Pennsylvania's Bridge Management Process for Identifying, Priority Ranking, and Completing Bridge Maintenance Activities

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Pennsylvania's Bridge Management System (BMS) stores a wide range of bridge inspection data and analyzes these data using individual subsystems to provide decision-making support for department managers. The subsystems are as follows: Bridge Rehabilitation and Replacement, Bridge Maintenance, Modeling, and Reports. Pennsylvania's BMS operates in a mainframe environment and includes 17 on-line data screens and up to 400 data elements for each bridge. Data on any of the 25,000 state-owned and 6,500 locally owned bridges in the system are retrievable within minutes of inquiry. The system can produce a wide range of reports, including standard menu-driven reports and customized user-generated reports. Besides storing and recording bridge inspection information, BMS can automatically generate improvement costs by bridge for maintenance, rehabilitation, and replacement needs. BMS also can prioritize bridges for capital maintenance improvements. A unique feature of BMS is its modeling capability, which enables the user to predict future bridge needs by programmatically degrading bridge condition and load-carrying capacity over time.

Before the Bridge Maintenance Subsystem is detailed, it is appropriate to give an overview of Pennsylvania's Bridge Management System (BMS). The Pennsylvania Department of Transportation's (PennDOT's) BMS has been operational since December 1986. This system stores a wide range of bridge inspection data and analyzes these data using individual subsystems to provide decision support for department managers. The following subsystems are shown in Figure 1:

- Bridge Rehabilitation and Replacement provides cost estimates and priority ranking of bridge improvement projects to support long-range planning and programming decisions.
- Bridge Maintenance provides cost estimating and priority ranking of bridge maintenance activities for assistance in developing annual maintenance programs.
- Modeling uses deterioration curves for bridge condition and bridge load capacity. It enables department managers to predict future bridge improvement needs using different funding scenarios.
- Reports is available to provide both standardized and customized report generation capabilities for any subset of data in BMS.

Pennsylvania maintains a proactive approach to bridge inspection and bridge management, often implementing new systems or procedural changes before the date set by federal requirements.

The BMS is a powerful management tool that not only records and stores bridge inspection data for Pennsylvania's bridges but also enables department managers to make key decisions concerning bridge inspection, maintenance, rehabilitation, and replacement. Data on any of the 25,000 state-owned and 6,500 locally owned bridges in the system are retrievable within minutes of inquiry. BMS operates in a mainframe environment and includes 17 on-line data screens and up to 400 data elements for every bridge. The system also can produce a wide range of reports, including standard menu-driven reports and customized, user-generated reports. A query language is

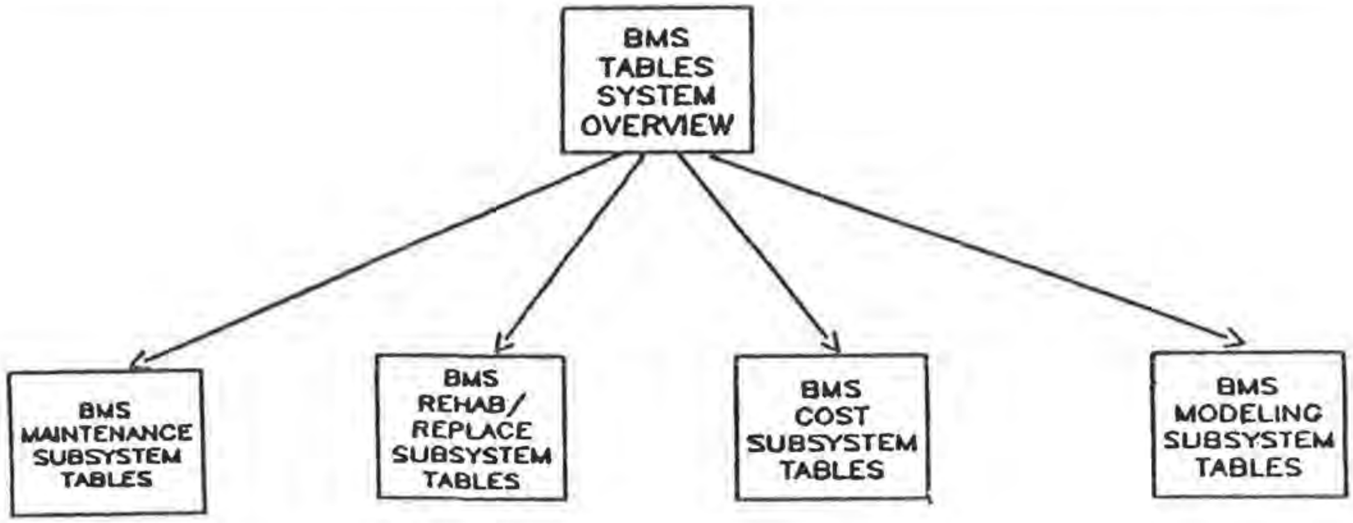

FIGURE 1 BMS tables system overview (*1*).

built into the BMS to allow users to customize reports on any combination of data elements in the system.

Besides storing and recording bridge inspection information, BMS can automatically generate improvement costs by bridge for maintenance, rehabilitation, and replacement needs. BMS also can rank bridges for capital maintenance improvements. A unique feature of BMS is its modeling capability, which enables the user to predict future bridge needs by programmatically degrading bridge condition and load-carrying capacity over time.

Although BMS has been in production since December 1986, improvements and enhancements have occurred continuously. Completed BMS enhancements include new screens for fracture-critical and underwater bridge inspection, sign structure and retaining wall inspection, and system integration with PennDOT's Roadway Management System, Project Inventory System, and Project Management System. All of these screens represent areas of new initiatives since the original BMS was developed.

All data required by the Federal Highway Administration (FHWA) are included in PennDOT's BMS, in addition to data deemed necessary by PennDot. Data are grouped by general data type, and a coding manual provides detailed description and codings for each data item. Table 1 (*2*) gives all data screen names.

Data that reside in BMS can come from any of three sources: direct data entry via keyboard, such as bridge condition ratings; data generated through system calculations, such as improvement costs or priorities; and data imported from other department management systems, such as average daily traffic or program and budget status. BMS also exports bridge data to other department management systems. The exchange of data between department systems occurs automatically at either daily or weekly frequencies depending on data type. All department management systems operate on a mainframe computer platform that simplifies the exchange of data between systems and offers instantaneous data access to all users via computer terminals in all of Pennsylvania's 67 counties. BMS currently exchanges data with the Project Inventory, Project Management, and Roadway Management systems. These mainframe systems can interface because they all use a common link-node location referencing system that uses a 14-digit key to define any point on the network. Therefore, each bridge is uniquely defined by a 14-digit code. BMS also can store inspection data, on line, for the previous five inspections. Beyond that point, the oldest inspection data are archived on magnetic tape. All data are easily retrievable.

The Bridge Maintenance Subsystem of BMS ranks bridges on the basis of needed maintenance activities. It also estimates costs for these activities. A priority-setting procedure has been developed that considers the effect of the most structurally critical maintenance activity need on the bridge and the individual bridge's impact on the road system. A maintenance deficiency rating is calculated by the system for each bridge on a scale of 0 to 100, with higher values suggesting higher maintenance needs. A menu of 76 bridge maintenance activities has been developed in consultation with PennDOT's engineering districts and the Central Office Bureau of Maintenance and stored in the system. These activities cover the full range of maintenance that can be done on a bridge using either department forces or contractors. On the basis of these 76 bridge activities, the Maintenance Needs Reporting Form (Figure 2) was developed for the bridge inspector as a checkoff type listing and as the reporting document. When a reparable deficiency is found, the inspector re-

TABLE 1 Summary of BMS Data (*1*)

Screen	Type of BMS Data
AA	General Data
AB	Features Intersected Data
AC	Structure Data
AD	Utility, Hydrology and Posting Data
AE	Inspection Data
AF	Proposed Improvement Data
AG	Repair and Painting Data
AH	Proposed Maintenance Data
AJ	Fracture Critical Data
AL	Narrative Data
AM	Condition Rating Data
AN	Completed Maintenance Data
AO	Planning, Programming and Budgeting Data
AR	State Roadway Data
AS	Sign Structure Data
AT	Retaining Wall Data
AW	Underwater Inspection Data

views the listing, selects the proper activity, circles the general location, estimates a quantity, and assigns an urgency factor. It reflects the inspector's judgment as to how soon the maintenance activity should be completed. This process occurs at the end of each safety inspection and does not require a significant amount of additional time: approximately 15 min for a typical structure. Also, the inspector estimates the quantity of work needed to facilitate the project planning process. With this additional information, the system can rank bridges on the basis of maintenance needs and can estimate the costs.

The Bridge Maintenance Subsystem provides decision support in the development of the department's Annual Maintenance and Betterment work programs. These programs provide for all noncapital highway and bridge work. The work is done by department forces or contractors. Bridge work includes small bridge replacements and any of the 76 bridge maintenance activities mentioned above. Work programs are developed on an annual basis, and BMS provides support. Besides the various maintenance activities completed each year, about 100 small bridge replacements are included annually in this program.

A thorough field inspection on at least a biennial basis initiates the entire process for bridge management systems and the Bridge Maintenance Subsystem. Bridge inspections

1. Document the bridge and its condition,
2. Become a basis of system data and management information,
3. Ensure the ultimate safety of the traveling public,
4. Form the basis for maintenance planning,
5. Form a portion of the bridge history in the record, and
6. Become a basis for total costing of bridge needs.

The bridge maintenance needs data are collected as a part of the bridge inspection process. Hence, these data are entered into the BMS on-line individual bridge files at the field offices when the inspection data are updated, as soon as the inspection is completed. Once in the computerized system, it can be extracted in any format required by bridge or maintenance staff to satisfy specific planning, programming, or other needs. After each maintenance activity is completed, maintenance information is transferred from the maintenance needs list in BMS to the completed maintenance activities list, where it serves as a historical record of completed work.

The current maintenance work backlog far exceeds what the department can physically and financially handle. Hence, it is important that guidance be provided to the district and the county offices to assist them in selecting the best candidate bridges for maintenance work and which activities to perform first. This helps to ensure that the most critical deficiencies are brought to the attention of management.

A simple ranking procedure has been developed. It considers the effect of the most structurally critical maintenance activity need on the bridge as well as the individual bridge's impact on the road system. The components of the procedure are as follows: activity ranking, activity urgency, bridge criticality, and bridge adequacy.

The bridge maintenance activities themselves vary in their importance to and effect on the structural integrity of the bridge. Activities such as repairing abutment underscour would generally be performed on a priority basis, whereas activities such as applying protective coatings and constructing abutment slopewalls would tend to be less critical and possibly deferred.

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BRIDGE MANAGEMENT SYSTEM

BRIDGE INSPECTION REPORT

MTCE. & MAJOR IMPROV. NEEDS

INSP. DATE: ____________

Inspection Report for:	STRUCTURE IDENTIFICATION NUMBER	STRUCTURE TYPE
Entire Bridge ☐	[A01] _ _ _ | _ _ _ _ _ | _ _ _ _ | _ _ _ _	____________
Main Span(s) only ☐		
Approach Span(s) only ☐	____________ over ____________	____________

		[H01] ITEM NO	[H03] LOCATION	UNIT	[H05] EST. * QUANTITY	[H08] PR	[H09] O/C
APPROACH ROADWAY	PAVEMENT (PATCH/RAISE)	RDPAVMT	L N R L F R	S.Y.			
	PAVEMENT RELIEF JT. (REP/REPL)	RDRLFJT	L N R L F R	S.Y.			
	SHOULDERS (REPAIR/RECONSTR)	RDSHLDR	L N R L F R	S.Y.			
	DRAINAGE-OFF BRIDGE (IMPROVE)	RDDRAIN	L N R L F R	EA.			
	GUIDE RAIL (CONNECT TO BRIDGE)	RDGDERL	L N R L F R	EA.			
	LOAD LIMIT SIGNS (REPLACE)	RDLDSGN	L N R L F R	EA.			
	CLEARANCE SIGNS (REPLACE)	RDCLSGN	L N R L F R	EA.			
	CUT BRUSH TO CLEAR SIGNS	RDBRUSH	L N R L F R	EA.			
	APPROACH SLAB (REPLACE)	A744201	L N R L F R	S.Y.			
CLEAN/FLUSH	DECK	A743101		E.B.			
	SCUPPER/DOWNSPOUTING	B743101	1 2 3 4 5 O	E.B.			
	BEARING/BEARING SEAT	C743102	1 2 3 4 5 O	E.B.			
	STEEL-HORIZONTAL SURFACES	D743102	1 2 3 4 5 O	E.B.			
DECK	BITUM. DECK W. SURF (REP/REPL)	BITWRGS	1 2 3 4 5 O	S.Y.			
	TIMBER DECK (REP/REPL)	B744301	1 2 3 4 5 O	S.Y.			
	OPEN STEEL GRID (REP/REPL)	C744302	1 2 3 4 5 O	S.Y.			
	CONCRETE DECK (REPAIR)	D744303	1 2 3 4 5 O	S.Y.			
	CONCRETE SIDEWALK (REPAIR)	E744303	1 2 3 4 5 O	S.Y.			
	CONCRETE CURB/PARAPET (REP)	F744303	1 2 3 4 5 O	S.Y.			
DECK JOINTS	RESEAL	A743301	N 1 2 3 O F	L.F.			
	REPAIR/RESEAL	A744101	N 1 2 3 O F	L.F.			
	COMPRESSION SEAL (REP/REHAB)	B744102	N 1 2 3 O F	L.F.			
	MODULAR DAM (REP/REHAB)	C744102	N 1 2 3 O F	L.F.			
	STEEL DAMS (REP/REHAB)	D744102	N 1 2 3 O F	L.F.			
	OTHER TYPES (REP/REHAB)	E744102	N 1 2 3 O F	L.F.			
RAILING	BRIDGE/PARAPET (REP/REPL)	RLGBRPR	N 1 2 3 O F	L.F.			
	STRUCT MOUNT (REP/REPL)	RLGSTRM	N 1 2 3 O F	L.F.			
	PEDESTRIAN (REP/REPL)	RLGPEDN	N 1 2 3 O F	L.F.			
	MEDIAN BARRIER (REP/REPL)	RLGMEDB	1 2 3 4 5 O	L.F.			
DK. DRAIN	SCUPPER GRATE (REPLACE)	DRNGRAT	1 2 3 4 5 O	EA.			
	DRAIN/SCUPPER (INSTALL)	B744401	1 2 3 4 5 O	EA.			
	DOWNSPOUTING (REP/REPL)	C744402	N 1 2 3 F O	EA.			
BEARINGS	LUBRICATE	A743501	N 1 2 3 F O	EA.			
	STEEL (REP/REHAB)	A744501	N 1 2 3 F O	EA.			
	STEEL (REPLACE)	B744501	N 1 2 3 F O	EA.			
	EXPANSION (RESET)	C744502	N 1 2 3 F O	EA.			
	PEDESTAL/SEAT (RECONSTRUCT)	D744503	N 1 2 3 F O	EA.			
TIMBER	STRINGER (REP/REPL)	A744601	1 2 3 4 5 O	EA.			
	OTHER MEMBERS (REP/REPL)	B744601	1 2 3 4 5 O	EA.			
STEEL	STRINGER (REP/REPL)	A744602	1 2 3 4 5 O	EA.			
	FLOORBEAM (REP/REPL)	B744602	1 2 3 4 5 O	EA.			
	GIRDER (REPAIR)	C744602	1 2 3 4 5 O	EA.			
	DIAPH/LAT. BRACING (REP/REPL)	D744602	1 2 3 4 5 O	EA.			
RC/PS	STRINGER (REP/REPL)	A744603	1 2 3 4 5 O	EA.			
	DIAPHRAGM (REP/REPL)	B744603	1 2 3 4 5 O	EA.			
	OTHER MEMBERS (REP/REPL)	C744603	1 2 3 4 5 O	EA.			
TRUSS	MEMBER (STRENGTHEN/REP/REPL)	A744701	1 2 3 4 5 O	EA.			
	PORTAL (MODIFY)	B744701	1 2 3 4 5 O	EA.			
	MEMBER (TIGHTEN/FLAMESHORTEN)	C744702	1 2 3 4 5 O	EA.			

		[H01] ITEM NO	[H03] LOCATION	UNIT	[H05] EST. * QUANTITY	[H08] PR	[H09] O/C
PAINTING	SUPERSTRUCTURE - SPOT	A743201	1 2 3 4 5 O	E.B.			
	SUBSTRUCTURE - SPOT	B743201	N 1 2 3 O F	E.B.			
	SUPERSTRUCTURE - FULL	C743201	1 2 3 4 5 O	E.B.			
	SUBSTRUCTURE - FULL	D743201	N 1 2 3 O F	E.B.			
ABUTMENT - WING - PIER, ETC.	BACKWALL (REP/REPL)	A744801	L N R L F R	C.Y.			
	ABUTMENTS (REPAIR)	B744802	L N R L F R	C.Y.			
	WING (REP/REPL)	C744802	L N R L F R	C.Y.			
	PIERS (REPAIR)	D744802	1 2 3 4 5 O	C.Y.			
	FOOTING (UNDERPIN)	E744803	N 1 2 3 O F	C.Y.			
	MASONRY (REPOINT)	F744804	N 1 2 3 O F	L.F.			
	ABUT. SLOPEWALL (REP/REPL)	A745101	L N R L F R	S.Y.			
	ABUT. SLOPEWALL (CONSTRUCT NEW)	B745102	L N R L F R	C.Y.			
	PILE REPAIR	A745901	N 1 2 3 O F	EA.			
EROSION CONTOL	STREAM BED PAVING (REP/CONSTR)	A745301	UP UN DN	C.Y.			
	ROCK PROTECTION	B745301	UP UN DN	C.Y.			
	SCOUR HOLE (BACKFILL)	C745301	UP UN DN	C.Y.			
	STREAM DEFLECTOR (REP/CONSTR)	D745302	UP UN DN	C.Y.			
	VEGETATION/DEBRIS (REMOVE)	ECREMVG	UP UN DN	C.Y.			
	DEPOSITION (REMOVE)	ECREMDP	UP UN DN	C.Y.			
CULVERT	HEADWALL/WINGS (REP/REPL)	A745201	IN OUT	S.Y.			
	APRON/CUTOFF WALL (REP/REPL)	B745202	IN OUT	S.Y.			
	BARREL (REPAIR)	C745203	———	S.Y.			

FOR COMPLETION BY REVIEW ENGINEER

APPLY PROTECTIVE COATING

DECK/PARAPETS/SIDEWALK	A743401	O P S	S.Y.			
SUBSTRUCTURE	B743401	N 1 2 3 0 F	S.Y.			

CONSTRUCT TEMPORARY

SUPPORT BENT	A745401	N 1 2 3 0 F	EA.			
PIPES	B745401	LT ℄ RT	E.B.			
BRIDGE	C745401	LT ℄ RT	E.B.			

LEGEND

N .... NEAR
F .... FAR
1, 2, 3, ETC. ..... SPAN OR PIER NUMBER
O .... OTHER
LNR .... NEAR LEFT OR RIGHT
LFR .... FAR LEFT OR RIGHT
* .... IN WHOLE UNITS

UP .... UPSTREAM
UN .... UNDER
DN .... DOWNSTREAM
IN .... INLET
OUT .... OUTLET
E.B. .... EACH BRIDGE (SITE)
[XXX] .... BMS. DATA ITEM ID.

PR - PRIORITY CODE

0 - PROMPT ACTION REQUIRED (INSPECTOR TO INFORM THE BRIDGE ENGINEER BEFORE UPDATING BMS).
1 - HIGH PRIORITY, AS SOON AS WORK CAN BE SCHEDULED.
2 - PRIORITY, REVIEW WORK PLAN, ADJUST SCHEDULE IF NEEDED.
3 - ADD TO SCHEDULED WORK.
4 - ROUTINE STRUCTURAL, CAN BE DELAYED UNTIL FUNDS ARE AVAILABLE.
5 - ROUTINE NON-STRUCTURAL, CAN BE DELAYED UNTIL PROGRAMMED.

MAJOR IMPROVEMENT NEEDS

[F01] YEAR NEEDED _ _ _ _ [F02] TYPE WORK _ _ _

[F04] IMPROV LGTH _ _ _ _ _ _

FIGURE 2 Bridge inspection report (2).

As a general rule, activities that most directly, immediately, and positively affect the continued safety and structural adequacy of the bridge would be performed first. Those with minimal immediate impacts would be performed later. The activities have been divided into five groups (A through E) on the basis of their generalized relative importance to the current structural stability of the bridge. In addition, the activities "repair/replace: steel stringers, floorbeams, girders or truss members" could be related to existing or potential fatigue damage. If the needs are indeed fatigue related, they are more important and are given the highest ranking, A. The fatigue relationship is made by comparing these maintenance activity needs with the type of fatigue-prone member that controls the inventory load rating. If the activity is fatigued related, it is given higher priority.

The severity of a deficiency can be a reason to increase its priority for repair. The urgency factor for each activity need is coded by the district bridge inspection unit. Although subjective, it yields an informed, somewhat standardized assessment of how soon the work needs to be completed. It is also a measure of the severity of the deficiency. The rater can rate one of six priority codes, from 0 (prompt action required) to 5 (can be delayed until programmed).

The importance of a bridge to the road network and the impact of the loss of bridge service to traffic are other factors that must be considered in deciding the order in which bridges are to be maintained or repaired. It is readily apparent that the road system hierarchy realistically defines importance. That is, if a bridge on the Interstate and a bridge on the local access system have similar deficiencies, it is prudent that the Interstate highway bridge be repaired first. However, the impact of a bridge's closure also needs to be weighed. If the detour length is excessive and intolerable, the bridge priority for repair should be raised.

The assessment of the importance of the bridge is based on the classification of the highway, its traffic level (ADT), and the detour length that will be imposed on traffic if the bridge were closed. Multiplying the ADT by the detour length results in a partial relative measure of this importance.

The capability of the bridge to safely carry the loads that traverse the route will weigh in a manager's decision of whether to implement repairs. The load capacity rating indicates the current strength of the bridge. It does not indicate what can be expected in the future. The condition rating of the most critical component of the bridge can be used to generally assess degradation. It is based on the summation of the condition ratings for the deck, the superstructure, and the substructure. If any rating is 4 or less, it individually establishes the remaining life. By considering both the current load of capacity and the lowest condition rating of the structure's components, a measure of the deficiency of the bridge is obtained.

Having defined the major parameters that are considered, the relative weights assigned to them and their elements were established in the BMS. To be consistent with the general philosophy of the rehabilitation/replacement prioritization system, a deficiency-point concept was used for ranking maintenance activity. However, the factors and methodology used in each system are quite different. Although it is numerically possible for a single bridge to be assigned in excess of 100 deficiency points, the deficiency point assignment is limited to a maximum of 100. The higher a bridge's point assignment, the higher its deficiency and its priority. (Total deficiency is represented by 100 points; no deficiency is represented by 0 points.)

Table 2 summarizes the four major components of the prioritization system, defines the elements in their makeup, and indicates the initial weights assigned to each. As the procedure is used, evaluated, and refined, the weight assignments may change.

The maintenance deficiency point assignment for a specific bridge is based on the bridge maintenance activity with the largest sum of deficiency points for activity ranking and urgency. The bridge's deficiency point assignment and the bridge's county ranking for maintenance based on the deficiency point assignment will be recorded on the bridge maintenance activity needs screen. Hence, a manager viewing the subject screen for an individual bridge has an immediate indication of the relative priority of the most critical repair need on that bridge and the need compared with the worst possible case (100 deficiency points).

With a deficiency point assignment being stored in BMS for every bridge, prioritized listings can be easily generated using the particular parameters desired. To facilitate this reporting, user-friendly standard report generators with user-defined variables have been developed.

A prioritized listing of bridges to be repaired can be generated for various geographical areas (statewide, district, or county) for use in developing the annual bridge repair work programs. Once programmed, the activity needs screen can be updated to reflect whether each activity is to be done by department force or contract and the year of the program that includes the work.

The department has implemented a mainframe-based Maintenance Operations and Resources Information System (MORIS) to assist the maintenance organization in planning, implementing, and effectively managing all maintenance activities. The system combined previous material, equipment, manpower, and planning subsystems and further enhanced their capabilities.

MORIS can plan and schedule all maintenance activities in advance of field work, including bridge work. It then tracks expenditures of labor, materials, and equipment

TABLE 2 Maintenance Deficiency Points Assignment (*1*)

Maximum Deficiency Pts	Component	Element	Deficiency Point Assignment
40	Bridge Maintenance	Group AF	40
	Activity Rank	A	25
		B	20
	Note AF = Group A	C	15
	Activity that is fatigue	D	10
	prone and controls the	E	5
	inventory rating.)		
25	Activity Urgency Factor		
		Code 0	25
		1	20
		2	15
		3	10
		4	5
		5	0
25	Bridge Criticality		
	Part A:	Interstate	5
		U.S. Numbered Highway	4
		State Highway	3
		County Highway	2
		City, Borough St. or Twp. Rd	1
	Part B:	PCN	5
		PCN/Coal Haul	5
		Agri. Access	3
		Industrial Access	3
	Part C:	ADT x Detour Length ≥ 30,000	15
		≥ 15,000 but < 30,000	10
		≥ 3,000 but < 15,000	5
		< 3,000	0
25	Bridge Adequacy		
	Part A:	Lowest Condition Rtg ≤ 3	15
		> 3 but ≤ 4	10
		> 4 but ≤ 5	5
		> 5	0
	Part B:	Load Capacity (Inv. Rtg.)	
		(H configuration) ≤ 12 tons	10
		(H configuration) > 12-19	7
		(ML 80 configuration) > 19 to 30	4
		(ML 80 configuration) > 30	0

daily and provides the necessary data for management to analyze performance, including productivity.

When the BMS is told that certain activities on specific bridges are programmed for implementation by department forces, a copy of the data is transmitted to the planning file in MORIS. The maintenance manager then reviews and transfers the data to the annual and periodic work plans within the MORIS system.

The MORIS system generates the daily crew payroll form, filling in the bridge location identifier plus the activity numbers related to the 76 activities discussed previously. When the work is satisfactorily completed, the bridge engineer signs off and the completed work order goes back to the BMS to update the file and remove the priority maintenance need.

A detailed manual (*3*) is used as a technical planning aid and construction guide for the bridge foremen and their supervisors. They also provide management with a means of measuring both productivity and work quality. These standards include the following components:

- A complete description of the activity in narrative form;
- Crew makeup;
- Specific equipment and material requirements;
- Rate of production; and

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PROGRAM ID:  P4575130       DEPARTMENT OF TRANSPORTATION      REPORT ID: BMSI5220
 SCREEN: "AM"                 BRIDGE MANAGEMENT SYSTEM

                          BMS PROPOSED MAINTENANCE ACTIVITIES
 SR ID: 22008106520000


 FHWA FEATURE INTERSECTED: SR 3009;SUS.RIV;CONRAIL


  INSPECTION DATE     MAINT DEF PTS    CO RANK     MAJ IMPROV PROJ STATUS
    122292                040.0          0184                  2

 ACTIVITY           ACTIVITY                      EST     EST    OV     PRG     INSP   MTE PG

  ID                   DESC         LOC    UNIT  QTY     COST   RD PR D/C      DATE    CD YR
A743101 CLEAN/FLUSH DK.             ALL    E.B. 00001 0000400      5  D       122292
A743301 RESEAL DK.JOINT          N1230F L.F. 00360 0003600         5  D       122292
B743101 FLUSH SCUP/DNSPTG.                 E.B. 00001 0000275      5  D       122292
C743201 PAINT SUPERSTRUCTURE               E.B. 00001 0007000      4  C       122292
RDPAVMT PATCH/RAISE PAVEMENT N             S.Y. 00003 0000120      5  D       122292
RDRLFJT RPR/RPL PAVRELIEF JT N             S.Y. 00027 0006750      5  D       122292
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FIGURE 3 BMS proposed maintenance activities.

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PROGRAM ID:  P4575130       DEPARTMENT OF TRANSPORTATION      REPORT ID: BMSI5300
 SCREEN: "AN"                 BRIDGE MANAGEMENT SYSTEM

                         BMS COMPLETED MAINTENANCE INFORMATION
 SR ID: 22008106520000
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DATE	MAINT ACTIV	ACTIVITY DESCRIPTION	UNIT	ACTL QNTY	ACTL COST	PRG D/C	PI NO
042489	A743101	CLEAN/FLUSH DK.	E.B.	00001	0000252	D	
042690	A743101	CLEAN/FLUSH DK.	E.B.	00001	0000336	D	
121291	B743101	FLUSH SCUP/DNSPTG.	E.B.	00001	0001739	D	

FIGURE 4 BMS completed maintenance information.