



# Structural Engineering Solved Problems, 6th Ed

By C. Dale Buckner PhD PE SECB

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**Structural Engineering Solved Problems, 6th Ed** By C. Dale Buckner PhD PE SECB

*Structural Engineering Solved Problems* contains 100 practice problems representing a broad range of topics on the Structural Engineering (SE) and Civil PE exams. Each problem provides an opportunity to apply your knowledge of structural engineering concepts. The breadth of topics covered and the varied complexities of the problems allow you to assess and strengthen your problem-solving skills. Problems in both qualitative and quantitative formats are included, and solutions use the same codes and standards adopted for the exam. Step-by-step solutions are used to solve numerical problems, and detailed explanations are given for qualitative problems.

*Structural Engineering Solved Problems* will help you to

- familiarize yourself with the exam topics
- connect relevant structural engineering theories to challenging problems
- navigate through exam-adopted codes and standards
- identify accurate and efficient problem-solving approaches

## Topics Covered

- Foundations and Retaining Structures
- Masonry Design
- Seismic Design
- Structural Analysis
- Structural Concrete Design
- Structural Steel Design
- Timber Design

## Codes and Standards Used in This Book

*AASHTO LRFD Bridge Design Specifications* (AASHTO)

*Building Code Requirements and Specification for Masonry Structures* (ACI 530/530.1)

*Building Code Requirements for Structural Concrete* (ACI 318)

*International Building Code* (IBC)

*Minimum Design Loads for Buildings and Other Structures* (ASCE/SEI7)

*National Design Specification for Wood Construction ASD/LRFD (NDS)*  
*PCI Design Handbook: Precast and Prestressed Concrete (PCI)*  
*Seismic Design Manual (AISC 325)*  
*Special Design Provisions for Wind and Seismic with Commentary (SDPWS)*  
*Steel Construction Manual (AISC 327)*  
*North American Specification for the Design of Cold-Formed Steel Structural Members (AISI)*

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## **Editorial Review**

### **About the Author**

C. Dale Buckner, PhD, PE, SECB, is a registered professional civil engineer in Virginia. Dr. Buckner is a consulting structural engineer and professor emeritus in the Department of Civil and Environmental Engineering at the Virginia Military Institute. He holds bachelor of science, master of science, and doctorate degrees in civil engineering from North Carolina State University. He has authored several SE and Civil PE exam review books, and has spent more than 15 years preparing examinees for the PE and SE exams.

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## **Introduction**

### **HOW TO USE THIS BOOK**

*Structural Engineering Solved Problems* is intended to be used as part of your exam review for the civil structural PE depth exam and the 16-hour structural SE exam, both prepared by the National Council of Examiners for Engineering and Surveying (NCEES). As such, it provides a comprehensive set of 100 solved problems, which are categorized into chapters that encompass the broad categories found on these exams. These categories are structural analysis, structural concrete design, structural steel design, seismic design, foundations and retaining structures, timber design, and masonry design.

The chapters may be worked in any order, but it is recommended that you work only one chapter at a time. Problems should be worked sequentially, as they are arranged in order of increasing complexity. As a rough guide, the first quarter of a chapter consists of two types of problems. The first type includes qualitative problems that require specific short answers rather than calculations or sketches. These problems cover a broad range of topics and may be used to prepare for the multiple-choice problems of the civil PE and structural SE exams. The second type includes basic quantitative problems that will require 30 to 45 minutes to solve. The middle half of the chapter consists of more difficult quantitative problems that will require 1 hour to solve. The last quarter of a chapter consists of in-depth quantitative problems that will require 1.5 to 2 hours to solve. These latter problems are similar in scope to those found on the depth sections of the structural SE exam.

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