Appendix E Pavement Design Guidelines Virginia Department

"Highway agencies across the nation are moving towards implementation of the new AASHTO Mechanistic- Empirical Pavement Design Guide (MEPDG) for pavement design. The objective of this project was to implement the MEPDG into the daily operations of the Utah Department of Transportation (UDOT). The implementation of the MEPDG as a UDOT standard required modifications in some UDOT pavement design protocols (i.e., lab testing procedures, equipment, and protocols, traffic data reporting, software issues, design output interpretation, and others). A key requirement is validation of the MEPDG's nationally calibrated pavement distress and smoothness prediction models when applied under Utah conditions and performing local calibration if needed. This was accomplished using data from Long Term Pavement Performance (LTPP) projects located in Utah and UDOT pavement management system (PMS) pavement sections. The nationally calibrated MEPDG models were evaluated. With the exception of the new hot-mix asphalt (HMA) pavement total rutting model, all other models were found to be reasonable. The rutting model was locally calibrated to increase goodness of fit and remove significant bias. Due to the nature of the data used in model validation, it is recommended that further MEPDG model validation be accomplished in the future using a database that contains HMA pavement and jointed plain concrete pavement (JPCP) exhibiting moderate to severe deterioration. This report represents Phase II of the UDOT MEPDG implementation study and builds on the Phase I study report completed in 2005 for UDOT. The Draft User's Guide for UDOT Mechanistic-Empirical Pavement Design (UDOT Research Report No. UT-09.11a, dated October 2009) incorporates the findings of this report as inputs and pavement design guidelines for Utah for use by UDOT's pavement design engineers during trial implementation of the MEPDG"--Technical report documentation page.

The goal of this research study was to assess and address the implications of the axle load spectra approach proposed by the M-E Design Guide. In addition, recommendations were developed regarding traffic data needs and availability to aid in deciding the installation locations of future WIM stations in Texas. A methodology for specifying the required accuracy of WIM equipment based on the effect that this accuracy has on pavement performance prediction was also developed. Regarding traffic volume forecasting, a methodology is presented that allows optimum use of available data by simultaneously estimating traffic growth and seasonal traffic variability.

TRB’s National Cooperative Highway Research Program (NCHRP) Synthesis 417: Geometric Design Practices for Resurfacing, Restoration, and Rehabilitation documents the current state-of-the-practice related to nonfreeway resurfacing, restoration, and rehabilitation projects.

Master the principles, analysis, and design in pavement engineering This student-friendly textbook offers comprehensive coverage of pavement design and highways. Written by two seasoned civil engineering educators, the book contains precise explanations of traditional and computerized mechanistic design methods along with detailed examples of real-world pavement and highway projects. Pavement Design: Materials, Analysis, and Highways shows, step by step, how to apply the latest, software-based AASHTOWare Pavement Mechanistic-Empirical Design method. Each design topic is covered in separate, modular chapters, enabling you to tailor a course of study. Fundamentals of Engineering (FE) sample questions are also provided in each chapter. Coverage includes: Stress-strain in pavement Soils, aggregates, asphalt, and portland cement concrete Traffic analysis for pavement design Distresses and distress-prediction models in flexible and rigid pavement Flexible and rigid pavement design by AASHTO 1993 and AASHTOWare Overlay and drainage design Sustainable and rehabilitation pavement design, pavement management, and recycling Geometric design of highways

This book provides a review of the principles and methods of drainage with an emphasis on design. The whole field of drainage is covered, and although the book concentrates mainly on the practice in North America, Europe and Britain, the practice in developing countries is also included. The book is directed primarily at the graduate engineer entering professional practice, but will also provide a useful reference for more senior engineers and for those in adjunct professions. Chapter 1 outlines the necessity for drainage on a large or small scale, for rural and urban areas. As the drainage engineer must decide how much unwanted water there will be and when it will occur, the chapter discusses climatic types, prediction of rainfall, evapotranspiration effects, return periods (of design storms and runoff events), river flow and flood prediction, and various sensing systems for providing short term predictions of rainfall, runoff, streamflow and flood warning. Chapter 2 gives a thorough review of the properties of soil in the context of drainage design. The extensive mathematical theories which relate to the crucial area of soil water movement are outlined and due attention is paid to the growing importance of predicting soil water movement in partially saturated soils.

The purpose of this manual is to provide clear and helpful information for maintaining gravel roads. Very little technical help is available to small agencies that are responsible for managing these roads. Gravel road maintenance has traditionally been "more of an art than a science" and very few formal standards exist. This manual contains guidelines to help answer the questions that arise concerning gravel road maintenance such as: What is enough surface crown? What is too much? What causes corrugation? The information is as nontechnical as possible without sacrificing clear guidelines and instructions on how to do the job right.

Mechanistic-empirical Pavement Design GuideA Manual of PracticeAASHTORoadside Design GuideAASHTO Guide for Design of Pavement Structures, 1993AASHTOMix Design Practices for Warm Mix AsphaltTransportation Research Board

As AASH is expected to eventually adopt the MEPDG at its primary pavement design method, it is critical that the SDDOT become familiar with the MEPGD documentation and associated design software. The research conducted under this project was a first step toward achieving this goal.

Over 1,600 total pages .... Application and Use: Commanders, security and antiterrorism personnel, planners, and other members of project planning teams will use this to establish project specific design criteria for DoD facilities, estimate the costs for implementing those criteria, and evaluating both the design criteria and the options for implementing it. The design criteria and costs will be incorporated into project programming documents.

The Code of Federal Regulations is the codification of the general and permanent rules published in the Federal Register by the executive departments and agencies of the Federal Government.

This second edition of Concrete Pavement Design, Construction, and Performance provides a solid foundation for pavement engineers seeking relevant and applicable design and construction instruction. It relies on general principles instead of specific ones, and incorporates illustrative case studies and prime design examples to highlight the material. It presents a thorough understanding of materials selection, mixture proportioning, design and detailing, drainage, construction techniques, and pavement performance. It also offers insight into the theoretical framework underlying commonly used design procedures as well as the limits of the applicability of the procedures. All chapters

have been updated to reflect recent developments, including some alternative and emerging design technologies that improve sustainability. What's New in the Second Edition: The second edition of this book contains a new chapter on sustainability, and coverage of mechanistic-empirical design and pervious concrete pavements. RCC pavements are now given a new chapter. The text also expands the industrial pavement design chapter. Outlines alternatives for concrete pavement solutions Identifies desired performance and behavior parameters Establishes appropriate materials and desired concrete proportions Presents steps for translating the design into a durable facility The book highlights significant innovations such as one is two-lift concrete pavements, precast concrete pavement systems, RCC pavement, interlocking concrete pavers, thin concrete pavement design, and pervious concrete. This text also addresses pavement management, maintenance, rehabilitation, and overlays.

This report from the second Strategic Highway Research Program (SHRP 2), which is administered by the Transportation Research Board of the National Academies, focuses on improving the ability of highway agencies to design and construct long-lasting highway projects with minimal disruption to the traveling public.

Pavement Engineering will cover the entire range of pavement construction, from soil preparation to structural design and life-cycle costing and analysis. It will link the concepts of mix and structural design, while also placing emphasis on pavement evaluation and rehabilitation techniques. State-of-the-art content will introduce the latest concepts and techniques, including ground-penetrating radar and seismic testing. This new edition will be fully updated, and add a new chapter on systems approaches to pavement engineering, with an emphasis on sustainability, as well as all new downloadable models and simulations.

TRB's National Cooperative Highway Research Program (NCHRP) Report 691: Mix Design Practices for Warm-Mix Asphalt explores a mix design method tailored to the unique material properties of warm mix asphalt technologies. Warm mix asphalt (WMA) refers to asphalt concrete mixtures that are produced at temperatures approximately 50°F (28°C) or more cooler than typically used in the production of hot mix asphalt (HMA). The goal of WMA is to produce mixtures with similar strength, durability, and performance characteristics as HMA using substantially reduced production temperatures. There are important environmental and health benefits associated with reduced production temperatures including lower greenhouse gas emissions, lower fuel consumption, and reduced exposure of workers to asphalt fumes. Lower production temperatures can also potentially improve pavement performance by reducing binder aging, providing added time for mixture compaction, and allowing improved compaction during cold weather paving. Appendices to NCHRP Report 691 include the following. Appendices A, B, and D are included in the printed and PDF version of the report. Appendices C and E are available only online.

TRB's National Cooperative Highway Research Program (NCHRP) Report 719: Calibration of Rutting Models for Structural and Mix Design highlights proposed revisions to the Mechanistic–Empirical Pavement Design Guide (MEPDG) and software to incorporate three alternative rut-depth prediction models that rely on repeated load (triaxial) permanent deformation or constant height testing to provide the requisite input data.