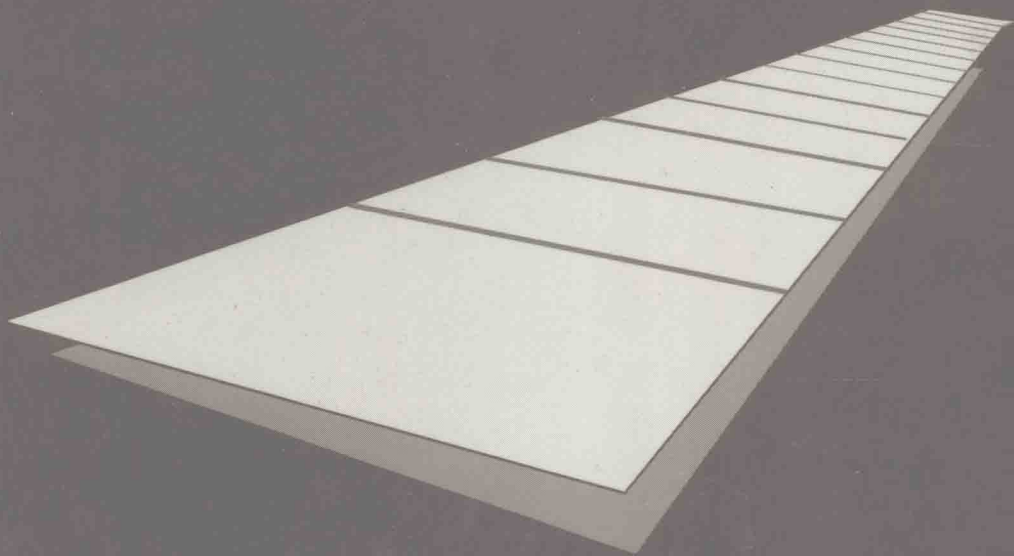


Pavement Management Implementation



Holt/Gramling, editors



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Frank B. Holt and Wade L. Gramling, editors

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Peer Review Policy

Each paper published in this volume was evaluated by three peer reviewers. The authors addressed all of the reviewers' comments to the satisfaction of both the technical editor(s) and the ASTM Committee on Publications.

The quality of the papers in this publication reflects not only the obvious efforts of the authors and the technical editor(s), but also the work of these peer reviewers. The ASTM Committee on Publications acknowledges with appreciation their dedication and contribution to time and effort on behalf of ASTM.

Foreword

This publication, *Pavement Management Implementation*, contains papers presented at the symposium of the same name, held in Atlantic City, NJ on 26–27 June 1991. The symposium was sponsored by ASTM Committee E-17 on Pavement Management Technologies and its Subcommittee, E17.41 on Pavement Management. Frank B. Holt of Eckrose/Green Associates in Madison, WI and Wade L. Gramling of Pasco USA, Inc., in Mechanicsburg, PA, presided as symposium co-chairman and are editors of the resulting publication.

Overview

During the past twenty years, there has been significant progress made in applying system management principles to the complex problems in maintaining infrastructure. Agencies responsible for the street and highway networks have been faced with decreasing buying power and increased needs. The maintenance of aging networks is complicated by increased weights and volumes of traffic accelerating deterioration, coupled with intense competition for limited budgets.

The development of pavement management methods has been widely recognized as one of the tools in the economic planning and maintaining of systems. Increased power of computers, available at reasonable costs, and the development and maturing of pavement management system technology will facilitate and accelerate the adoption of Pavement Management Systems by a wider community.

The purpose of this symposium on Pavement Management Implementation was to review and capitalize on progress to date, and provide focus and direction for pavement management in the 1990s. The requirement of the Federal Highway Administration for States to have a Pavement Management System in place by 1993 raised many questions as to the form and requirements of those systems. ASTM Committee E17, Pavement Management Technologies, with assistance from Committee D4, Road and Paving Materials (symposium co-sponsor), recognized the need to further the knowledge of the pavement community and assist those who were trying to assess, design, and implement Pavement Management Systems.

The Symposium focused on both the basic premises of pavement management, and the experience of pavement management users. The aims of the symposium were to offer the engineering community an overview of pavement management structures and organizations, provide an opportunity for users of pavement management to review the state of the art and discuss their experiences, successes, failures, future innovations, and offer new users assistance in designing and using their systems.

This volume contains 31 papers and is divided into two sections. The first section presents papers of an overview dealing with such topics as the history of pavement management, requirements of pavement management systems, the problems of implementing a system, and how to evaluate pavement management systems. The second section presents papers detailing the experience of users.

Overview Section

The Overview section includes the keynote address of Louis Papet, Chief Pavement Division of the Federal Highway Administration. Papet reviewed the FHWA requirements for pavement management, and offered an overview of the present state of implementation. Papers by Nostrand, Carmichael et al., Amirkhanian et al., and Hudson et al. deal with an overview of Pavement Management addressing issues such as: the history of pavement management in the FHWA, minimum requirements for a pavement management system,

the state of the art in pavement management, and standardization issues. Patterson offers a process to evaluate pavement management systems.

Additional papers deal with portions of pavement management systems that readers may want to include in their system, add to their existing systems, or use to evaluate the results of their systems. These include a discussion of data needs and priorities (Haas), pavement life (Baldi et al.), barriers that may affect implementation (Smith), engineering principles (Ullidtz et al.), and a look at timing and its effect on network performance (Mohseni et al.).

Experience Section

The Experience section presents 21 papers detailing the experience of users, and offers the reader examples of systems from across the United States, Canada, and Europe. In total, 17 different federal and state agencies, as well as one foreign country, are represented in this section.

Pavement Management systems for roads, streets, highways, and airports are discussed. Various types of systems and system approaches are presented, including maintenance planning, statewide highway programming systems, airport pavement management systems, and military facility pavement management.

Advances in the state of the art addressed through papers on pavement life and feedback systems to evaluate the pavement management system.

For those organizations looking for assistance in implementing a pavement management system, the symposium and this STP offer an overview of the implementation process, and will, with the existing literature, assist the user in designing, implementing, and modifying their system to meet their agency needs.

As 1993 draws near, the requirement of the Federal Highway Administration to implement a pavement management system will cause agencies to review their present systems, and the papers presented in this publication will be of valuable assistance in that process. For those agencies looking to establish a pavement management system, this volume can assist in developing a system that not only meets the agencies needs, but can help preclude some of the pitfalls that other agencies have had to overcome, thus resulting in a more flexible and usable system.

Work remains to be done in reaching a consensus for the various elements making up a pavement management system. New standards, specifications, and guidelines will continue to be developed as experience is gained.

Agreement on the types, accuracy, and definitions of pavement information needed for use in a Pavement Management System will lead to standardization and automation, and enhance the ability of users to more easily exchange information and knowledge.

Committee E-17 will continue its efforts to develop ASTM standards that address some of the issues presented in this volume. Standards dealing with network level pavement management, composite instrumentation, and priority of data needs for pavement management, are a few of the areas where standards are being formed to help users of pavement management systems.

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Key Note Address

Mr. Louis M. Papet, Chief, Pavement Division

FEDERAL HIGHWAY ADMINISTRATION - CURRENT PMS REQUIREMENTS

REFERENCE: Papet, L. M., "Federal Highway Administration - Current PMS Requirements," Pavement Management Implementation, ASTM STP 1121, Frank B. Holt and Wade L. Gramling, Eds., American Society for Testing and Materials, Philadelphia, 1992.

ABSTRACT: On January 13, 1989, the Federal Highway Administration (FHWA) published its Pavement Policy. One of the most important parts of that policy is a mandate that every State develop and implement a Pavement Management System (PMS) within 4 years after that publishing date. All States have been attempting to meet that deadline and FHWA has been monitoring their progress. To provide guidance on the Policy, FHWA followed with an FHPM (6-2-4-1) in which the major elements that need to be included for a system to be judged acceptable were explained. The figures chosen depict the progress being made by number of States in each of the major elements of a PMS. The comments on each give one a feel for what FHWA thinks is needed in a PMS to meet minimum criteria for acceptability.

KEYWORDS: pavement policy, policy mandate, PMS in operation, 4-year deadline, inventory, condition survey, reference system

Current Pavement Management System (PMS) Requirements

On January 13, 1989, the FHWA published its Pavement Policy final rule in the Federal Register. In that policy there are three major mandates.

It should be pointed out at this point that the FHWA does not administratively issue many mandates. Unless a particular requirement is a specific part of the law, FHWA tries not to issue edicts of any kind. However, in the case of pavements, it is thought that the subject is so important that a deviation from the usual practice was necessary.

The first mandate requires the State highway agencies (SHA) to adopt a pavement design process and discard some of those old "rules of thumb" that have been used over

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the years to establish pavement thickness. The second requires that the SHA's develop a product selection process to justify the specific materials being used on Federal-aid projects.

The third mandate in the Pavement Policy, which is the most important one as far as the ASTM Symposium is concerned, requires that every SHA have a comprehensive PMS in operation, acceptable to FHWA, within 4 years from the date of issuance. The deadline date is January 13, 1993, so the mid-point in that time period has already passed.

When the 4-year period began, there were perhaps a handful of States that had already progressed to the point where their PMS could be considered acceptable. There was another handful which had no system at all; they had not even begun to collect data. The rest of the highway agencies were somewhere in between and were working toward the development of a PMS for their State.

Today the situation is considerably different. All of the States have begun developing a PMS and most of them have an operating system; although some SHA's have only a few of the basic elements working. There are still a few that will find it difficult to have a PMS "in operation" "acceptable to FHWA" before that 1993 goal.

The FHWA issued a reminder memorandum on December 28, 1990, to call everyone's attention to that impending deadline.

The title of this paper is "Current PMS Requirements" and those requirements will be covered quite thoroughly. However, because the information is available, a set of figures were chosen that shows the progress being made by the States towards meeting the aforementioned deadline.

About a year ago, a questionnaire was prepared for the States to complete indicating what progress each of them has made toward developing their PMS. This questionnaire was usually filled out during the presentation of the 1-Day Seminar on Pavement Management (PM) for mid/top level managers. Some of the other States were obtained through Regional Pavement Engineers and some updating was done by PM engineers that attended the Advanced Course in PMS given by FHWA.

Because of this, the information shown in the ensuing figures is not completely up to date because it was gathered over a lengthy time period. However, it does give one a good indication of progress and of the trends that are taking place.

The figures do not label any State by name because their purpose is not to compare one State against another. The figures show various elements of PMS's and give the progress by number of States in each.

In the figures one will see a solid bar which represents the number of States that have progressed to that point at present. The hatched bar usually shown tacked on to the solid bar indicates the number of States anticipating that they will reach that point in the near future. The States are shown as 52 total because Puerto Rico and the District of Columbia are included.

As the status of each of these elements is shown, the text will indicate the importance of each element when considering the FHWA "acceptability" as stated in the Policy. It must be stated, however, that the responsibility for determining whether or not a system is acceptable rests with the FHWA Division Administrator in each State.

A PMS must be tailored to a particular State's needs if it is to be effective. The Division Administrator works with the State on a day-to-day basis and is in the best position to evaluate the State's needs and judge the acceptability of its PMS.

Although the Washington Office will not be making the determination of acceptability, the headquarters office will be asked for guidance.

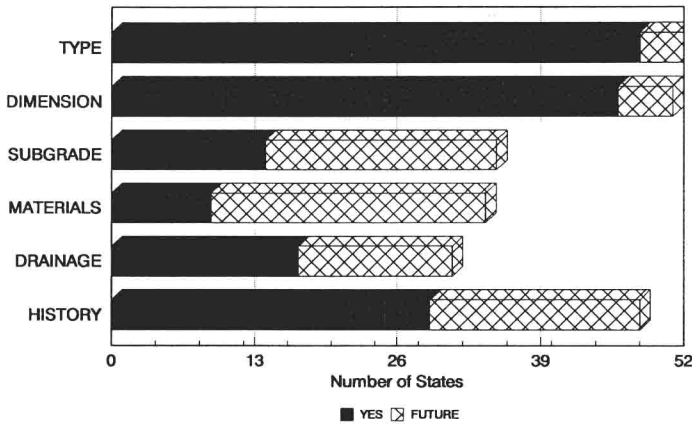


FIG. 1 - Elements included in inventory

One of the most important elements necessary for an acceptable PMS is an inventory. Figure 1 shows the number of States that have made and included a complete inventory of the network under their PMS's. The inventory should include as a minimum, the type of pavement and the dimensions, and as Figure 1 shows all of the States have or will have those included.

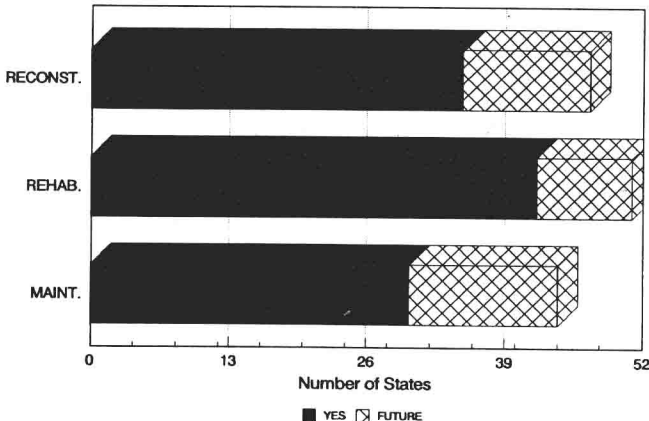


Fig. 2 - Type of work covered by PMS

Figure 2 depicts the coverage of the systems by type of work. It would seem that any PMS worth its salt would cover all projects in reconstruction and rehabilitation, so they probably all will. Maintenance may not be covered in all systems and although desirable, a division administration would probably not insist on it as a criteria for acceptability.

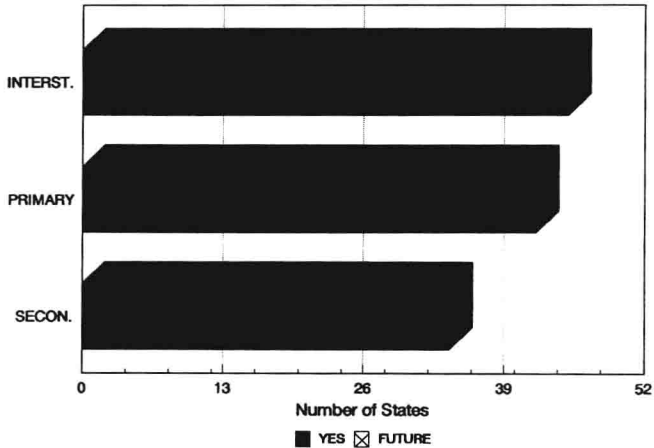


FIG. 3 - PMS Coverage by System

Figure 3 shows the PMS coverage by system. The Policy states that the PMS shall cover "all Rural Arterials (Interstate, Other Principal Arterial, and Minor Arterials) and Urban Principal Arterials (Interstate, Other Freeways and Expressways, and Other Principal Arterials) routes under its jurisdiction." It does not specify coverage by system.

If the proposed new legislation is passed, however, this may change because FHWA will probably apply the policy to the "System of National Significance."

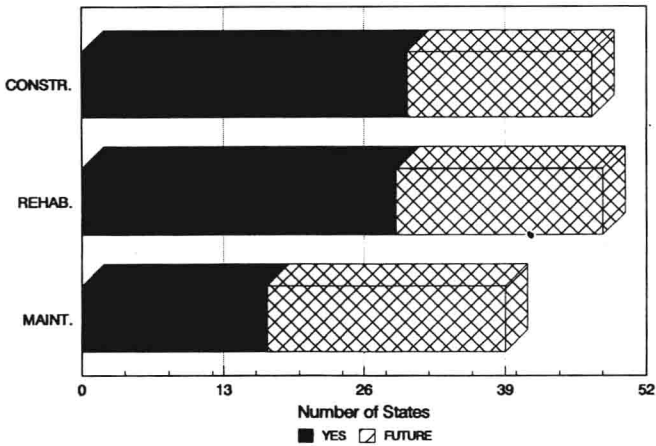


FIG. 4 - Type of work included in history

The bottom line product of a good PMS is to be able to predict performance. Performance prediction is based on the performance experience with a given set of materials and pavement design. Therefore, it would appear that a PMS needs to include a history of construction and rehabilitation and as one can see on Figure 4 almost all the States anticipate having a history of the type of work included.

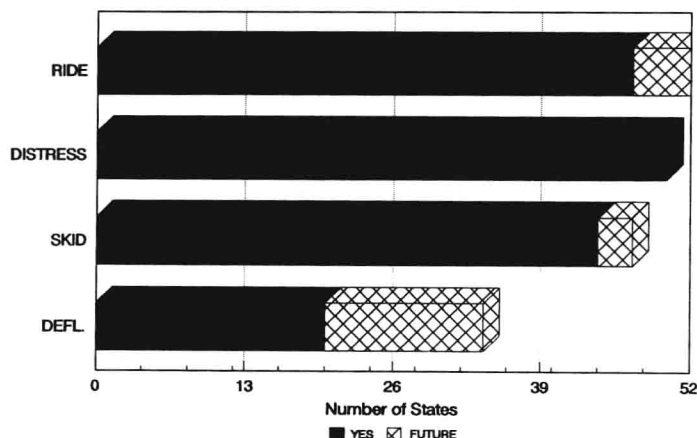


FIG. 5 - Condition Survey data included in PMS.

The FHWA advocates that the four major elements of deterioration be collected. Ride, Distress, Skid, and Deflection. The FHWA will not mandate that all States collect structural data, (deflection) though it is desirable. Most States will have all four as can be seen in Figure 5.

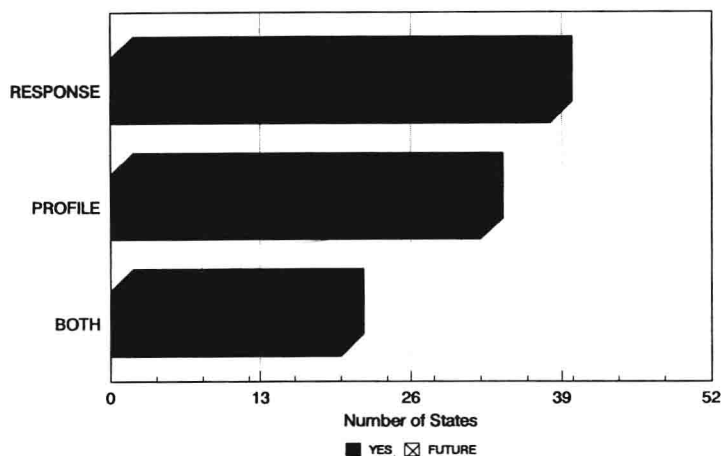


FIG. 6 - Type of ride measuring equipment used.

Figure 6 depicts what type of ride measuring equipment the States have. The FHWA does not require that any particular type of equipment be used. It is thought that collecting ride data is a must regardless of the way it is done. All States do collect ride for the Highway Performance Monitoring System data.

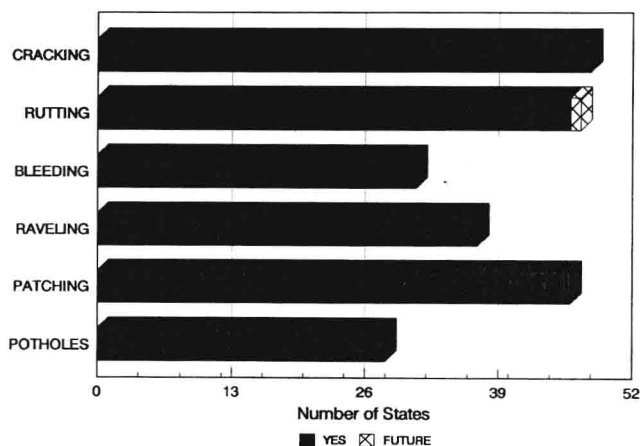


FIG. 7 - Types of AC pavement distress data collected

Figure 7 shows the number of States collecting data on each of the distresses normally connected with asphalt.

An acceptable PMS needs to have condition data. A good measure of condition is distress, therefore, distress data needs to be obtained. The FHWA does not and will not specify which individual items of distress should be collected.

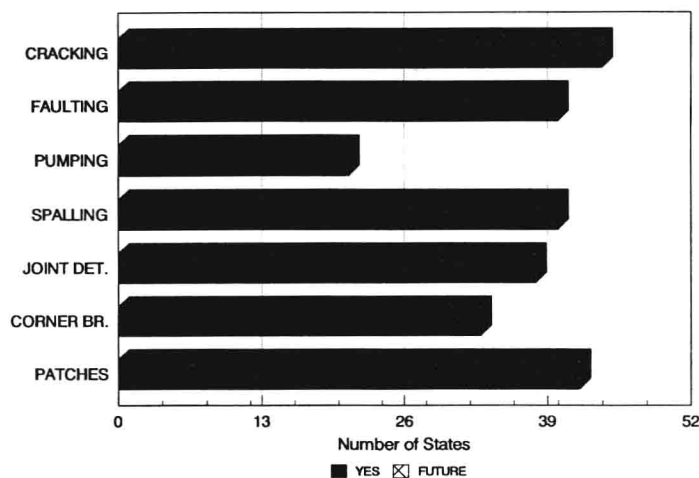


FIG. 8 - Types of PCC pavement distress data collected.