# INTRODUCTION

Transportation agencies are responsible for the design, construction, maintenance, and management of highway pavements. Though pavement engineers are faced with a number of challenges, a primary challenge is that of change. The clearest example of this change is the new approach to pavement analysis described in the *Mechanistic-Empirical Pavement Design Guide – A Manual of Practice* (AASHTO 2008). Over a period of approximately 10 years, the fundamental approach to pavement design has changed from a procedure that is modeled from the observed performance at test tracks constructed in the 1950s to one based on modeling the performance of pavement structures based on axle load spectra, climate, and intrinsic material properties. However, it is not just design procedures that are changing. Construction practices are also changing, with the emphasis shifting to accelerated construction, the use of sustainable materials, and the provision of safer and quieter pavement surfaces. In pavement maintenance and management, the leading edge of this change consists of a more proactive approach to managing a pavement network, and the consideration of pavements as one important element of a system of transportation assets that must be managed. This proactive approach to managing assets involves integrating pavement investment decisions with other agency needs for better and more fiscally responsible and transparent decision-making.

Furthermore, the technology associated with accessing pavement-related information is changing. Today, in addition to traditional “hard copy” or published reports, information is readily accessible via electronic formats such as web sites and portable document format (PDF) files. With the ongoing changes in technology, it is almost impossible to keep traditional “hard copy” documents current, and it is certainly not economically viable or sustainable to generate printed versions every time a change is needed.

The focus of the *Pavement Handbook* is on documenting knowledge on a broad range of pavement engineering related topics. The information contained in the *Pavement Handbook* includes most relevant AASHTO publications as well as relevant documents published by NCHRP and Federal Highway Administration (FHWA).

The importance of easily accessible information is well documented. For instance, research suggests that the primary barriers to the successful transfer of knowledge are time and money (Mericka 1992, O’Shaughnessy 1992, Muench and Mahoney 2004). Specifically, work schedules are full, it is difficult to accommodate the time needed for training sessions, and training budgets are usually tight and stretched very thin. These barriers have created a demand for quality online information that is broad-based, technically accurate, searchable, and capable of being delivered at the convenience of the user. This demand is significant and is growing. The American Society for Training and Development (ASTD) reports that e-learning (electronic-based learning) in 2007 constituted 32.6 percent of all corporate learning hours (Paradise 2008). Clearly, online training tools and electronic-based information can fulfill a distinct need while reaching a significant number of users.

Because pavement knowledge is constantly evolving, the *Pavement Handbook* is designed to be readily updatable and easily distributable. Based on the ubiquity and growing popularity of the internet, a web-based publication and publishing format is ideal because it is nearly instantaneously accessible by anyone with a computer and internet connection, nearly instantaneously updatable, capable of providing easy and properly restricted edit access, and able to store a history of revisions in an online database. It has been determined that the electronic, interactive version of the *Pavement Handbook* is best delivered on a web-based wiki platform with certain key enhancements (e.g., secure access). The wiki format can allow for browsing, searching, printing pages, and producing PDF documents. In addition, the *Pavement Handbook* editing process uses a standard MS Word-like graphical user interface and is similar to standard word processing. The *Pavement Handbook* provides a secure, inexpensive, consistent means of editing content, while providing end users the benefit of knowing they are always working with the most up to date information.

In this regard, the *Pavement Handbook* is intended to function not only like an online encyclopedia of pavement related topics, but also as a typical textbook or manual where information is arranged in a sequential order. This allows more flexibility with the end users in that key words or topics can be queried and quickly reviewed. The *Pavement Handbook* format, however, does not prohibit progressing through the information in a more sequential manner for training purposes. The topics contained within the *Pavement Handbook* include (which is also the recommended sequential order of topics):

1. **Pavement Types** –brief discussion and overview of asphalt, concrete, composite, and gravel pavements.
2. **Pavement Materials** – discussion of the various materials used in pavement construction, including soil, aggregate, asphalt binders and modifiers, hydraulic cement binders and modifiers, asphalt mix design and selection, and hydraulic cement concrete mix design and selection.
3. **Pavement Structural Design** – discussion of purpose and fundamental concepts of pavement design including a history of AASHTO pavement design procedures and mechanistic-empirical pavement design.
4. **Pavement Surface Characteristics** – discussion of pavement surface characteristics related to profile, texture, friction, porosity, hydroplaning potential, splash/spray, and tire-pavement noise.
5. **Pavement Type Selection** – discussion of where to apply (new, reconstruction, rehabilitation), identification of alternative strategies, life-cycle cost analysis components (e.g., analysis period, discount rate, agency and user costs, computational approach), and FHWA RealCost software.
6. **Pavement Construction** – discussion of the importance of quality construction and materials, quality management (quality control, quality assurance, and independent assurance), qualifying construction materials, and construction and materials specifications.
7. **Pavement Evaluation** – discussion of the types and purpose of pavement evaluations including, condition/distress, surface and subsurface drainage, field sampling and testing, and surface characteristics testing.
8. **Pavement Structural Testing and Analysis** – discussion of structural assessment and characterization including nondestructive testing, destructive sampling and testing, backcalculation and related analysis, application decisions, and distinction for what is needed on network and project-level applications.
9. **Pavement Preservation Treatments** – discussion of pavement preservation concepts and purposes, scope of preservation activities, benefits of preservation, and description of preservation treatments and usage.
10. **Pavement Rehabilitation Strategies** – discussion of pavement rehabilitation concepts and purposes, scope of rehabilitation activities, and description of rehabilitation treatments and usage.
11. **Pavement Management** – discussion of the importance of pavement management, pavement management levels (strategic, network, and project-level), and pavement management components (inventory, database, condition assessment, analysis models, analysis tools, reporting, and feedback loop).
12. **Pavement Sustainability** – discussion on the sustainability concepts, scope of application, reduction in energy consumption, reduction in material consumption, reduction in air, water, and noise pollution, and sustainability assessment (economic, environmental, and societal).

The target users of the *Pavement Handbook* ranges from entry-level technicians and engineers, academia, to the well experienced pavement engineer. The *Pavement Handbook* provides brief and concise information on an extensive list of pavement related topics, with links and references to more detailed information and reports that are readily available via the Internet. In this manner, a relatively short period of time can be spent on obtaining general, but concise, information on any given pavement related topic, however, by including links and/or references to other more in depth information will allow further explanation based on the needs of the end user.

The *Pavement Handbook* was developed to allow for editing current content, updating practices and procedures, and incorporating new technologies (as appropriate) in real-time. To aid with any future updates or modifications, detailed instructions and guidance on such topics as formatting, editing, creating links, adding visual media (e.g., videos, photos), and topic naming convention are included in the *Pavement Handbook* documentation.

## References

American Association of State Transportation and Highway Officials (AASHTO). 2008. *Mechanistic-Empirical Pavement Design Guide – A Manual of Practice*, MEPDG-1. American Association of State Transportation and Highway Officials, Washington DC.

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