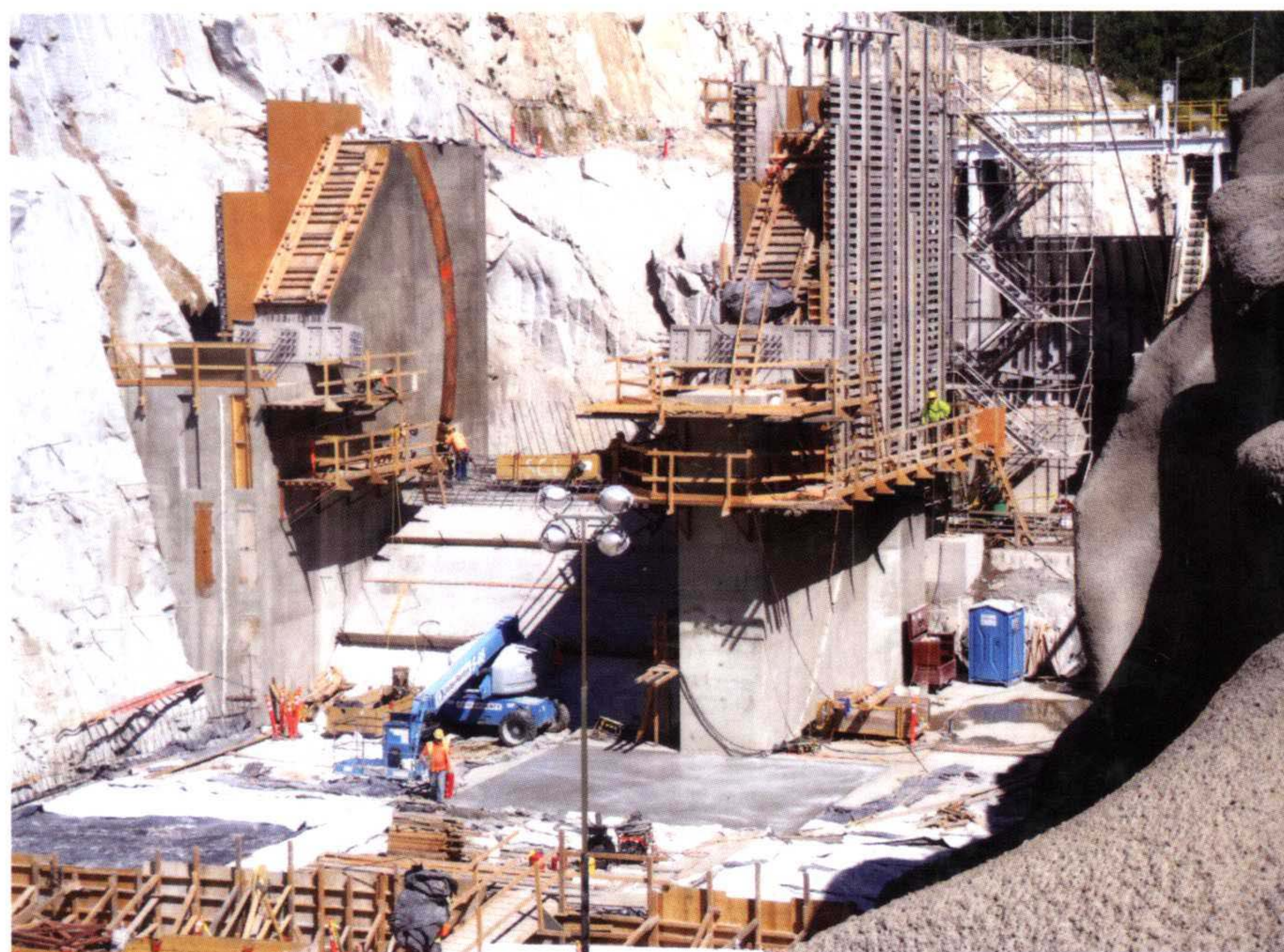


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TEMPORARY STRUCTURE DESIGN



Chris Souder

WILEY

WHEN SAFETY IS PARAMOUNT, PROPER DESIGN BECOMES CRITICAL

As the first design-oriented guide to temporary construction structures, this book gives construction professionals and students alike a deeper understanding of the intricacies involved in scaffolding, formwork, shoring, and more. The safety of every worker on site depends upon the stability of these structures, which often must support tons of steel or concrete—and the most tragic failures are usually the result of improper design, construction, or maintenance.

This detailed guide covers all aspects of temporary structure design, from loads, materials, equipment, procedures, and support types, to help ensure that these critical structures are safe and effective.

- **Review the basics of statics, measurement, and center of gravity**
- **Review the strengths of common temporary structures materials and their allowable stresses**
- **Design shoring, formwork, falsework, scaffold, bracing, and other support systems safely**
- **Understand support system options, costs, and where each is applied**

When safety is at issue, there is no room for error. This book provides the information students and professionals need to make every structure sound and error-free.

CHRIS SOUDER is an Associate Professor of Construction Management at the California State University in Chico, CA, focusing on Temporary Structures and Scheduling and Project Controls. He is a sixteen-year veteran of construction management in the heavy civil industry with Kiewit, taking various leading roles in high revenue projects.

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CHRIS SOUDER

WILEY

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TEMPORARY STRUCTURE DESIGN

I would like to dedicate this book to Stuart (Bart) Bartholomew.

I only knew Bart for 14 years, but in this short time he had more influence on me than most. Not only did Bart design the temporary structure class that this book was designed for, he was instrumental in my decision to change to the teaching profession. Countless breakfast and lunch meetings had me listening in amazement to the years of construction, teaching, and consulting experiences. Bart, you are a model of integrity, honesty, and ethical behavior.

ABOUT THE AUTHOR

Chris Souder graduated with an undergraduate degree in construction management in 1988 before going to work for Kiewit Pacific Co. in northern California. Chris had a successful 16-year career with Kiewit and was involved with many projects in the heavy civil arena. Chris held positions from field engineer to project manager to lead estimator. Some of the projects Chris was involved with were the Woodland WWTP expansion in Woodland, California, Highway 85 Bridge construction for CalTrans in San Jose, California, WWTP Expansion and new facilities for the City of Roseville at its Booth Rd. and Pleasant Grove Plants, Highway 101 Retrofit work for CalTrans in San Francisco, California, new Highway 880 construction of bridge structures for CalTrans in Oakland, California, following the 1989 Loma Prieta earthquake, Water storage facilities for the City of Sacramento, new bridge and 2 miles of road construction including a pump station in Oroville, California, an expansion of the Sacramento River WTP facility for the City of Sacramento, and various estimating assignments for both heavy highway and water treatment facilities throughout northern California. These projects as a whole had total revenues in excess of \$420 million.

Chris then pursued an Interdisciplinary Master's degree in construction planning at California State University, Chico, while teaching full time in the construction management program. Today, Chris teaches temporary structures and scheduling and project controls to fourth-year students at Chico State while maintaining a continuous portfolio of consulting projects and industry trainings ranging from cost estimating, temporary structures design, and scheduling services. While teaching, Chris received the terminal degree in construction management by completing his M.S. in construction planning at Chico State. This education, combined with 16 years of heavy civil industry experience makes Chris a most effective type of professor in the construction management discipline.

PREFACE

Temporary structure design is not taken lightly by the owner, engineer, or contractor. It has and should always be a practice that is performed by a licensed engineer in its specific discipline. However, the construction manager should be versed in the design procedures to a point where he can request a particular design or review a concept or submittal with the ability to understand the basic components of the design.

In 1989, the fourth edition of *Simplified Mechanics and Strength of Materials* was written. This book is an example of the present book's goal. I was inspired by the simplicity that Parker and Ambrose displayed in their text. I truly believe that this subject can be well understood by the construction manager without the ultimate goal of becoming a licensed engineer. However, if that is the goal of the student, this text will prepare you to take the next step in engineering pursuing your goal to be licensed.

There is a need for this topic in a construction management (CM) degree, both undergraduate and graduate, civil engineering (CE), both undergraduate and graduate, or in industry that is simplified enough that the student, intern, or engineer can simply follow the major concepts without sacrificing key engineering principles. Different universities approach the temporary structures topic in several ways. Some, like Chico State, make it the culminating experience following statics and mechanics. This text will compliment a similar program. Others teach a "structure" class that gives the students a basic understanding of how structures are designed. The latter focuses more on permanent design. Many civil engineering students graduate and go on to work for state agencies or heavy civil contractors. Both of these careers rely heavily on the design of temporary structures. With the state agency, one will be reviewing and inspecting temporary structures. With the contractor, one will be involved with helping design and building temporary structures. These two paths are very rewarding for a CM or CE undergraduate or graduate student.

I also wanted students of temporary structures to be able to comprehend the more complicated analysis that come with more difficult loading conditions without the need for a complete understanding or need for indeterminate structure analysis. I want the student to be aware of the available software on the market today that can simplify even the most complicated loading condition.

I also thought it was important that the student or engineer of this subject be able to understand and perform simple cost estimates of the designs that are explained in each chapter. Most chapters have brief explanations of cost analyses so the educated decisions can be made during the design phase.

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