

## PAVEMENT MANAGEMENT

Pavements are the main components of roads and are done with a lion's share of capital investment for road construction. Maintaining and operating pavements typically involve complex decisions, about how and when to resurface or apply other treatments in order to keep the road performing and at the same time keeping the operating costs at a reasonable level. Pavement Management is thus, the systematic process of planning, designing, constructing, operating, and maintaining road pavements in a cost-effective manner. It combines best engineering principles with sound business practices and economic theory to facilitate a more organized and logical approach to decision-making.

Pavement management decisions need to integrate diverse spatially referenced data, including condition surveys, pavement width, number of lanes, construction history, traffic counts, bridge condition surveys, sign inventories and construction & maintenance records. Pavement Management System (PMS) consists of three major components:

- System to regularly collect pavement condition data.
- Computer database to sort and store the collected data.
- Analysis program to evaluate repair or preservation strategies and suggest cost effective methods to maintain the road in traffic worthy condition.

Sound design principles and methodology serve as the basis for the successful construction of a pavement. It has to be noted that even though the Pavement Serviceability Index is normally used as the measurement of the serviceability of a pavement during the design stage, the Initial Roughness Index (IRI) is frequently used as the measure of roughness or smoothness during and after the construction of the pavement.

The process of pavement management does not stop when the construction of the pavement is completed. Various monitoring, maintenance and rehabilitation works are needed once the pavement is fully functional. Ideally, proactive approaches should be chosen over reactive approaches when it comes to pavement maintenance activities. To be proactive, periodic in-service evaluation should be conducted to monitor and evaluate the performance of the pavement so that sufficient information is available to project the future maintenance & repair needs. Furthermore, the collection of information from in-service evaluations would also contribute to the establishment of the history of the pavement which is essential for better understanding of any problem associated with the pavement. When relevant data and information accumulated through in-service evaluation are recorded and readily interpreted, the process of decision making is greatly enhanced. Systematic data capturing, logging and analyzing will ensure that the underlying

root causes of problems are pinpointed and later remedied, rather than merely covered over.

Literature surveys have revealed that in the developed countries, GIS asset tracking systems are in extensive use, for monitoring and maintaining their pavement network systems. These spatially-enabled pavement management systems allow management, engineers and the public to use a web-based map interface to identify problem pavement areas in near real-time. Investing in GIS pavement management system has been found to pay for itself many times over through reduced repair costs, optimized maintenance schedules and inter agency coordination like making sure that newly paved roads are not immediately dug up by sewer or cable maintenance crews etc. GIS linked to a PMS is an efficient means to query data and display trends and patterns to track pavement condition and allocate funds effectively.

Pavement Management Planning (PMP) is also a systematic, long-term approach in optimizing pavement maintenance. This approach integrates various maintenance options in one plan based on available funding. The resulting outcome compounds the advantages of each singular approach and significantly extends the life of the pavement. To maximize the benefits and minimize the overall costs associated with the process, a systematic and scientific approach is needed to manage the pavements. To be most successful, the approach program should provide for a broad policy covering all aspects of pavement management that involves consideration of planning and programming concerns as well as construction and maintenance engineering details. It should incorporate the principles of asset management, data collection and management, economic

analysis tools and engineering applications.

During the past several years, FHWA, Transportation Research Board (TRB) and National Cooperative Highway Research Program (NCHRP) have contributed to major technical studies which significantly influence the way pavement management practitioners perform over the next decade. Through initiatives of these agencies, technical advancements are being made in the development, use and standardization of automated data collection, ground penetrating radar, and rolling wheel deflectometers. Training initiatives have also been a high priority, with new courses on pavement management, use of multiyear prioritization, conduct of engineering analysis using pavement management data and preventive maintenance concepts.

It is unlikely that traffic levels in India will decrease in the future or that pavement will get so good that they will never need repair. The need for efficient management is far greater today than ever before and for highway pavements, the tool for efficiency is a good pavement management system. It should be understood that continuous and preventive maintenance prolongs the life span of a pavement considerably and is the preferred approach as compared to reactive maintenance measures. The challenge of managing and maintaining the existing road infrastructure under today's environment is considered by many to be more difficult than the design and construction of the initial system.

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