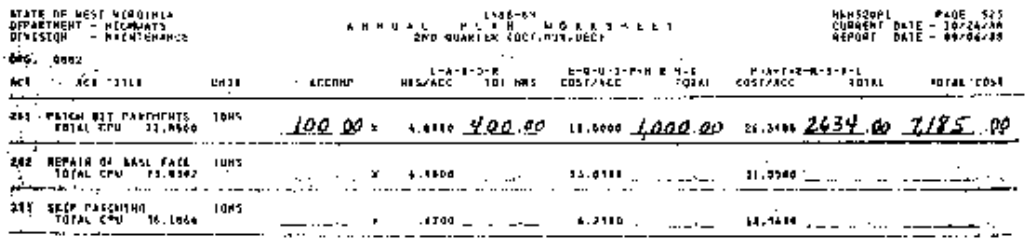
STEP 2 Multiply the number of planned accomplishments by the next column, "Hours Per Accomplishment". Enter the result in the blank provided for "Total Hours".

STEP 3 Multiply the number of planned accomplishments by the Equipment "Cost Per Accomplishment". Enter the result in the blank provided for "Equipment Total".

STEP 4 Multiply the number of planned accomplishments by the Material "Cost Per Accomplishment". Enter the result in the blank provided for the "Material Total".

STEP 5: Multiply the number of planned accomplishments by the "Total Cost Per Unit" found directly beneath the Activity description. Enter the result in the blank provided for "Total Cost".

The following sample shows a worksheet with the calculations entered for Activity 201.



The same steps are repeated for each activity planned. Once all activities are planned, the columns for Labor Hours, Equipment Total Cost, Material Total Cost and Total Cost are then added. Adjustments can then be made to balance the resources or man-hours as needed.

VI. PLANNING AIDS

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A. FIELD PRODUCTION YTD COST REPORT

It will be helpful to use historical data when preparing the plan for any given period. The Field Production Year To Date Cost Report (Refer to Section V, Chapter 8) will contain most all the necessary historical information that will be needed. For example, there are some activities that change very little from one year to the next and this report will be helpful in planning those activities. Also by using this report, it can be seen what was accomplished in the past year, which is certainly some basis for determining what is needed for the coming year. There are many ways the report will prove to be beneficial.

B. ROADWAY FEATURE INVENTORY

Another significant planning aid is the Roadway Feature Inventory (Refer to Section V, Chapter 3). This report provides the planner with a detailed listing of the roads contained in the specific organization and each road's particular features such as guardrail, culverts, ditch miles, etc. The planner can then be knowledgeable of what is to be maintained thus enabling him to prepare a better plan.

C. MAINTENANCE PERFORMANCE STANDARDS

The Maintenance Performance Standard Manual will also be helpful as it contains valuable information about each activity and the number of man hours required to perform the unit of work. Each activity is also described in detail concerning the labor, material and equipment, the appropriate season or months to plan certain activities, in addition to valuable information on work methods. (Refer to Section V, Chapter 5).

D. MAN POWER QUOTA (MPQ)

A man power quota formula will be provided to the District Maintenance Analyst prior to the planning period. This formula will enable the planner to determine the number of man-hours needed to support the current quota and can be used in gauging plan adjustments. The formula must be updated for specific planning periods. The following is an example of the MPQ Formula and how it is used.

EXAMPLE

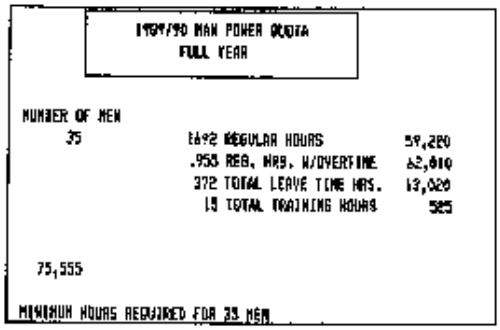
The organizational quota is entered into the blank provided. This number, after a series of calculations, will determine the following:

1. Number of Regular Hours
2. Number of Regular combined with Overtime Hours
3. Number of Leave time Hours
4. Number of Training Hours

All the hours are added together for a total. This total generates the minimum number

of hours required to maintain the number of men originally entered.

The following example is for a Quota of 35 men.



It may sometimes be difficult to achieve the number of man-hours as shown due to the different types of plans being prepared. However, an attempt to keep the plan near this figure should be made.

It should be noted that the Man Power Quota formula is contained on the spreadsheet software. The District Maintenance Management Analyst should be contacted for further information.

VII. CURRENT GUIDELINES AND SPECIAL INSTRUCTIONS

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A memorandum setting forth the current guidelines under which the plan is to be prepared will be submitted with the Annual Plan Worksheets at the time of each planning period. It is important to review the instructions thoroughly before beginning the plan. These instructions will specifically outline the goals of the plan and any necessary special instructions or goals of the Central Office Managers.

VIII. SOFTWARE SPREADSHEET UTILIZATION

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A spreadsheet software package is now in use throughout the DOH. The Annual Plan Worksheet is coded on the spreadsheet. This coding in conjunction with various formulas allows the manager to utilize a PC to perform all the mathematical functions instantly. By using the software program, time can be saved in addition to increasing accuracy. Additionally, changes to a plan can be completed swiftly and effortlessly utilizing the PC and software. Learning to use the software is relatively easy, however, the planner may prefer to seek assistance through the District Management Analyst when preparing the plan. Either way, the District Maintenance Analyst should be contacted to obtain detailed information concerning this software.

IX. **PLAN APPROVAL**

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Each District will likely have its own approval process. Perhaps the plans will be reviewed by the Maintenance Assistants in addition to the Assistant District Administrator - Maintenance. The requirement of the Central Office is the plan be reviewed and approved by the District Administrator before submission to Highway Operations Division. A memorandum from the Director of Highway Operations regarding final approval and possible exceptions to approval will be attached to the final hard copy plan and returned to each District.

X. **UTILIZING THE PLAN**

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Supervisors, in addition to persons designated to prepare the Weekly Schedule within an organization, should familiarize themselves with the plan and schedule accordingly. For instance, if 75 Road Miles of a specific activity have been planned for the period, an effort should be made to plan and accomplish the 75 Road Miles.

Perhaps the Supervisor desires the work units to be completed all in one month, or maybe the intent is to spread the work over the period. In either case, the person preparing the work schedules should be aware of what is being scheduled and how that scheduled work equates with the Plan Activities and the Supervisor's intentions and goals.

XI. **MONITORING THE PLAN**

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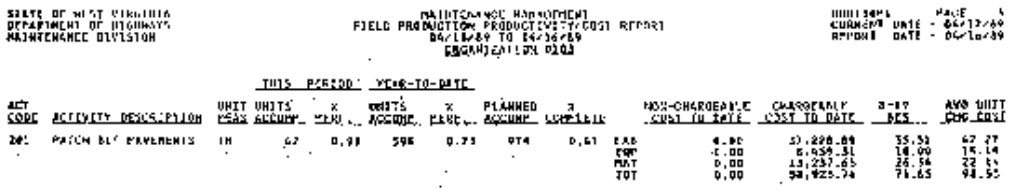
The planned accomplishments for each activity for the Year−To−Date period will appear on the Field Production Year To Date Cost Report (refer to Volume V, Chapter 6). The YTD Planned Accomplishments are compared to the YTD Actual Accomplishments as the period progresses.

EXAMPLE:



STATE OF WEST VIRGINIA
DEPARTMENT OF HIGHWAYS
MAINTENANCE DIVISION

MAINTENANCE MANAGEMENT
FIELD PRODUCTION PRODUCTIVITY/COST REPORT
04/18/89 TO 04/30/89
ORGANIZATION 0103

CURRENT UNIT - 04/12/89
REPORT DATE - 04/18/89

		THIS PERIOD			YEAR-TO-DATE							
ACT CODE	ACTIVITY DESCRIPTION	UNIT MEAS	UNITS ACCOMP.	X	UNITS ACCOMP.	X	PLANNED ACCOMP.	% COMPLETE		NON-CHARGEABLE COST TO DATE	CHARGEABLE COST TO DATE	$-BY MES	AVG UNIT CHG COST
201	PATCH BIT PAVEMENTS	TN	62	0.98	598	0.73	974	0.61	EAB	0.00	$3,288.88	55.53	62.27
									EQP	0.00	$ 659.51	10.99	10.64
									MAT	0.00	$3,237.65	26.56	22.55
									TOT	0.00	$58,925.74	71.65	98.55

The status of Activity 201, in the preceding example, shows that 974 tons have been planned 'to date' and 598 tons have actually been accomplished 'to date'. The actual accomplishments divided by the planned accomplishments results in a percent complete of 61% for the activity. This tells the planner that approximately 376 tons of Activity 201 remains to be accomplished before the end of the period, in order to complete the planned quantity.

The Maintenance Plan is a management tool that allows the Maintenance Supervisor to input the organizational needs and available resources coupled with the manager's goals and management skills to develop a well thought−out, economical and goal oriented work plan. One might say that the Maintenance Plan is actually the combination of tangible and intangible assets resulting in a realistic plan of action.

Maintenance managers need to realize that the plan is a tool and as such, some degree of flexibility must be incorporated into the plan. Very often, situations change and it may actually be desirable for the manager to depart from the plan. An example of this would be the announcement by Central Headquarters that additional funding is being made available for a Spring Resurfacing Program. The Maintenance Plan having been developed prior to the announcement of an additional funding source, must now have a degree of flexibility. This is essential to allow the organization to participate in the newly funded program.

Of course the 'situation' could change in the opposite direction and render cutbacks in the planned work program. The point is best explained as follows:

"In the normal course of events, the plan indicates the results that the organization wants to attain, there are circumstances in which rigid adherence to plans is not the best course of action".