

Preface

The main goal of this introductory text is to demonstrate how basic concepts in Soil Mechanics can be used as a “forensic” tool in the investigation of geotechnical failures. This, in turn, provides a good opportunity to show how to use available procedures in the formulation of useful simple models. Geotechnical failure is understood here in a broad sense as the failure of a structure to function properly due to a geotechnical reason.

Some of the geotechnical failures selected are well known for their impact on the geotechnical community. Others are closer to the author’s experience. They have been organized into three main topics: Settlement, Bearing Capacity and Excavations. They cover a significant proportion of every day’s activity of professional geotechnical engineers. No attempt has been made to create a comprehensive handbook of failures. Instead, the emphasis has been given to creative applications of simple mechanical concepts and well known principles and solutions of Soil Mechanics. The book shows how much can be learned from relatively simple approaches. Despite this emphasis on simplicity, the book provides a deep insight into the cases analyzed. A non-negligible number of new analytical closed-form solutions have also been found. Their derivation can be followed in detail.

In all the cases described an effort was made to provide a detailed and step by step description of the hypothesis introduced and of the analysis performed. Each of the eight chapters of the book addresses a certain type of failure, illustrated by a case history. The chapters have a common structure which is essentially the following:

1. Case description
2. Relevant theory
3. Mechanical analysis
4. Mitigation measures
5. Lessons learned

The chapters are self-contained. They provide a review of Soil Mechanics principles and methods required to understand and explain the failure described. In some cases the analysis offered provides a non-conventional application of basic principles.

An often asked question regarding failures is how to avoid them. This is of great practical interest and a section of each chapter is dedicated to provide a few solutions. The chapters are completed with a summary of lessons learned from the failure and its analysis. Some chapters also include a short account on advanced topics to help the interested readers to go beyond the approaches used in the book.

Readers are expected to be familiar with the basic concepts of Soil Mechanics and Foundation Engineering. The target audience is undergraduate and graduate students, faculty and practicing professionals in the fields of Civil and Geotechnical Engineering.

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