



COLORADO

Department of Transportation



M-E Pavement Design Manual

2017

INTRODUCTION

Purpose of Manual

The purpose of this Pavement Design Manual is to provide the Colorado Department of Transportation (CDOT) and consultant pavement designers with a uniform and detailed procedure for designing pavements on CDOT projects. This manual should be used after July 1, 2017.

Organization of the Manual

The manual is organized in a manner that affords the users with simple and methodical steps in the design of pavements for the Colorado state highway system. The contents are arranged carefully to provide users with sufficient flexibility in selecting and focusing on the appropriate topics and chapters that will suit their specific pavement design needs. There are four major pavement design categories presented in this manual; new construction/reconstruction, rehabilitation with overlays, rehabilitation without overlays, and intersection designs. Each category contains CDOT's current procedures utilized in the design of flexible and rigid pavements. Also included are relevant and required input data including pavement design information, subgrade and base materials, pavement type selection, life cycle cost analysis, pavement justification report (PJR), and appendices. These chapters are provided to support and document the entire pavement design process. The Introduction Pavement Design Manual Organization Flow Chart depicts a general overview of how this manual is organized.

Importance of Pavement Design

CDOT spends more than 30 percent of its annual construction and maintenance budget on pavements. Therefore, pavements need to be properly designed using an analytical process with accurate design inputs. A pavement design needs to be performed during the early phase of project development. This step ensures that pavement design is used to estimate and establish the project cost rather than the project cost dictating the pavement design.

Training

This manual provides general and detailed information about pavement design processes and procedures applicable to various locations in the State of Colorado. Information on more comprehensive training courses entitled Pavement Design and Life Cycle Cost Analysis and other materials related training classes is available through the CDOT Materials and Geotechnical Branch, Pavement Management and Design Program.

Approved Pavement Design Methods

The AASHTO Mechanistic-Empirical (M-E) design procedure using AASHTOWare Pavement M-E Design software (formerly DARWin-METM) is the recommended method to determine pavement design thickness. The CDOT strongly recommends using the AASHTO Interim Mechanistic Empirical Pavement Design Guide (MEPDG) Manual of Practice along with the latest CDOT Pavement Design Manual.

Coordinating Designs with Other Agencies

Other agencies should contact either the Region Materials Engineer (RME) or the Pavement Design Program Manager (PDMP) concerning CDOT and Region policies relating to pavement issues.

Data Collection

The data collected for new construction and rehabilitation projects are somewhat different. The pavement rehabilitation project will take the largest data collection effort. In many instances, it may be necessary to design for both pavement reconstruction and pavement rehabilitation. The final selection between the two will involve a study of costs, traffic handling, and other related items.

Pavement Justification Report (PJR) and Other Documentation

A PJR is a formal engineering document that presents all analysis, data, and other considerations used to design a pavement. Guidelines for the information that needs to be included in a pavement design report are contained in this manual. For the special cases identified below that do not require a pavement design report, the documentation should include a brief description of the criteria, engineering considerations, and or Region policy used in the decision process. For other reporting requirements, contact the RME for guidance. The PJR shall be sent to the CDOT Region Materials Engineer. A copy of the PJR on all surface treatment projects and all new or reconstruction projects with Hot Mix Asphalt (HMA or Portland Cement Concrete Pavement (PCCP) material costs greater than \$2,000,000 will be sent to the PDPM. Access and local agency project PJR's will not be required to be submitted to the PDPM.

Projects Needing a Pavement Justification Report

HMA overlays less than 2 inches are considered a preventive maintenance treatment, and therefore a PJR may not be required. Nevertheless, considering the significant investment thin overlays represent, these treatments should be considered in an overall pavement preservation program. For design categories not covered above, contact the RME or the PDPM for guidance about recommended design procedures and documentation requirements.

Responsibility, Approval, and Signature Authority

Pavement design and documentation is primarily the responsibility of the engineer of record and must be reviewed and approved by the RME. In the event that the RME position is vacant, the pavement designs shall be forwarded to the CDOT Materials and Geotechnical Branch Manager. For the pavement design work prepared by a consultant, the PJR shall be stamped, signed, and dated by the consultant and shall include his/her Professional Engineer's License number. The development of pavement design in CDOT is done in English units, which is the standard.

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