STATE OF WASHINGTON REPORTING SYSTEM

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•AT THE 1968 Maintenance Workshop in Columbus, Ohio, I appeared before this group to report on the Maintenance Management System we were developing in the State of Washington and to summarize our progress up to that time. By now the system, also being developed along similar lines in other states, has been widely publicized and presumably everyone knows the basics.

Essential to such a system is the development of time standards and quality standards, an inventory of the system, and preparation of minor job lists and daily schedules from monthly schedules, which, in turn, have been based on an annual work plan. Since that time, we have made considerable progress in implementing our system and have recently prepared a performance budget for the 1971-1973 biennium, based on a summation of two annual plans, plus other known fixed costs.

Very shortly after the 1968 workshop, we developed a series of labor performance reports and used these for about a year and a half. The basic report was a Maintenance Section Labor Performance Report, which summarized the accomplishments monthly and compared them with the time standards for all activities so covered and reported a performance percentage against the standard. These were summed up by division for the use of the local superintendent, by district for use by the district staff, and in a statewide summary for headquarters use. Recently, we have dropped all of these reports except the section report, and are developing a more advanced method of evaluating, which we refer to as the accomplishment report. This will be discussed briefly, later.

Figure 1 shows a field worksheet developed by the local supervisor, who may be, in isolated areas, an independent leadman, but commonly a foreman since we steadily tend to consolidate and move more toward gang maintenance wherever feasible. This plan was developed for control section 3238, as shown, and lists the work to be accomplished for the coming year under major work categories. This work, for each major job category, is broken down by operation number to further identify what is to be accomplished. For instance, the major work category no. 1110 is patching roadway surface. Operation no. 11236 is actually a combination of the operation no. 1123 with a 6 added to indicate the district. This is premix continuous patch over 50 ft, using motor grader and roller. The unit is in tons of mix. The estimated quantity for the year is 120 tons. Mileposts are shown under "Remarks" and all work is in a rural area as shown by the "R". Operation no. 1124 is for the haul of the above material and is in equipment miles.

Operation no. 1135 is hand patching potholes. Here again the unit is a ton of mix. Obviously, individual judgment enters into items such as this but the majority of the field supervisors have many years of experience and, quite commonly, the experience is on the particular section for which the plan is being prepared.

Major job 1180 is cleaning roadway surface and operation no. 1182 is mechanical sweeping of intersections. Major job 1410 covers mowing and burning. Operation no. 1411 is mowing, unit is in acres, the quantity to be mowed is 14 and under "remarks," note twice a year. The actual area is 7 acres doubled for two mowings. This is common practice in drier areas in the eastern part of the state where mowing is only necessary in the spring and fall.

Figure 2, used for yearly planning, shows merely a transfer from the field worksheet, which has been based on actual travel over the section. The transfer is done in the field office. You will note that the top item on the sheet is the same as the first item on the preceding sheet. At this point, the individual preparing this plan determines the month in which the work will be done. Since this work is covered by a standard, nothing further need be entered.

Note that the fifth item in Figure 2, traffic control, is in man-hours. It is not covered by a standard. Therefore, in the development of the annual plan, the average rate of $5.33 an hour is entered. The 99, under labor, shows that man-hours only (neither equipment nor materials) are involved and 50 percent of this will be done in July, 10 percent in each of August, September, and October, and 20 percent in April of the following year.

Other items of the work under this particular control section are handled similarly. After review and revision, if necessary, by the division superintendent, the division plan is consolidated and then forwarded to the district office for further review by the maintenance engineer and his staff before being submitted to the central computer.

Figure 3 shows the computer printout for this control section. Through the computer program, the items in the annual plan are turned into dollars. The 120 tons are converted to $1,126 with the percentages for labor, equipment, and materials shown. This total cost is derived by multiplying the standard unit cost times the number of units.

ORGANIZATION CODE 4Gle110 PREPARED BY JLS
ROUTE NO. 206 DATE 5/1/69
FUNCTIONAL CLASS OTHER

CONTROL SECTION 3238

MAJOR WORK CATEGORY	OPERATION NUMBER	UNIT	QUANTITY FROM FIELD REVIEW	REMARKS	AREA
1110	11236	Ton	120	MP 5.0 To 10.8	R
↓	11246	Eq Mi	544	Chattaroy Point	↓
↓	11356	Ton	20	Entire Section	
1180	11866	Ton	3	Cleanup Rock Into Section	
1195	11956	M Hrs	96	Patching Operations	
1210	12116	M Hrs	14	Rip Rap MP 11.2	
1310	13116	100 LF	94	MP 6.0 To 7.0 East Ditches Many Ditches	
↓	13196	100 LF	144	MP 9.0 To 10.0 In Places	
1330	13316	Each	32	Clean Culvert Once A Year	
↓	13336	Each	32	First Year Most Culverts Locations	
1350	13516	M Hours	40	MP 4.8 Pipe Headwalls	
1395	13956	M Hours	90	Flagging During Operat.	
1410	14116	Acres	14	Mow Twice A Year	
1610	16166	100 LF	250	Brush MP 5.0 To 12.0	
1710	17136	Acres	10	Shoulder Sterilant Once A Year	
1810	18836	Ton	20	Entire Section Edge Breaks	↓

PAGE 1 OF 2 PAGES

Figure 1. Field worksheet.

Figure 4 shows first the summary by division. Note that item 6110, which we have previously discussed (the last in the upper column on the left), appears under total cost to the division as $8,574 and includes the cost of all patching operations in all the control sections in maintenance section 6110. Directly below that appears the total cost of the patching within the division as $124,903. Below this is shown the summation for the district. Note on the top line, division 1's total cost for patching appears. At the bottom of this column the total cost to the district, thus arrived at, is $500,667. At the bottom is a statewide summary and, here again, you will note district 6 has $500,667 appearing under total cost column and the total cost is $4,404,610 statewide.

The system was not developed far enough to be useful at the beginning of the current fiscal year; however, after we acquired the ability, we applied it inversely and developed an annual plan in each district to tailor it to the available funds. This was accomplished in midwinter, about halfway through the fiscal year. Also, since we were at that time preparing a performance budget for the 1971-73 biennium, we developed annual plans for those two years. In other words, we developed a four-year plan at the same time, using the 1969-71 plan as a base. In March of this year, through a new computer program, we developed our accomplishment report (Fig. 5), which is a means of comparing the work accomplished to date to that planned to date. Figure 6 is a statewide summary. This report is prepared monthly.

Let's look at operation 53111 as shown in Figure 5. The 5300 series are suspense items and will be transferred to the 2300 series by the comptroller when all bills are in. The additional number indicates district 1. Description of work, centerline or lane striping; unit measurement, mile; work accomplished in the current month, 61; work units planned for the current month, 134; percent completed for the current month, 46; work units accomplished to date, 870; work units planned to date, 818; percentage completed, 106, which represents an acceptable overrun at that time of the year, for a performance percentage of 81, which is inside the area of tolerance since 75 percent is the lowest acceptable figure. An asterisk would appear if it is above or below normal. Perhaps this operation should be investigated to determine if slight changes should be

CARD TYPE 1 [8.0] FISCAL YEAR 3 [7.0] ORGANIZATION CODE 5 [4.6.6.1.1.0]

Prepared by JLS Date 5/1/69 Checked by RLD Date 5/4/69 Sheet 1 of 2

FUNCTIONAL CLASS CODE: Principal –1; Major –2; Collector –3; Other –4; Interstate –5

ACTIVITY CODE: Add – 1; Delete – 2; Replace – 3

DESCRIPTION	ACTIVITY: Major Work Category 11 Code	ACTIVITY: Operation Number 15	ACTIVITY: Unit 20	LOCATION: Control Section 25	LOCATION: Area Code 31	QUANTITY: Work Units 33	QUANTITY: Man Hours 40	COST DISTRIBUTION: Std. Unit Cost 45	COST DISTRIBUTION: % Lbr 50	% Eqp 52	% Mat 54	PERCENT MONTHLY DISTRIBUTION: July 56	Aug 58	Sept 60	Oct 62	Nov 64	Dec 66	Jan 68	Feb 70	Mar 72	Apr 74	May 76	June 78	Acty Code 80
CONT MACHINE PATCH	1.1.1.0	1.1.2.36	TON	32.38	P4	120						9.9												1
HAUL		1.1.2.46	EA. MI			544						9.9												
POT HOLE PATCH		1.1.3.56	TON			20						2.5	2.5	2.5	2.5									
SWEEP INTERSECTIONS	1.1.80	1.1.82.6	EACH			3															9.9			
TRAFFIC CONTROL	1.1.95	1.1.95.6	M MRS				76	5.33	9.9			5.0	1.0	1.0	1.0						2.0			
REPAIR R.P. RAIL	1.2.1.0	1.2.1.1.6	M MRS				19	7.14	7.5	2.5										9.9				
MOTOR GRADER-DITCHING	1.3.1.0	1.3.1.1.6	100 LF			94								9.9										
BACKHOE - DITCHING		1.3.1.9.6	100 LF			144								5.0	5.0									
MANUAL CULVERT CLEAN	1.3.3.0	1.3.3.1.6	EACH			32								9.9										
PAINT CULVERT MARKS		1.3.3.3.6	EACH			32															9.9			
REPAIR DRAINAGE	1.3.50	1.3.5.1.6	M MRS				40	7.15	7.5	2.5											9.9			
TRAFFIC CONTROL	1.3.95	1.3.9.5.6	M MRS				90	5.33	9.9					3.0	1.0					1.0	5.0			
MOWING-SIDE MOUNT	1.4.1.0	1.4.1.1.6	ACRES			14						4.2										2.5	3.5	
MANUAL BRUSHING	1.6.1.0	1.6.1.6.6	100 LF			2.5.0									3.0						3.5	3.5		
POWER SPRAY-RIDE	1.7.1.0	1.7.1.3.6	ACRES			10								9.9										
PATCH POT HOLES-SHOULD	1.8.1.0	1.8.2.3.6	TON			20															5.0	2.5	2.5	
FILL SHOULDERS	1.8.60	1.8.6.1.6	CU YD			32													3.3	3.3	3.4			
SIGN GO	2.1.1.0	2.1.1.1.6	EA. MI			48										0.5	4.0	4.0	1.5					
MOLD BOARD PUSH PLOW		2.1.1.36				1923																		
PLOWING & SANDING		2.1.1.66				2232																		
WING PLOW		2.1.236				600												5.0	5.0					

Figure 2. Maintenance yearly planning sheet.

FISCAL YEAR 70

REPORT NO 8031
PAGE NO 2227
DATE RUN 01/30/70

MAINTENANCE SECTION 66110

MONTHLY MANHOUR DISTRIBUTION

ACTIVITY CNTL SECT	UNIT	QUANTITY WORK UNITS	QUANTITY MAN HOURS	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FED	MAR	APR	MAY	JUN	TOTAL COST	LBR %	EQP %	MAT %
11236 MECH MIX CONT																			
3238	TON	120	22	22												1126	10	9	81
JOB TOTAL		120	22	22												1126	10	9	81
11246 HAUL FOR 1123																			
3238	EQ MI	544	33	33												235	68	32	
JOB TOTAL		544	33	33												235	68	32	
11356 PATCH POT HOLES																			
3238	TON	20	78	20	20	20	18									622	61	14	24
JOB TOTAL		20	78	20	20	20	18									622	61	14	24
11826 SWEEP INTER	*																		
3238	EACH	3	2										2			27	40	60	
JOB TOTAL		3	2										2			27	40	60	

Figure 3. Computer printout summary for control section.

FISCAL YEAR 70 REPORT NO 8032
PAGE NO 380
DATE RUN 12/29/69

DIVISION 661

MONTHLY MANHOUR DISTRIBUTION

MAINT SECT	WORK UNITS	MAN HOURS	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL COSTS	% LBR	% EQP	% MAT
1110 PATCHING																		
6101	375	192	98											94	4470	22.0	14.0	64.0
6102	3783	2124	584	624	402	39	20	60	60	60	138	20	49	68	26200	40.5	16.6	42.9
6103	182	553		80							142	142	142	47	5880	46.9	13.3	39.8
6104	3092	1890	283	201	541	20						99	373	373	19286	48.7	19.0	32.3
6105	395	187	20	29								23	23	12	1316	40.6	15.1	44.3
6106	2132	786	163	294	31					31	31	94	31	31	11440	31.3	15.0	53.7
6107	2010	358	238								22	31	21	46	6089	29.7	14.6	55.7
6108	10794	1138	592	329							20	39	64	94	16426	34.5	16.6	48.9
6109	876	2605	1052	59	59	59	71			59	59	59	71	1057	25222	51.3	21.8	26.9
6110	4130	571	126	238	10	10	10	10	10	10	10	39	59	39	8574	33.3	15.1	51.6
TOTAL	27769	10244	3156	1854	1043	128	101	70	70	160	422	546	833	1861	124903	41.0	17.4	41.6

WASHINGTON STATE HIGHWAY COMMISSION
DEPARTMENT OF HIGHWAYS

MAINTENANCE YEARLY WORK PLAN

FISCAL YEAR 70 REPORT NO 8033
PAGE NO 123
DATE RUN 12/29/69

DISTRICT 6

MONTHLY MANHOUR DISTRIBUTION

DIV.	WORK UNITS	MAN HOURS	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL COSTS	% LBR	% EQP	% MAT
1110 PATCHING																		
61	27769	10244	3156	1854	1043	128	101	70	70	160	422	546	833	1861	124902	41.0	17.4	41.6
62	51833	10552	1731	2704	1198	312				175	685	994	748	2005	145302	36.2	17.3	46.5
63	20962	5732	1651	679	437	210	13		223		258	234	463	1564	70908	40.5	16.8	42.7
64	5169	10635	1809	856	1691	164					417	1389	1131	3178	159555	34.1	17.6	48.3
TOTAL	105733	37163	8347	6093	4369	814	114	70	293	335	1782	3163	3175	8608	500667	37.3	17.4	45.3

WASHINGTON STATE HIGHWAY COMMISSION
DEPARTMENT OF HIGHWAYS

MAINTENANCE YEARLY WORK PLAN

FISCAL YEAR 70 REPORT NO 8034
PAGE NO 1
DATE RUN 12/29/69

STATEWIDE

MONTHLY MANHOUR DISTRIBUTION

DIST	WORK UNITS	MAN HOURS	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL COSTS	% LBR	% EQP	% MAT
1110 PATCHING																		
1	244987	58037	11559	7300	3237	1596	1507	1238	1256	2769	2842	2449	4524	9760	653074	38.4	20.1	41.5
2	233366	127331	872	4220	3250	26411	24000				1515	37401	13851	15811	771689	31.0	20.4	48.6
3	1124066	105629	37221	27601	9291	2520	1431	1179	1111	1499	4464	3121	6470	9721	1337608	38.7	21.6	39.7
4	314359	55414	6517	5867	3634	9816	3154	733	365	801	4126	5413	8675	6313	719171	38.8	19.1	42.1
5	85202	20946	3497	3077	744	336	518	174	171	384	1127	2825	2851	5242	329592	32.2	21.5	46.3
6	105733	37163	8347	6093	4369	814	114	70	293	335	1782	3163	3175	8608	500667	37.3	17.4	45.3
7	13546	8529	1468	2179	1035	302	335	504	462	327	268	290	568	791	92809	46.3	20.7	33.0
TOTAL	2121259	405049	69481	56337	25560	41795	31059	3898	3658	6115	16124	54662	40114	56246	4404610	36.8	20.3	42.9

Figure 4. Computer printout summary for division, district, and state.

ACCOMPLISHMENT REPORT
FOR MAY 1970

REPORT NO. 8066
PAGE NO. 24

DIVISION 4110

OPERATION NUMBER	DESCRIPTION	UNIT MEAS	CURRENT MONTH WORK UNITS ACCOMP	CURRENT MONTH WORK UNITS PLAN	CURRENT MONTH PERCT COMPL	CURRENT YEAR WORK UNITS ACCOMP TO DATE	CURRENT YEAR WORK UNITS PLAN TO DATE	CURRENT YEAR PERCT COMPL	CURRENT YEAR TOTAL MANHOURS	CURRENT YEAR TOTAL STANDARD HOURS	CURRENT YEAR PERFM PERCT	CURRENT YEAR TOTAL LABOR COST	CURRENT YEAR CURRENT UNIT LABOR COST
22151	PAINT PRST YD *	EACH						>	12.0			41.52	
22121	EDGE ONLY 3"	MILE						>	4.0			19.88	
50131	SGN MANUFACTURE	NONE				2042		>	2042.0			8479.06	4.15
53111	CNTR OR LANE	MILE	61	134	46	870	819	106	2617.0	2131.5	81	11397.75	13.10
53117	CNTR OR LANE	MILE					132	00					
53121	EDGE ONLY 3"	MILE	258	448	58	1945	2103	92	4574.5	4765.3	104	19456.06	10.00
53127	EDGE ONLY 3"	MILE					474	000					
53191	STR-OTHER ACT	NONE	159		>	2813		>	2813.0			11651.08	4.14
60111	DLAY EQUIP BRDN	NONE	171		>	869		>	869.5			3498.83	4.02
60121	INS-CHNGE ATCH	NONE				15		>	15.0			56.31	3.75
60131	MV EQUIP FR MNT	NONE	108		>	138		>	138.3			781.52	5.66
60141	MNT STK PILES	NONE				2		>	2.0			10.90	5.45
60151	CREW TVL OVR 40	NONE	117		>	252		>	252.5			1538.82	6.10
60161	FIELD SUPERVSON	NONE				16		>	16.0			115.04	7.19
60171	TRAINING	NONE				1		>	1.0			3.46	3.46
60191	SERVICE EQUIP	NONE				153		>	153.0			510.78	3.33
60291	OTHER GAL FUNC	NONE				49		>	49.5			73.85	1.50
	DIV TOTAL		874	582	150	9165	3527	260	13559.3	6896.8	96	57634.86	

Figure 5. Accomplishment report for division.

ACCOMPLISHMENT REPORT
FOR MAY 1979

REPORT NO. 8068
PAGE NO. 16

STATEWIDE REPORT

OPERATION NUMBER	DESCRIPTION	UNIT MEAS	CURRENT MONTH WORK UNITS ACCOMP	CURRENT MONTH WORK UNITS PLAN	CURRENT MONTH PERCT COMPL	WORK UNITS ACCOMP TO DATE	WORK UNITS PLAN TO DATE	CURRENT YEAR PERCT COMPL	CURRENT YEAR TOTAL MANHOURS	CURRENT YEAR TOTAL STANDARD HOURS	CURRENT YEAR PERFM PERCT	TOTAL LABOR COST	CURRENT UNIT LABOR COST
13516	RPR DRAIN/IRRIG	NONE	144	54	444	1516	498	304	1516.0			8236.40	5.43
13517	RPR DRAIN/IRRIG	NONE	237		>	598	340	176	598.0			3077.67	5.14
13521	OTHER	NONE	8		>	730	204	358	730.0			3780.65	5.17
13522	OTHER	NONE		64	[illegible]	277	64	433	277.0			1358.29	4.90
13523	OTHER	NONE	14		>	744	16	>	771.4			4077.54	5.48
13524	OTHER	NONE	9	5	180	177	94	188	177.0			920.47	5.20
13525	OTHER	NONE	6		>	911		>	911.0			4469.07	4.90
13526	OTHER	NONE	5		>	337	55	613	337.0			1771.37	5.25
13527	OTHER	NONE				544	24	>	544.0			2865.43	5.26
13951	FLAG W/1311-94	NONE	457	499	91	6496	6573	99	6497.0			31772.50	4.89
13952	FLAG W/1311-94	NONE	256	147	174	3018	2159	140	3018.0			14992.86	4.96
13953	FLAG W/1311-94	NONE	146	237	61	3243	1660	195	3244.5			15574.00	4.80
13954	FLAG W/1311-94	NONE	494	615	139	5561	5528	101	5564.0			27415.63	4.92
13955	FLAG W/1311-94	NONE	486	479	73	3769	4605	82	3769.0			18400.17	4.88
13956	FLAG W/1311-94	NONE	852	761	112	4315	3184	135	4305.0			21799.32	5.06
13957	FLAG W/1311-94	NONE	238	78	305	1317	746	177	1317.0			6204.50	4.71
14111	TRCT SMT OR TAG	ACRE	752	576	131	3311	2411	138	4303.0	4150.3	96	21191.39	6.38
14112	TRCT SMT OR TAG	ACRE	66	119	55	1089	437	248	1601.0	1352.7	84	8222.10	7.59
14113	TRCT SMT OR TAG	ACRE	545	341	101	1406	1180	119	1657.0	1757.9	106	9820.33	5.91
14114	TRCT SMT OR TAG	ACRE	618	1254	49	2228	4709	46	3677.0	2785.2	76	19333.66	8.23
14115	TRCT SMT OR TAG	ACRE	396	320	120	1840	1852	100	2280.0	2311.5	101	11335.13	6.13
14116	TRCT SMT OR TAG	ACRE	1066	1112	96	3569	4606	77	4397.0	4462.3	101	22622.43	6.33
14117	TRCT SMT OR TAG	ACRE				287		>	405.0	358.8	89	1964.92	6.84

Figure 6. Accomplishment report statewide.

made in the method of operating or if there were some unusual factors, such as weather delays, that dropped the efficiency this low, as this is a fairly constant operation and the performance rating should be near 100 percent.

Operation 53121 is striping edge lines, 3 inches, 258 units accomplished this month; 448 planned, percentage completed for this month, 58; accomplished to date, 1945; compared to plan to date, 2103; for 92 percent completed; performance percentage 104, which is quite satisfactory.

Operation 6013 is moving equipment for maintenance, 108 hours accomplished this month, total to date, 138, where none was planned. This is an oversight in planning and this should warn the superintendent that he must include man-hours to provide dollars for this operation in the future. The total labor expenditure was $780.52, which was not provided in the budget and must be absorbed by reducing some other operation.

The initial budgets, as presented by the districts, were obviously high. Probably with reservations about the use of this new system, they deliberately overplanned. It was necessary then that the headquarters staff visit each district in turn and review the planned work for the coming biennium.

An accomplishment report for the first 10 months of the current fiscal year proved invaluable in reviewing the budget for the ensuing biennium. When the accomplishment to date did not agree with the plan, the districts invariably pleaded incorrect planning due to inexperience with the system. Our countercharge, "You didn't plan your work that poorly, you're just not accomplishing what you set out to do." Although the discussion was deadly serious, satisfactory compromises were reached in nearly all instances and, in some respects, it was rather amusing. For an item such as patching, the unfailing reply was, "We are just now reaching the season when we will be doing this and this will pick up greatly," and our answer, "That's not what we are talking about. We are discussing accomplishment to date against planned to date and obviously the work should have been accomplished last July, August, and September."

For lack of room on the report, one desirable element is missing; that is, the total plan annually for each operation number. It is necessary to refer to the annual plan for this figure.

It was obvious, initially, that our job list could have contained thousands of items as we expanded to include such things as terrain and differences in climate, such as our wet coastal area, Cascade mountain region, and some of the dry interior. Early in our time studies, we found that these elements did not affect the performance of most operations; therefore, we were able to set fewer standard operations for use statewide. For example: under major job 1110, patching, we have mechanical patching (motor grader and roller), manual premix spot patching, mechanical premix continuous over 50 ft, machine premix patching (spreader box and roller), full-depth patch on PCC, full-depth patch on asphalt, patch potholes, hand spread and compact with truck, and so forth. All these standard operations should be accomplished at the same rate in all parts of the state with a few exceptions, such as striping and some spray operations.

Separate operations exist for such things as hauling incidental to the work and traffic control. To provide for any very unusual job that might occur occasionally, we have included other patching methods. Under all operation numbers, we have included a class called "other." Our first report of accomplishment in March showed up one factor that is rather disconcerting. Entirely too many of our employees tend to charge everything to this operation number. There are some who think this results from mental laziness, it being much easier to charge there than to look up and charge the proper number. There is also some reason to suspect, in some instances, this is used simply because it is a nonstandard item and, thus, no measurement of performance can be made. All district maintenance engineers have been advised to watch this item very closely and question all such charges of time. We consider the use of this item necessary because otherwise unusual charges would be buried in a standard operation, and we need to learn what our actual costs are for the various operations. The control of charging is difficult—it is quite possible for people to be dishonest under such a system unless it is monitored very closely by field supervision.

In review of the rough budget as first developed, it was evident that the districts had overreacted to the unusually severe winter of 1968-69. By adjusting previous winter

expenditures over a 10-year period to 1969 prices, it was readily apparent that the statewide total request exceeded the amount expended in that one unusual year. Since we had no trouble in January of 1969 pursuading the legislature that we needed the supplemental appropriation to cover that winter, we felt it highly undesirable to budget so pessimistically and, therefore, revised all districts' requests to more near the norm.

Our current biennial budget is 42.5 million dollars. Management services, which includes the comptroller's office, had suggested 48.5 million for the coming biennium, while our performance budget indicates we need more than 52 million dollars. In view of the manner in which the review was conducted, I am confident that this represents our needs.

We have long deferred many items of maintenance, such as bridge painting, overlays, and seal coats, since this work is generally done by contract and it is the most immediate means available for making savings. Someone recently stated that deferred maintenance is another way of saying neglect. It is my opinion that we cannot continue to defer without jeopardizing the entire investment. Our current biennial budget for construction is almost half of that spent in the previous decade from 1960 to 1970. With this type of growth in construction, it is obvious that the cost for maintenance and traffic services will go up steeply in the coming years. This is particularly true since the modern highway is much more complex than the roads of bygone years and includes very expensive items, such as formal rest areas and many acres of formal landscaping.

Since all operating programs must be budgeted first before the final estimated amount for new construction can be determined, it is necessary, after the preliminary budgets are prepared, to compare the construction program with the maintenance program to assure that no duplications exist—for example, planning extensive patching on a road which will be resurfaced under the construction program. Also, the budget is based on current salaries and it is expected, if the legislature grants pay increases, additional funds will be provided for this purpose.

Daily labor reporting was undertaken two years ago and the information is transmitted to central computer by IBM 1050. Initially, everyone interpreted daily reporting literally and considerable manpower was invested in an effort to comply. To permit mailing from remote sections to division offices, a five-day lag is now accepted. The individual time cards, in addition to showing the hours a man worked on any operation, also report equipment and materials used. We are now developing a computer program to handle equipment rental the same as manpower; that is, reported daily from the time card. This program has been rather difficult to write due to our rental system. Before the system is completed, it is obvious that materials consumed will need to be reported in the same manner. At the present time, equipment charges lag one month behind labor, and materials somewhat longer.

We have developed a catalogue for all materials in stores and have a computer program to print out master lists for headquarters and district use. Due to the time involved in our system of purchasing, we are certain that the development of a monthly report on stores will lead to transfer between districts and we believe this can lead to the reduction of the amount of material in stores and improve the economy of our operations.

In conclusion, I might add that I pointed out to our director that they must be building something that we had to take care of, considering our large construction budget, but he assured me that this was not true; our money was all going for right-of-way and relocation assistance.