DATA DEVELOPMENT FOR IMPROVEMENT OF MAINTENANCE PERFORMANCE

C. O. Leigh
Assistant Maint. Engineer
Virginia Dept. of Highways

Mr. Roy Jorgensen pointed out some types of data that are useful in a maintenance management system and I want to show the source of this data we are developing through a pilot study in Virginia.

At the beginning of the study, as Mr. Jorgensen pointed out, it was felt necessary to measure the amount of maintenance work performed. Our approach to this was to have our field forces report the amount of work performed using various work units. This reporting is done in terms of county, route section, kind of road and activity. Our first step was to designate appropriate work units for as many of the maintenance activities as possible. Work units were selected for as many activities that we felt could easily be reported by the field organization. (Fig. 1)

ORDINARY MAINTENANCE

CODE	ACTIVITY	WORK UNIT
111	Skin Patching	Tons of Aggregate
131	Machine Gravel Surface	Miles Bladed
134	Apply Dust Palliative	CWT. Chemical
221	Tractor Mowing	Acres
233	Paint Guard Rail	Feet of Guard Rail

Fig. 1

These are some typical examples of work units that we did select for the field reporting. These are shown to demonstrate the wide range of work units that can be used. Actually we found that the best work unit is expressed in material because this is the most easily reported by our field units. They seem to have difficulty reporting work units expressed in area. Information on productivity, labor, equipment and materials is submitted by the field forces using three reports, the time sheet, equipment rental sheet, and the stock issue and accomplishment report in this pilot study. Since the reporting of work is the major deviation from our current practice, I will discuss the first. (Fig. 2)

This report is made out by the men in the field on a daily basis.

In the upper right hand corner, "Organization," designates Richmond District, South Hill Residency - first column, Maintenance Area 2. This designation gives

the organization and thereby designates the manager responsible for the work. Looking at the column headed "Activity" we see 111, Skin Patching. Skin Patching has a work unit of tons of aggregate - 10.8 tons of #78 stone. The work was performed in County 12, on Route 46, Section 2605. Section 2605 denotes a road in the Primary System, and also the kind of road.

The unit cost and total cost of the material is also shown. A similar entry is shown for the asphalt used. The columns at the left, M. A. B. indicate the type of entry. "M" indicates the entry is for charging out material only. "A" is for a work performance entry only. "B" indicates the entry is for charging out material and is also a measure of work performance. The work done and material used has then been recorded by organizational unit, county, route, system, kind of road and activity.

M - Materials Only

A - Accomplishment Only

B - Both Materials and Accomplishment

VIRGINIA MAINTENANCE STUDY
STOCK ISSUE AND ACCOMPLISHMENT REPORT

Organization 041

DATE: Jan 13. 1966

	M	A	B														
	T	S															
02			X	841	#78 Stone	10	8	23	12	0046	2605				111	2.50	27.00
02	X			051	Asphalt	200	0	15	12	0046	2605				111	.14	28.00

Approved: Checked and Posted by: Received by:

Fig. 2

This is a time sheet showing the employ's hours recorded by organizational unit, county, route, system, kind of road and activity. (Fig. 3)

Make, Type, Size Ford Dump Truck, 2 Ton — EQUIPMENT TIME REPORT card type 6 — Organization 041

597 — 1.10

CLASS 860

EXCUSED AT — GASOLINE OIL AND GREASE — FROM

MATERIAL RECEIVED — TOTAL — PRICE

17870 — GASOLINE - GALS.

18420 — KEROSENE - GALS.

550 — DIESEL OIL - GALS.

1-15-66 — MOTOR OIL - QTS.

GREASE - LBS.

HYDRAULIC OIL

TOTALS

AREA OR CREW NO.	County	ROUTE	CITY OR COUNTY SECTION	PROJECT SECTION	JOB Letter	JOB Number	LAND OWNER	ACTIVITY	1 M	2 T	3 W	4 Th	5 F	6 S	7 S	8 M	9 T	10 W	11 Th	12 F	13 S	14 S	15 M	16 T	17 W	18 Th	19 F	20 S	21 S	22 M	23 T	24 W	25 Th	26 F	27 S	28 S	29 M	30 T	31 W	TOTAL HOURS
02	12	0046	8605					111																												8				

TOTAL DAILY HOURS

Broken Down	055	
Not Needed	056	
Bad Weather	057	

Fig. 3

Similarly the same information is recorded for the equipment hours used in the operation. Shown also is the type of equipment and other pertinent data. (Fig. 4)

These reports are sent to our computer section, key punched and various reports produced to meet management or study needs.

Mr. Jorgensen gave some examples of the reports produced and the next slide shows one example.

1 ☒ Salaried — Regular
2 ☐ Salaried — Overtime
3 ☐ Hourly
4 ☐ Truck Hire
5 ☐ Convicts

VIRGINIA MAINTENANCE STUDY
EMPLOYEE TIME REPORT

Organization 041
Road Camp No. _____

Period Ending 1-15-66

Employee Name John Smith

Social Security No. 000-00-0000

Title Highway Equipment Operator A

Hired Equip. License Number _____

Rate 1.79

AREA OR CREW NO.	County	ROUTE	CITY OR COUNTY SECTION	PROJECT SECTION	JOB Letter	JOB Number	LAND OWNER	ACTIVITY	1 M	2 T	3 W	4 Th	5 F	6 S	7 S	8 M	9 T	10 W	11 Th	12 F	13 S	14 S	15 M	16 T	17 W	18 Th	19 F	20 S	21 S	22 M	23 T	24 W	25 Th	26 F	27 S	28 S	29 M	30 T	31 W	TOTAL HOURS
02	12	0046	8605					111																												8				

TOTAL DAILY HOURS

APPROVED

Fig. 4

This report gives the total work performed by a Residency for the month of August, 1965, on all systems and classes of roads in the Residency. (Fig.5) Take the first line as an example. All of the skin patching, activity 111, in the South Hill Residency for the month of August is shown. Total amount of work is

303.0 tons of stone placed. Total labor hours 1494.0 - Total cost $3,878.82 - Productivity rate 4.93 man hours per ton - Unit cost $12.80 per ton in place.

We accumulated this type of information previously on a daily basis and in analyzing all of these production figures, we arrived through the use of time studies and this data, at what appears to be an attainable production rate and also a good method. Planned quantities are not shown here because planning procedures have not been fully developed at the present time. In a previous part of the study the actual quantities were analyzed on a daily basis in relation to type of roads, and planned quantities were derived for the various classes of roads.

The specific uses of this type of data was covered by Mr. Jorgensen. I would like to say that the data itself does not solve your problems. Information such as this, showing comparisons of productivity, comparisons of quantity of work performed are only indicative of problems. As a Maintenance Engineer, you still have to go out and find what the cause is, but it does give you a place to look. A man can be performing excellent as far as expenditures are concerned and still not be doing the job.

ACT	UNIT MEAS	QUANTITY PLAN	QUANTITY ACTUAL	LABOR HOURS PLAN	LABOR HOURS ACTUAL	TOTAL COST PLAN	TOTAL COST ACTUAL	RATE PLAN	RATE ACTUAL	UNIT COST PLAN	UNIT COST ACTUAL
041C 111	23		303.0		1494.0		3,878.82		[illegible]		12.
041CC 112	23		.2		28.0		35.44		[illegible]		[illegible]
041CC 113	23		115.0		128.0		327.84		1.11		[illegible]
041CC 121	13		3.0		16.0		28.24		[illegible]		[illegible]
041CC 123					24.0		47.20				1.96
041CC 131	23		653.6		64.0		126.66		.09		.19
041CC 132	32		294.5		313.0		1,223.87		1.22		[illegible]
041CC 133	32		351.1		1044.0		2,656.68		2.97		[illegible]
041CC 134	21		108.0		26.0		65.04		.24		.60
041CC 142	23		15.0		12.0		27.48		.80		[illegible]
041CC 143					48.0		81.36				[illegible]
041CC 149					112.0		168.32				[illegible]
041CC 151	32		38.7		91.0		323.53		2.35		[illegible]
041CC 152	23		43.5		96.0		184.32		2.20		[illegible]
041CC 153	23		10.0		48.0		125.76		4.90		12.57
041CC 159					738.0		1,344.34				[illegible]
041CC 161	32		74.0		2210.5		5,928.44		79.87		0.11
041CC 162	[illegible]		129.8		332.0		956.12		2.55		[illegible]
041CC 163	31		51374.5		2589.0		3,701.91		.05		.07
041CC 164					340.0		626.60				[illegible]
041CC 169					16.0		20.80				[illegible]
041CC 211					137.0		268.21				[illegible]
041CC 212	32		97.9		1319.0		2,116.30		13.52		[illegible]
041CC 213					289.5		616.31				[illegible]
041CC 215					364.0		669.54				[illegible]
041CC 216					32.0		66.16				[illegible]
041CC 221	41		48.0		90.0		261.40		[illegible]		[illegible]
041CC 222	41		94.2		269.0		710.05		[illegible]		[illegible]

Fig. 5

In closing I would like to say that we have found our field forces are very capable of reporting this type of information and with the desired accuracy.

In Virginia we feel that developing data on work performance through a regular reporting system will be a major step in promoting maintenance economy.