

Decentralized Planning—A Means to Program Compliance

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ABSTRACT

Program compliance has been an elusive target for many agencies that have installed maintenance management systems. The Indiana Department of Highways (DOH) began system implementation in 1975, and for several years little progress was made on program compliance. Annual plans and actual work seemed to have little in common. Eight years later, Indiana DOH has good program compliance and more progress is made each year. The key to success has been a change to a planning process that allows top management to say "I'm in control"; at the same time it allows operational managers to say "It's my program." In the current process, the central office retains responsibility for program development, program control, budgeting, and distribution of resources. Operational managers have the responsibility of recommending local programs based on information and guidelines provided by the central office. Operational managers also have the authority to implement approved programs. Interaction among all levels of management is stressed. There are several input opportunities for field managers: They input amounts of work, specific projects, priorities, local prices, seasonal distribution of work, equipment schedules, and allotment schedules for materials. There are also several opportunities for central office control, including approval of inputs, program approval, and requisition approval. The strong points of the process are (a) a good information flow, (b) active participation by a large number of managers, and (c) programs that are implemented. The weakest part of the process is that judgment and opinion are not supported by comparison with quality standards. Uneven levels of service can result, although it is hoped that district and central office reviews and quantity standards lead to similar levels of service.

Program compliance has been an elusive target for many agencies that have installed maintenance management systems. The Indiana Department of Highways (DOH) began system implementation in 1975, and for several years little progress was made on program compliance. Annual plans and actual work seemed to have little in common.

Eight years later, Indiana DOH has good program compliance and more progress is made each year. The key to success has been a change from top-down programs to bottom-up programs. A top-down program is one in which a supervisor or higher authority is the dominant force in deciding the contents of the annual program. A bottom-up program begins with the first-line supervisor recommending the contents of the annual program to a higher authority. Local

programs are developed based on local inputs and prices.

The key steps of the current process are

1. Preparation for work program planning meetings,
2. Work program planning meetings,
3. Work program review and approval,
4. The budget process,
5. Workload distribution meetings,
6. Resource allotments and allocation, and
7. Material purchases.

A discussion of each element follows.

PREPARATION FOR ANNUAL PLANNING MEETING

Good preparation is necessary for successful work planning meetings. Some key elements of the preparation follow.

Presentation of historical data in a format that is understood and useful to users. Figure 1 shows a format that has been successful. This format is used by district and central office managers. Sub-district managers have a format that shows only their management unit. Both formats have adequate margins for writing recommended planning values. Note that in 1979-1980 management unit 3100 placed 0.72 tons of bituminous mixture per lane-mile (inventory unit not shown in figure).

Preparation of guidelines by central office staff. It is important to have ground rules that all levels of management agree to support. Top management policy and procedures can be part of the guidelines. Some of the guidelines that Indiana DOH has used are

1. The planning of response-type and difficult-to-predict activities such as shallow patching, spot repair of unpaved shoulders, and detour maintenance will rely heavily on the 3-year history of work reported by the subdistrict. The history will be seasoned with the knowledge of local and district supervisors about specific problem roads or resurface plans.
2. The planning of activities such as seal coating and reconditioning of unpaved shoulders, which require a large expenditure for materials, will require a location-by-location documentation that includes priorities. Figure 2 shows a sample documentation sheet. The documentation sheet will also show the kinds and amounts of material requested for the work.
3. The planning of some preventive maintenance activities, such as crack sealing and inspecting drains, must meet or exceed central office guidelines. Figure 3 shows the 3-year history and the planning values for crack sealing. The central office minimum planning value for sealing cracks is 0.20 lane-mile per lane-mile, or a 5-year cycle. Note that four of the subdistricts accepted the minimum and two subdistricts asked for planning values of 0.22 and 0.25 (far right-hand column). Also note that actual performance generally exceeds 0.20. This happens because subdistricts are instructed to

MM-132 QUANTITY STANDARDS HISTORY

ACTIVITY 201 SHALLOW PATCHING

MANAGEMENT UNIT: 3075 GREENFIELD

WORK CONTROL CATEGORY: UNLIMITED

SUB	ACTUAL QUANTITY STANDARD				CURRENT YEAR PLAN		
	79/80	80/81	81/82	AVERAGE	CREW DAYS	PRODUCTION ACCOMPLISHMENT	QUANTITY STANDARD
201 SHALLOW PATCHING					TONS		
3100	0.72	0.46	1.54	0.91	117	585	1.45
3200	0.62	0.49	1.05	0.72	100	500	0.76
3300	1.31	0.64	1.16	1.04	207	1,035	1.44
3400	0.71	0.52	0.61	0.61	67	335	0.77
3500	0.56	0.36	0.89	0.60	166	830	1.00
3600	1.21	1.35	1.03	1.20	156	780	1.32
3075	0.86	0.63	1.03	0.84	813	4,065	1.12

FIGURE 1 Quantity standards history: shallow patching.

FY 83/84 MMS WORK PROGRAM - DOCUMENTATION OF HIGH COST ROADWAY MAINTENANCE PROJECTS

Priority	ACTIVITY Seal Coating #205				Est. Crew Days	SUBDISTRICT Greencastle		Comments
	Road	From	To	Plan Work Quantity (in MMS Accomp. Units)		Special Material Requirements		
1	US-36	SR-75	SR-39	11.8 Lane Mi.	1	Sand Seal	AE150 .12 gal/sq. Yd.	12 ft. lane
2	SR-75	US-36	SR-236	15.0 Lane Mi.	2	" "	Sand 15 lbs./Sq. Yd.	10 ft. lane
3	US-231	SR-42	Cataract Rd.	6.9 Lane Mi.	1	" "		12 " "
4	US-231	US-36	Montg. Co. Line	14.8 Lane Mi.	2	" "		12 " "
5	US-36	US-231	Parke Co. Line	13.6 Lane Mi.	2	" "		12 " "

All Candidate Sections	64.1	8	Superintendents Comments and Signature:
Undistributed Plan Quantity	None		Supt.
Total Recommended Plan			District Review By: _____

FIGURE 2 Documentation of high-cost projects.

meet or exceed planning goals for preventive maintenance activities.

4. The planning of activities such as machine mowing and snow and ice removal will be based on policy. Subdistricts are not given an opportunity to set planning values for these activities.

5. The planning of overhead activities will rely heavily on past history as reported by the subdistrict. However, excessive overhead rates will not be planned. Figure 4 shows an example of the planning of an overhead activity. Note that planning values (far right-hand column) are generally below the 3-year average for actual performance. Also

note that the 3-year trend for this activity is downward.

Road inspections by local supervisors. The key to local planning is to ensure that planning recommendations are true reflections of needed maintenance work. This is the first step in control. If the planned work is needed, endorsed by local supervisors, backed by resource commitments from the central office, and set as a goal for accomplishment, a giant stride has been taken toward program accomplishment. Actual road maintenance needs cannot be identified without good inspection at the local

MM-132 QUANTITY STANDARDS HISTORY

ACTIVITY 207 SEALING CRACKS

MANAGEMENT UNIT: 3075 GREENFIELD

WORK CONTROL CATEGORY: LIMITED

SUB	ACTUAL QUANTITY STANDARD				CURRENT YEAR PLAN		
	79/80	80/81	81/82	AVERAGE	CREW DAYS	PRODUCTION ACCOMPLISHMENT	QUANTITY STANDARD
207	SEALING CRACKS				LANE MILES		
3100	0.59	0.36	0.43	0.46	28	84	0.20
3200	0.47	0.40	0.23	0.37	38	114	0.20
3300	0.18	0.20	0.19	0.19	56	168	0.20
3400	0.33	0.34	0.17	0.28	36	108	0.25
3500	0.34	0.25	0.28	0.29	44	132	0.20
3600	0.20	0.23	0.22	0.22	50	150	0.22
3075	0.32	0.28	0.24	0.28	252	756	0.21

FIGURE 3 Quantity standards history: sealing cracks.

MM-132 QUANTITY STANDARDS HISTORY

ACTIVITY 283 BUILDING AND GROUNDS MAINT.

MANAGEMENT UNIT: 1075 CRAWFORDSVILLE

WORK CONTROL CATEGORY: OVERHEAD

SUB	ACTUAL QUANTITY STANDARD				CURRENT YEAR PLAN		
	79/80	80/81	81/82	AVERAGE	CREW DAYS	PRODUCTION ACCOMPLISHMENT MANHOURS	QUANTITY STANDARD
283	BLDG. & GRND. MAINT.						
1100	4151.00	2422.00	2106.00	2893.00	400	3,200	3200.00
1200	10650.00	8595.00	9410.00	9551.67	801	6,408	6408.00
1300	12247.00	4292.00	4319.00	6952.67	538	4,304	4304.00
1400	5686.00	4157.00	3171.00	4338.00	500	4,000	4000.00
1500	7719.00	6685.00	6937.00	7113.67	550	4,400	4400.00
1600	4467.00	4928.00	4348.00	4581.00	425	3,400	3400.00
1075	7486.67	5179.83	5048.50	5905.00	3,214	25,712	4285.33

FIGURE 4 Quantity standards history: building and grounds maintenance.

level. Figure 5 shows an example of the form used for maintenance needs identification.

Formulation of workload recommendations by local supervisors. Local supervisors must meet and write planning value recommendations for each maintenance activity. They must also reach decisions and document their recommendations for high-cost activities. This preparation step ensures that the subdistrict is ready for the annual work program meeting.

THE ANNUAL WORK PROGRAM PLANNING MEETING

Indiana is divided into six districts and thirty-seven subdistricts. The typical subdistrict is divided into three geographical units. Work programs are developed for the subdistrict level. The planning meetings are held at the subdistricts. The meeting brings together supervisors and planners from all four management levels--unit, subdistrict, district, and central office.

The purpose of the meeting is to agree on a recommended work program for the subdistrict. A secondary motive for the meeting is that it provides an

excellent forum for communication and exchange of ideas.

Each work activity is discussed, using the previously mentioned guidelines and some further instructions. The further instructions include

1. Be sure to request work you believe is needed. If you do not request it, the work item has no chance of being included in the program and will most likely not be accomplished.

2. Do not be concerned about asking for too much work. Priorities will be set and work items deleted later if necessary.

3. The recommendations of the subdistrict (as agreed to by the district and central office in the meeting) will be entered into the computer along with the recommendations of the other 36 subdistricts. Dollar estimates to accomplish the work will be made. The program will be totaled for the state. Four checks will be made to make sure that (a) enough dollars are available to support the program, (b) enough manpower is available to support the program, (c) there is not an imbalance in the program to the advantage or disadvantage of any

Activity No. _____

Unit No. _____

ITEM NO.	DESCRIPTION OF WORK	ROUTE	LOCATION	SPECIAL EQUIPMENT	MATERIAL REQUIRED	CREW TYPE & SIZE	DATE OF INSPECT.	DATE SCHEDULED	DATE COMPLETED
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									

FIGURE 5 Road inspection log.

subdistrict or district, and (d) central office field engineers will make field checks of the high-cost recommendations to verify the need.

The meeting proceeds from activity to activity using the MM-132 and high-cost documentation sheets as a center of attention. These meetings typically last a full day.

WORK PROGRAM REVIEW AND APPROVAL

The data gathered at the meetings are entered into the computer and the checks mentioned previously are performed. After the checks are made, a meeting is convened to review the programs of each district. This meeting is attended by the district engineer, the district maintenance staff, central office maintenance planners and field engineers, the Chief of the Division of Maintenance, and the Chief of the Division of Operations. The program is discussed and recommendations for modifications are made by the central office to the district office. The districts are given about 2 to 3 weeks to make modifications. If extensive modifications are required, a second meeting will be held. Minor modifications are accomplished through the mail. This process continues until an agreement is reached.

THE BUDGET PROCESS

The putting together of the budget is a simple matter of applying more detailed dollar estimates to the approved work program. However, changes may be necessary because of department budget priorities and constraints. The major emphasis in budgeting is on the materials required to support the program. Again, the local managers are requested to help in the process. Their involvement is two-part.

First, local managers are involved in the ongoing process of work reporting. The materials reported

back through the system become the foundation for estimating the materials required per accomplishment unit. Local material usage rates per accomplishment unit are used in the budgeting process.

Second, local supervisors are asked to submit unit cost estimates for local materials such as aggregates, mixtures, and bituminous materials. The use of local unit prices allows local managers to administer a budget that is an accurate reflection of what is needed to accomplish the approved program.

WORKLOAD DISTRIBUTION MEETING

The purposes of the workload distribution meeting are to (a) schedule high-priority work in feasible work seasons, (b) schedule equipment that will be shared by two or more subdistricts, and (c) ensure the work is distributed to make the best use of the work force for the entire year. This phase of the work program development process is also decentralized.

Distribution is accomplished through 1-day meetings at each of the six district offices. The meeting is attended by three levels of management--subdistrict, district, and central office. The roles of each management unit are distinct and important. The subdistrict is the scheduler and will complete the paperwork shown in Figure 6. The district controls several key units of equipment that will be shared by the subdistricts. Use of this equipment must be scheduled during the meeting. The central office facilitates discussion, making sure that the paperwork is completed and that the intended purposes listed previously are achieved.

In this process, local supervisors schedule the work that they have planned in the annual work program. For example, in Figure 6 the local supervisor scheduled Activity 204, Full Width Shoulder Seal, in September. The district equipment scheduler sets the equipment rotation schedule to match the work

MANAGEMENT UNIT Greenfield 632-75DATE May 9, 1983

	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
Mondays Remaining	339	560	427	251	331	369	395	329	317	227	331	535
Act# 204			60									
<small>CS</small> 20 <small>CO</small> 3			367									
Act# 205			127									
<small>CS</small> 21 <small>CO</small> 6			241									
Act# 258		8		4			16	12	8	4	16	4
<small>CS</small> <small>CO</small>	338	552	241	255	331	369	401	341	325	231	347	539
Act# 258	36			20					16			
<small>CS</small> 4 <small>CO</small> 18	302			235					309			
Act# 213	112											
<small>CS</small> 16 <small>CO</small> 7	190											
Act# 209							42					
<small>CS</small> 6 <small>CO</small> 7							359					
Act# 235		32		44								20
<small>CS</small> 4 <small>CO</small> 24		520		191								319
Act# 225		35			42							
<small>CS</small> 7 <small>CO</small> 11		485			289							
Act# 226			12			12	24					
<small>CS</small> 3 <small>CO</small> 16			229			357	335					
Act# 257	40											90
<small>CS</small> 5 <small>CO</small> 26	150											229
Act# 277		48		40						40	16	80
<small>CS</small> 4 <small>CO</small> 56		437		151						191	331	149
Act# 231	49	49		35					35		49	28
<small>CS</small> 7 <small>CO</small> 35	101	388		116					274		282	121
Act# 241										65	70	
<small>CS</small> 5 <small>CO</small> 27	101	388	229	116	289	357	335	341	274	126	212	121

FIGURE 6 Workload distribution worksheet.

plans. The process of workload distribution continues until all activities have been scheduled.

RESOURCE ALLOTMENTS AND ALLOCATIONS

It is important that top management stand behind the work program developed through the development process. The most visible way of showing a commitment is to distribute resources (labor, equipment, and materials) in accordance with the work program. Therefore, manpower authorizations for the subdistricts are adjusted. Some subdistricts gain and some lose authorizations. In each case, the local supervisors know that the reason for the gain or loss is directly attributable to the maintenance program that they planned. Some types of equipment are distributed in accordance with the work program. For example, this past year one district asked for a significant increase in roadside ditching, whereas other districts requested smaller programs. The available ditching equipment was redistributed in accordance with the approved requests.

Perhaps the most important resource to a local supervisor in Indiana is dollars to purchase materi-

als for roadway maintenance. Of the three major roadway resources, materials is the only one paid for out of the local budget. Labor and equipment are paid by the central office.

The MMS 180, Roadway Materials Budget (Figure 7), is the document used to communicate the approved program for materials purchase. The report (Figure 7) shows, from left to right, the type of material and activities for which the material type is planned (column 1), the annual quantity of the material type for each activity and the total annual planned quantity (column 2), the projected local price (column 3), the budgeted dollars for the year (column 4), and the fiscal quarter in which the dollars are allotted (column 5). All of the inputs to this report are submitted by local management (and approved by the district and central offices.)

Note, for example, that Figure 7 shows that Greenfield subdistrict was programmed for 367.8 tons of material type 4254, coarse aggregate 11-12, for Activity 204, Full Width Shoulder Seal. Remember that in Figure 6 the Greenfield subdistrict had planned to perform this work in September. Again in Figure 7, note that the money for this work was allotted in the first quarter (July 1). This gives

MAINTENANCE MANAGEMENT SYSTEM
ROADWAY MATERIALS BUDGET - QUANTITIES AND ALLOTMENTS
FISCAL YEAR 83-84

MA MMS 180
REPORT FOR GREENFIELD SUB.
Material Code and Name
Activity Code and Name
Minor Object Code

						ALLOTMENT					
		Annual	Unit	Unit	Budgeted	**** 1st Q ****	**** 2nd Q ****	**** 3rd Q ****	**** 4th Q ****		
		Quantity	Meas	Price	Dollars	Quantity	Quantity	Quantity	Quantity	Quantity	Dollars
		***** SUBDISTRICT RESPONSIBILITY *****									
		1	2	3	4	5					
4251	Aggregate										
201	Shallow Patching	43.5	ton	3.75	\$163	12	\$48	25	\$97	4	\$18
202	Deep Patching	171.5	ton	3.75	\$643	84	\$315	17	\$66	70	\$263
210	Spot Repair Unp Shld	880.0	ton	3.75	\$3300	440	\$1650	355	\$1331	85	\$319
213	Recondition Unp Shld	1875.3	ton	3.75	\$7032					1875	\$7032
219	Other Rd/Shld Maint.	112.0	ton	3.75	\$420	67	\$252	11	\$42	33	\$126
228	Fence Repair	7.5	ton	3.75	\$28	3	\$12	3	\$11	1	\$5
229	Other Roadside Maint.	18.0	ton	3.75	\$68	6	\$23	9	\$34	3	\$11
231	Clean-Reshape Ditch	21.0	ton	3.75	\$79	3	\$11	9	\$36	8	\$32
233	Pipe Replacement	102.0	ton	3.75	\$383	25	\$96	25	\$96	51	\$191
239	Other Drainage Maint.	225.5	ton	3.75	\$846	71	\$268	88	\$330	66	\$248
245	Patch Bridge Decks	4.8	ton	3.75	\$18		\$2	3	\$14		\$2
249	Other Bridge Maint.	7.2	ton	3.75	\$27			7	\$27		
274	Institution Work	20.0	ton	3.75	\$75	10	\$38	10	\$38		
	TOTAL	3488.3	ton	3.75	\$13082	724	\$2715	565	\$2122	2198	\$8247
4252	Seal/Cover Agg.										
201	Shallow Patching	43.5	ton	3.94	\$171	43	\$171				
202	Deep Patching	14.7	ton	3.94	\$58	14	\$58				
206	Seal Long. Crack/Jnt.	58.1	ton	3.94	\$229	58	\$229				
207	Sealing Cracks	844.8	ton	3.94	\$3329	844	\$3329				
214	Joint & Bump Burning	4.8	ton	3.94	\$19	4	\$19				
219	Other Rd/Shld Maint.	10.0	ton	3.94	\$39	10	\$39				
274	Institution Work	8.0	ton	3.94	\$32	8	\$32				
	TOTAL	983.9	ton	3.94	\$3877	983	\$3877				
4253	Rip Rap										
231	Clean-Reshape Ditch	7.0	ton	4.42	\$31	1	\$4	3	\$14	2	\$12
239	Other Drainage Maint.	73.8	ton	4.42	\$326	23	\$103	28	\$127	21	\$95
249	Other Bridge Maint.	18.0	ton	4.42	\$80			18	\$80		
	TOTAL	98.8	ton	4.42	\$437	24	\$107	50	\$221	24	\$107
4254	Coarse Agg. 11-12										
204	Full Width Shld Seal	367.8	ton	5.00	\$1839	367	\$1839				
205	Seal Coating	1759.8	ton	5.00	\$8799	1759	\$8799				
	TOTAL	2127.6	ton	5.00	\$10638	2127	\$10638				
425					\$28034		\$17337		\$2343		\$8354

FIGURE 7 Roadway materials budget.

Send in your Requisition early. It takes some time to invite bids, place orders, and make shipments.

2638R INDIANA DEPARTMENT OF HIGHWAYS
INDIANAPOLIS, INDIANA

WARRANT NO. _____

COPIES: ORIGINAL (WHITE): TO CENTRAL OFFICE VIA DISTRICT ENGINEER WHEN NOT FOR PARTS
DUPLICATE (BLUE): TO DISTRICT ENGINEER
TRIPPLICATE (GREEN): TO DISTRICT ENGINEER
QUADRUPPLICATE (PINK)

REQUISITION

REQUESTED BY: Bert George, Supt.
P.O. Box 667
Greenfield, IN 46140
(CITY) (STATE) (ZIP)

SHIP TO: _____

(CITY) (STATE) (ZIP)

PURCHASE ORDER NUMBER	INVITATION NUMBER	REQUISITION NUMBER
		063

DATE: July 18 19 83

LOCATION CODE:

6	3	2
---	---	---

FUNCTION CODE:

7	8
---	---

OBJECT CODE:

4	2	5
---	---	---

COST ACCOUNT:

2	0	0
---	---	---

VENDOR:

--	--	--	--	--

PROJECT: _____

TOTAL ESTIMATED COST: \$1,541.92

APPROVAL SIGNATURES:

<i>[Signature]</i> SUBDISTRICT HEAD DATE 7-18-83	<i>[Signature]</i> DISTRICT ENGINEER DATE 7/18/83	DEPUTY DIRECTOR DATE
<i>[Signature]</i> ADMINISTRATIVE MANAGER DATE 7-19-83	<i>[Signature]</i> DIVISION CHIEF DATE 7/19/83	DIRECTOR DATE

ITEM NO.	TO BE FILLED IN BY CENTRAL OFFICE		QUANTITY REQUIRED	UNIT	DESCRIPTIVE NAME OR DESCRIPTION OF PART
	PART NUMBER				
1			368	tons	#11 Aggregate A or B - 85% crushed
2					
3					Material to be loaded by Vendor into State trucks as
4					directed by Supt.
5					
6					
7					
8					Passing IDOH Spec's dtd 1978
9					
10					OPEN END BID
11					OPEN END
12					

REMARKS: Material needed for shoulder seal of SR3 from Rushville City limits to Decatur County line.

ON THE BACK OF THIS SHEET GIVE THE NAMES OF PARTIES WHO COULD BE INTERESTED IN FURNISHING THE ABOVE MATERIALS AND SUPPLIES

SEE REVERSE SIDE FOR INSTRUCTIONS ON FILLING OUT THIS SHEET. 4254

FIGURE 8 Materials requisition form.

plenty of lead time to make sure that materials are on hand by September.

MATERIAL PURCHASES

The first step toward implementation of the approved work program is the submittal of a materials requisition. The requisition is also an important part of the control process. The requisition is initiated by the subdistrict, with subsequent reviews by the district and central office. Figure 8 shows a requisition for 368 tons of aggregates for shoulder seal in the Greenfield subdistrict. Note that the requisition is tied in several ways to the work program (Figure 7). Four ties that are edited in the central office are (a) the quantity, (b) the kind of material, (c) the unit price, and (d) the intended use of the material as identified in the remarks. The requisition shown in Figure 8 was a close match to plan and flowed cleanly through the review pro-

cess to final approval. Requisitions that do not match the plan require thorough documentation and are likely to be cancelled.

CONCLUSION

The workload development process described in the preceding sections has contributed greatly to program compliance in Indiana. Naturally, other steps (road inspections, work scheduling, work assignment) must be successfully completed before the planned work is actually performed. But the planning process gives a good start on accomplishing the right work in the right place. The process also gives a sense of ownership of the plan to local managers, and it gives higher authorities a means of control.

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