Maine's Pavement Management System

Designed to Accommodate Change

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After extensive review and development by the Office of Policy Analysis, in 1982 the Maine Department of Transportation (MDOT) adopted a pavement management system (PMS). The preliminary effort to design and implement the system enlisted the expertise of staff, consultants, and university personnel to identify the potential uses and products the department might eventually receive from it. Those researchers initially involved in establishing and developing PMS had the foresight to design one that was flexible and could be easily modified and expanded to meet the inevitable political, financial, and technological changes that would follow.

Status of MDOT's PMS

MDOT's PMS is a dynamic one that has evolved into its current form in response to external influences such as Federal Highway Administration (FHWA) Policy 6.2.4.1, the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), and the Maine Sensible Transportation Policy Act of 1991. It has also been shaped by internal influences, such as advisory and ad hoc committee recommendations and expanded client needs. PMS has the support of upper-level management, serves the operating bureaus and maintenance districts, and benefits from active feedback. The usefulness and credibility of the MDOT PMS, which has met FHWA requirements, have steadily increased.

PMS identifies deficient roadway sections; predicts deterioration; assesses current and future capital, preservation, and maintenance needs; and determines the consequences of various funding levels on all highways under MDOT jurisdiction (8,500 miles). Long-term monitoring sites were established to assess the effectiveness of paving and rehabilitation treatments for a range of traffic levels, subbase soil types, design criteria, and environmental conditions. The system includes pavement and shoulder width and type; construction, rehabilitation, and maintenance history; equivalent single axle load traffic; cracking, rutting, roughness, and drainage condition; surface friction; and deflections. It analyzes, summarizes, and reports information classified by maintenance district, highway system, funding source, functional class, route, metropolitan planning organization (MPO), Transportation Advisory Council region, county, and town. In addition, PMS publishes a needs report biennially describing the condition of the network and trends related to the department's pavement goals and provides specific project-level data and special analyses on request.

Refinements and Modifications

An Advisory Council composed of bureau directors from Construction, Policy Analysis, Right of Way, Technical Services, Maintenance, Computer Services, Design, and Planning oversees the operation of PMS. The council meets annually to audit the system's performance; reassess goals; and recommend refinements, staffing levels, and budgets. Ad hoc committees made up of appropriate experts are convened as necessary to

- Provide guidance on equipment acquisition;
- Establish criteria to identify highways that meet standards;
- Identify treatments for highways that do not meet standards;
- Establish criteria to identify highways in environmentally, historically, or politically sensitive areas;
- Refine treatment models and reporting procedures;
- Incorporate Life-Cycle Cost Analysis (LCCA) and optimization procedures; and
- Reassess network-level and project-level PMS goals.

PMS derives its usefulness from an effective working relationship (feedback loop) with users. It monitors and incorporates appropriate technological advancements to improve cost-effectiveness and reliability. Modifications are made when and to the extent necessary to fulfill the needs identified and approved by the

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users. Examples of ways in which user requirements have influenced the process are given as follows. Requests for

- Improved location information have led to the development of a link to the planning route-log-mile reference data base;
- More current project-level data have resulted in the development of a link to the Project Management data base; and
- An assessment of the impact of the two-year Transportation Improvement Program (TIP) yielded a biennial document that presents a detailed comparison of the pavement needs and TIP.

PMS Use at MDOT

The network-level programming PMS function at MDOT is currently on a two-year cycle. The condition data are updated, analyses are completed, lists of candidate capital and maintenance projects are generated with recommended treatments (primary, secondary, and tertiary) for each candidate, and network needs are determined for a range of funding levels. Network condition, performance data, trends since 1984, needs and projected consequences of various strategies, and funding levels to meet PMS goals on each highway system are summarized and published in *Needs Report—Part 1*.

Lists of candidate maintenance projects are used by the maintenance districts to develop their portion of the two-year TIP and lists of candidate capital projects are used by the Planning Bureau's program field review team to develop the capital portion of TIP. In both cases, feedback is provided on the accuracy of the information supplied by PMS. This feedback is used to find deficiencies in the deterioration, prediction, and treatment selection models.

The route-log-mile reference system used is common to the Pavement Management, Planning, and Maintenance bureaus. When a candidate is selected for TIP, a project identification number is assigned, which then becomes the common reference throughout the department. After TIP is finalized, its impact on the network pavement condition is appraised. The extent to which PMS candidate projects were implemented and the effectiveness of the programmed treatment are evaluated. The results of this analysis are published in *Needs Report—Part 2*.

Proposed schedule and scope changes of pavement preservation projects are reviewed by PMS and alternatives are recommended that minimize the impact on the network in terms of PMS goals. PMS data are included in the project information file and designers review their projects using the PMS videotape library. Overlay designs are based on deflections measured by a RoadRater and cross-section data measured by an Automatic Road Analyzer (ARAN). A PC program, ARAN Shim Analysis Program was developed by PMS, allowing designers to calculate quantities to restore desired cross-slope (see *TR News*, March-April 1992, SOMAT Test Pavement, page 32).

When budget shortfalls require that projects must be deferred for future programs, PMS assesses the backlog and recommends strategies to minimize adverse effects. When unexpected revenue became available, such as Jobs Bond money, PMS data were used to identify project locations for effective expenditure of funds.

The forecasting capabilities of the deterioration models and the ability to isolate distress types have been used to prepare special analyses and summaries for the Maintenance bureau. Reports identifying locations most likely to develop potholes during the spring thaw were used to create a maintenance strategy for potential springtime problem areas. Other reports identifying locations of delayed projects for which the roughness levels were expected to exceed acceptable limits were used to obtain funding for temporary treatment; and those identifying drainage deficiencies

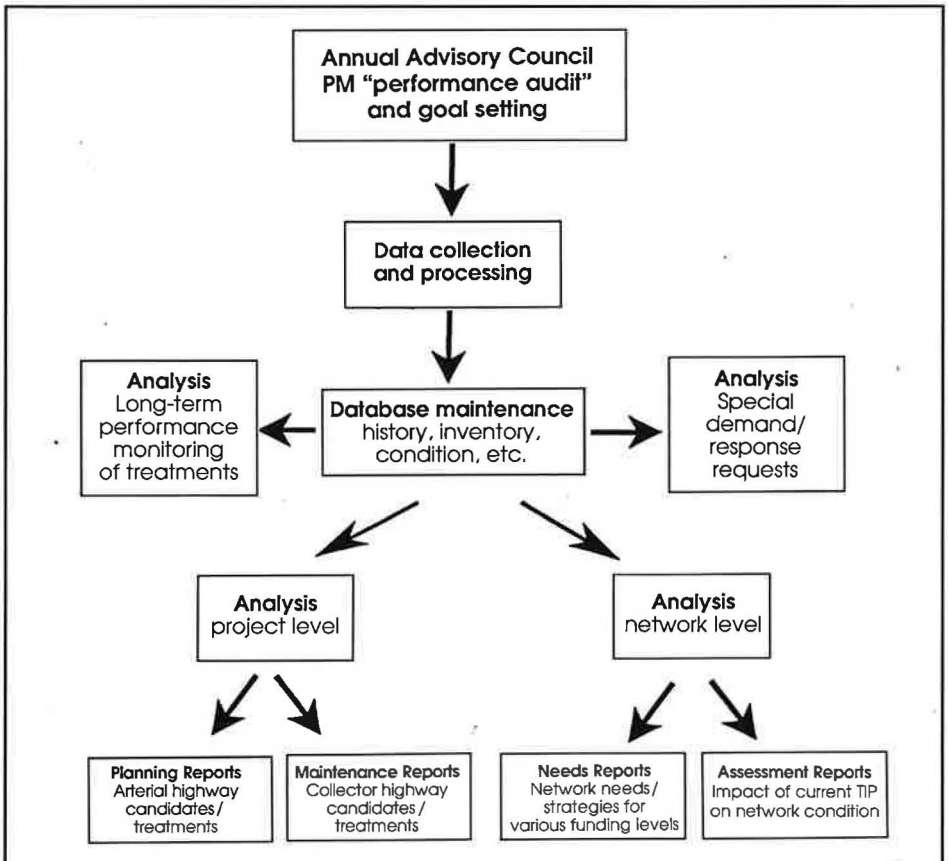

FIGURE 1 Flowchart indicating Maine Department of Transportation's pavement management system procedures.