

Development of Uniform Sections for PMS Inventory and Application-Interim Report

Introduction

“Louisiana-Vision 2020” serves as a benchmark for improving the highway pavements over a 20-year period. Current Louisiana state laws, the Louisiana Department of Transportation and Development (LADOTD), and the Federal Highway Administration (FHWA) emphasize the development and implementation of cost-effective pavement preservation strategy to improve the condition of the transportation network. Such strategy must rely heavily on the historical pavement condition data which are stored in the pavement management database and analyzed by the personnel of the pavement management system (PMS). In October 2003, a review team comprised of LADOTD employees and the FHWA was tasked with assessing and evaluating the effectiveness of the PMS. The review focused on the pavement selection process as perceived by the pavement management data users. The team concluded that the various functional sections of LADOTD did not effectively use PMS data as a whole due to the gap between the output of PMS and the Department users’ needs.

In an effort to improve PMS operations, the PMS section of LADOTD and Louisiana Transportation Research Center (LTRC) initiated a two-phase research study to evaluate the overall accessibility and effectiveness of the PMS system. Consequently, a research plan was designed and executed with the help of LTRC researchers and PMS engineers. The first phase focused on the assessment of the state-of-the-practice of LADOTD’s PMS regarding accessibility, PMS reports, reference location systems, and distress indices. Part of the assessment was conducted through the analysis of the responses of all district engineers to specially designed survey questionnaires and personnel interviews. This report focuses on the Phase I study and on the results of the departmental survey to determine the needs of the districts.

Objective

The objective of the research study was to find the most cost effective way to incorporate the PMS into LADOTD’s regular operation and make the information in the PMS usable for engineers within the Department.

Research Approach

The objective is accomplished as follows: (1) identify the needs of PMS users at LADOTD; (2) establish a unified roadway identification system acceptable to all PMS users; and (3) evaluate and update the existing pavement performance and treatment selection models. This report deals with major tasks 1 and 2 of the study.

During the course of the study, various components of the PMS were evaluated. A detailed survey of all district engineers along with other departmental engineers was conducted to establish the needs of each district. The key efforts of the research team during Phase I of the study include: (1) A review of the state-of-the-practice of the PMS of the LADOTD. The review included but was not limited to the current highway classification system, the reference location systems, the distress data collection and storage practices, other data available in the Department, deduct points, distress indices and remaining service life calculations, and project- and network-level reports. (2) A survey of all district engineers to address the needs of the districts. The survey addressed various issues including the types of reports and their accessibility, the utility of the PMS outputs, the existing location reference systems, the various pavement preservation actions, and the degree to which PMS users fully understand the benefits and potential cost savings that can be precipitated by using the PMS data.

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Conclusions

After review of the PMS and district survey results, the following observations are offered:

- The LADOTD has an active and dynamic PMS. The pavement distress data is collected continuously (no sampling) for every 1/10th mile segment, and good data on pavement distresses is available from 1995 to 2007. In addition, all districts have access to the PMS data, and the majority use the data.
- The use of the data, as reported by the district engineers, varies substantially from one district to another. Furthermore, no consensus was found amongst the district engineers regarding the type of reports that they like to receive from the PMS office.
- Although most districts have electronic records of their maintenance and rehabilitation activities, the data are not accessible to, nor are stored in, the PMS databank. The disadvantage of this is that the PMS engineers cannot track the performance and cost of the various pavement preservation actions.
- Various location reference systems (LRS) are being used; the majority of the district engineers would like to convert to a unified location reference system although they have no concern about the current systems. Moreover, there is no standard procedure for establishing station numbering for projects.
- The deduct point policy has been modified twice since its establishment. However, no study has been conducted to calibrate the deduct points. In addition, different threshold values (trigger values for preservation actions) for different pavement types and distresses are used by LADOTD.
- With respect to efforts to implement the Mechanical Empirical Pavement Design Guide (MEPDG) using the PMS data, the following observations were made: (a) PMS data is fair/good for initial calibration of performance models (Level 2), and (b) PMS data is not stored as required by MEPDG at the desired-level or in some cases at the minimum-level.

Recommendations

- Develop new forms of reports that streamline the contents of the report to the audience. For example, network-level reports should be prepared for the managers and the legislators, whereas project-level reports should target district engineers and technicians (include detailed engineering data).
- Hold a meeting between the PMS unit and the various district engineers to discuss the efficient use of the data. The meeting agenda may include: (1) the types of data that are needed for a comprehensive and cost-effective pavement management, including fix type, cost, reference locations, and materials; (2) the format and accuracy of the data; (3) data quality control; and (4) the cost to unify all data forms versus the available resources.
- Link existing location reference systems to GPS. This would allow the LADOTD to continue using the existing systems. The linkage can be accomplished by utilizing the existing software developed by the computer section of the Department. However, the software has some limitations; it currently links only control section log mile and route mile post with GPS. It should be further improved to link the remaining location reference systems. In addition, it can identify the primary route only.
- The PMS office should design and conduct training sessions and hold meetings with district personnel to train and update PMS users regarding the recent developments and capabilities of the PMS. This would enhance communication between the PMS and the districts.
- Calibrate and modify the current scheme of deduct points and adopt uniform trigger (threshold values) for all pavement types and for all types of distress in flexible, composite, and rigid pavements. Uniformity of the threshold values for all pavement and distress types would enhance communication between the districts and would eliminate the need for establishing a dictionary for the threshold values.
- Calibrate the MEPDG pavement performance models for Level 2 design using PMS data. Consider establishing satellite PMS/Design database only for added new sections as recommended by FHWA.

All of these recommendations have been or are in the process of being implemented by the PMS section of LADOTD.

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