

# Foundation Systems for High-Rise Structures



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# Foundation Systems for High-Rise Structures

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## Preface

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Various urban areas in the world are experiencing scarcity of land, and the spatial expansion of buildings and structures is becoming increasingly problematic. High-rise structures are the only solution to this problem. The design, construction, and performance of such high-rise structures mostly depend on the stability of the foundation systems. High-rise structures, such as the Burj Khalifa building in Dubai or the proposed Kingdom Tower in Jeddah, depend upon the performance of their foundation systems. This book is the first to assemble the latest research on the analysis, design, and construction of such foundation systems for high-rise structures.

Based on the authors' own scientific research and extensive experience, and those of researchers from engineering practices, *Foundation Systems for High-Rise Structures* presents the theoretical basics of the analysis and design of all types of foundation systems and explains their application in completed construction projects.

This book deals with the geotechnical analysis and design of all types of foundation systems for high-rise buildings and other complex structures with a distinctive soil–structure interaction. The basics of the analysis of stability and serviceability, necessary soil investigations, important technical regulations, and quality and safety assurance are explained, and possibilities for optimized foundation systems are given. Additionally, special aspects of foundation systems, such as geothermally activated foundation systems and the reuse of existing foundations, are described and illustrated. To complete this book, a comprehensive chapter on the analysis and design of foundation systems and the dynamic behavior of foundation systems for high-rise structures has also been included.

At the end of each chapter, the reader finds an overview of the references used, which is helpful for finding additional information in high-quality literature. To understand the boundary conditions for analysis and design of foundation systems, the standards and regulations are named as well. Due to the complexity of the analysis, design, and construction of the combined pile-raft foundation (CPRF), international guidelines on CPRFs by the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE) are also included in the Appendix.

The authors thank Mr. Ashutosh Kumar of IIT Bombay for helping to assemble the contents of the chapter about the dynamic behavior of foundation systems. The authors also thank CRC Press/Taylor & Francis Group for publishing this book for professionals in engineering practice and for students and faculty members who will be working in the future in this special field of application.

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systems, slope stability, and underground constructions, including tunnels for metro systems and high-speed railway lines.

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