Introduction

The primary function of *Simplified LRFD Bridge Design* is to serve as a study reference for practicing engineers and students preparing to take the National Council of Examiners for Engineering and Surveying (NCEES) civil and structural exams. As such, this book guides you through the application of the fifth (2010) edition of the *AASHTO LRFD Bridge Design Specifications*, which you must have at your side as you work this book's problems.

Be aware that although AASHTO is incorporated into many major building codes and structural specifications, there may be codes and specifications that differ from, and take priority over, the specifications in AASHTO. In practice you should check with the governing jurisdiction to confirm which codes and specifications must be followed. In addition to AASHTO, you may need to consult other references for more comprehensive explanations of bridge design theory.

This book's first chapter, "LRFD Method of Bridge Design," introduces you to the key steps of LRFD bridge design as they relate to the book's eight design examples and three practice problems. The chapter also includes and describes the use of many key tables and figures from AASHTO. Because this book covers various AASHTO subjects, you may use it to brush up on a few specific subjects, or may study the book in its entirety. Do note, however, that the eight design examples are the most exhaustive in their applications of AASHTO subjects, and that the three practice problems that follow build on concepts and information that have been set out in those first eight examples. You can use this book most effectively by studying the design examples in order. Furthermore, the book's explanations are meant to explain and clarify AASHTO; however, they assume that the reader can refer directly to AASHTO itself when necessary. Among the book's examples are references to AASHTO tables ("A Tbl . . ."), sections ("A Sec . . ."), figures ("A Fig . . ."), and equations ("A Eq . . .").

Throughout the book, example and practice problems illustrate How To Use the *AASHTO LRFD Bridge Design Specifications*, fifth edition (2010). Take your time with these and make sure you understand each example before moving ahead. Keep in mind, though, that in actual design situations there are often several correct solutions to the same problem.

If You Are a Practicing Engineer, Engineering Student, or Instructor

Although this book is primarily intended to aid in exam preparation, it is also a valuable aid to engineers, and can serve as a classroom text for civil engineering seniors and graduate students. For anyone using this book, the design examples serve as a step-by-step, comprehensive guide to bridge design using AASHTO.

If You Are an Examinee

If you are preparing to take the NCEES civil, or structural PE exam, work all of the examples in this book to prepare yourself on the application of the principles presented. By solving the problems in this book you will have a better understanding of the elements of bridge design that could be part of the problems on the exams. By reviewing the solutions, you will learn efficient problem-solving methods that may benefit you in a timed exam.

About the Exams

In April 2011, the new 16-hour structural exam replaced the separate Structural I and II exams. The new exam is a breadth and depth exam offered in two components on successive days. The eight-hour Vertical Forces (Gravity/Other) and Incidental Lateral component is offered only on Friday and focuses on gravity loads and lateral earth pressures. The eight-hour Lateral Forces (Wind/Earthquake) component is offered only on Saturday and focuses on wind and earthquake loads.

Each component of the SE exam has a breadth (morning) and a depth (afternoon) module. Examinees must take the breadth module of each component and one of the two depth modules in each component.

Breadth modules (morning sessions): These modules contain questions covering a comprehensive range of structural engineering topics. All questions are multiple choice.

Depth modules (afternoon sessions): These modules focus more closely on a single area of practice in structural engineering. Examinees must choose either buildings or bridges. Examinees must work the same topic area on both components.

The civil PE exam consists of two sessions, each lasting four hours and consisting of 40 multiple choice questions, but the questions in the morning and afternoon sessions are of about equal difficulty. The morning (breadth) session of the exam may contain general bridge design–related problems. The structural afternoon (depth) session of the exam may include more in-depth bridge design–related problems. The problems in each session typically require an average of six minutes to work

Although the format of the design examples presented in this book differs from those six-minute problems for the civil and structural PE exams, as you work the problems in this book in preparation for either the civil or structural exam, you will find all of the topics covered here also covered on the structural PE exam in some form or another. Using this book will help you gain a broader knowledge base and understanding of the many bridge design subjects covered on exams.