FOUNDATIONS AND EARTH RETAINING STRUCTURES

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PREFACE

OBJECTIVES

There are three primary objectives for this textbook: first, to present basic concepts and fundamental principles that are necessary to understand the background of the methods employed in foundation design; second, to inform students on the values and limitations of popular methods of analysis in foundation engineering; and third, to provide a framework for students to carry out simple foundation design and appreciate the design process.

BACKGROUND

Foundation engineering is becoming more challenging as the transportation, housing, industrial, environmental, and commercial needs of the population increase and solid ground is becoming scarcer. Foundation engineers have to deal with these challenges through

1. Better understanding of the fundamentals
2. Utilization of modern technology such as remote sensing, geographic information systems, novel in-situ testing equipment, and numerical simulation
3. Better appreciation of the social, economic, and environmental context of foundation engineering
4. Accumulation of experience

There is a trend toward more usage of computer software in engineering practice because of advancement in computer technologies, ready availability of this software, and its applications to a wide range of problems. Computer software can increase efficiency, save resources, and allow designers to analyze increasingly complex foundation systems. Constitutive models are at the heart of computer software used for numerical analysis. These models are the domain of experts. However, a growing number of novices (young and inexperienced engineers) are using these models for daily work without understanding the fundamental bases for them or proper applications to the problem or system that is intended to be modeled. This is an undesirable situation because foundation engineering works impact lives, properties, and the environment. Improper use of these models could lead to disastrous outcomes. This textbook provides students with the basic background information to better understand foundation analysis and to assist them in interpreting the results for design.

AUDIENCE

This textbook is written primarily for an undergraduate course in foundation analysis and design. It should also appeal to graduate students and practicing engineers. The coverage of topics in this textbook does not follow any particular curriculum because different institutions have different educational missions and the student body normally comprises students with different abilities. Instructors can

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