



# Soil Mechanics Fundamentals and Applications, Second Edition

By Isao Ishibashi, Hemanta Hazarika

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**Soil Mechanics Fundamentals and Applications, Second Edition** By Isao Ishibashi, Hemanta Hazarika

## *How Does Soil Behave and Why Does It Behave That Way?*

**Soil Mechanics Fundamentals and Applications, Second Edition** effectively explores the nature of soil, explains the principles of soil mechanics, and examines soil as an engineering material. This latest edition includes all the fundamental concepts of soil mechanics, as well as an introduction to foundation engineering, including coverage of site exploration, shallow and deep foundation design, and slope stability. It presents the material in a systematic, step-by-step manner, and contains numerous problems, examples, and solutions.

### **New to the Second Edition:**

The revised text expands the contents to include an introductory foundation engineering section to make the book cover the full range of geotechnical engineering. The book includes three new chapters: Site Exploration, Deep Foundations, and Slope Stability.

This text:

- Provides an introductory chapter on soil mechanics
- Explores the origin and description of soils and discusses soil shapes and gradations
- Presents the unique characteristics of clays
- Details soil classifications by the Unified Soil Classification System (also ASTM) and by the American Association of State Highway and Transportation Officials (AASHTO)
- Highlights laboratory and field compaction techniques, including field specification and density testing, and the CBR (California Bearing Ratio) method
- Discusses the flow of water through soils, defining hydraulic heads, as well as

the two-dimensional flow net technique and a systematic approach to compute boundary water pressures

- Examines the concept of effective stress and its applications to various soil mechanics problems
- Explores stress increments in a soil mass due to various types of footing load on the ground
- Presents Terzaghi's one-dimensional consolidation theory and its applications
- Covers Mohr's circle from geotechnical perspectives with use of the pole, which is utilized in chapters relating to shear strength and lateral earth pressure
- Addresses the shear strength of soils, failure criteria, and laboratory as well as field shear strength determination techniques
- Evaluates at-rest earth pressure and the classic Rankine and Coulomb active and passive pressure theories and present critical review of those methods
- Reviews introductory foundation engineering and site exploration
- Describes the bearing capacity theory and, as an application, the shallow foundation design procedure
- Covers deep and shallow foundation design procedures
- Explains slope stability problems and remediation procedures, and more

Soil Mechanics Fundamentals and Applications, Second Edition is a concise and thorough text that explains soil's fundamental behavior and its applications to foundation designs and slope stability problems and incorporates basic engineering science knowledge with engineering practices and practical applications.

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## **Editorial Review**

### Review

"Overall, this book is written in an easy-to-read style suitable for undergraduate engineering students. Chapter 1 is an excellent example of that style. In just a few pages, Chapter 1 provides the reader with an appreciation for geotechnical engineering and its evolution. It succinctly makes the point that soils are different from other civil engineering materials, and thus gives students a reason and purpose for studying the behavior of soils in a stand-alone course. In particular, the case histories in Section 1.5 stand out; students are immediately confronted with some of the unique challenges in geotechnical practice. ... For me, the material in Chapter 2 that stands out is related to phase diagrams; the presentation of phase diagrams is ideal for students. How one can use the phase diagram to determine fundamental physical properties is illustrated well. It emphasizes the *process* of 'filling in' the phase diagram to find phase weights and volumes, rather than having students sort through a plethora of pre-derived expressions to find one that works for a specific problem. This process is important because it helps reinforce the fundamental weight-volume relationships for soils, which can be used again and again throughout the course as students learn more advanced concepts."

?Charles E. Pierce, Ph.D, The University of South Carolina, Columbia, USA

"In summary, the level of explanation is much richer than most undergrad level books in use and ... Many soil mechanics text book authors do not know where to draw the line between mechanics and engineering and they load up the texts with too many foundation related information"

?Hirroshan Hettiarahchi, United Nations University

"This is a good soil mechanics book. It is written very concisely and straightforwardly, in a way students can teach themselves. It covers most of the common topics in the areas of Soil Mechanics and Geotechnical Engineering practice. It is a good textbook for a Civil Engineering Program where students only take one course in geotechnical engineering."

?Jay X. Wang, Louisiana Tech University

### About the Author

**Dr. Isao Ishibashi**, P.E., is a professor in the Department of Civil and Environmental Engineering, Old Dominion University, Norfolk, Virginia. He obtained bachelors and master's degrees from Nagoya University, Japan. After earning his PhD from the University of Washington, Seattle, he taught and was on the research faculty at the University of Washington and Cornell University before moving to Old Dominion University in 1986. His research includes soil liquefaction, dynamic soil properties, static and dynamic earth pressures, seismic water pressure, granular mechanics, slope stability, and used-tire application to embankment. He has authored or co-authored more than 100 published technical papers.

Dr. Hemanta Hazarika is a professor in the Department of Civil Engineering, Kyushu University, Fukuoka, Japan. He obtained his bachelor of technology degree in civil engineering from the Indian Institute of Technology (IIT), Madras, India, and his PhD in geotechnical engineering from Nagoya University, Japan. He also worked as a practicing engineer in industry as well as a researcher in the public sector research

institute of Japan. Professor Hazarika has more than 130 technical publications in reputed international journals, proceedings of international conferences, and symposia, including contributed chapters in several books. He is also the editor of two books in his research fields.

## **Users Review**

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#### **Gabriel Reed:**

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