The stability of slopes

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The stability of slopes. By E. N. Bromhead. Surrey University Press, The Blackie Publishing Group, Glasgow, United Kingdom; Chapman and Hall, New York, NY, U.S.A. 1986. 373 p. £40.00, $140.00 Cdn. (approx.)

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The stability of slopes presents the present state-of-knowledge on the behavior of natural slopes and, to a lesser extent, man-made slopes. The various forms of slopes instability, including the evolution of natural slopes, are presented. While some mention is made of rock slopes, the emphasis is primarily on natural soil slopes.

The book covers a broad spectrum of subjects related to slope instability and is directed primarily to practicing geotechnical engineers. It is also of interest to disciplines such as engineering geology, hydrology, and geomorphology.

The titles of the chapters summarize the wide range of topics that must be understood when dealing with slope stability problems. Chapter 1 entitled, "An introduction to slope stability," classifies the types of mass movements commonly encountered in nature. These range from falls, to slides, to flows. Technical terms are defined as well as being illustrated using line drawings and photographs. The illustrations and examples are numerous; however, they primarily reflect British experience and practice.

Chapter 2, "Natural slopes," is an extension of chap. 1, presenting the present-day morphology of interest from an engineering standpoint. The authors must obviously limit the detail and information that can be presented but the subject is well covered from an engineering standpoint.

Chapter 3, "Fundamental properties of soil and rocks," presents the fundamental behavioral properties of soils and rocks. Concepts and principles of direct interest to slope stability problems are highlighted. Information on progressive failure, residual shear strength, high-sensitivity soils, and discontinuities in soils and rocks is presented. The effective shear strength equation is presented with little further comment on the strength of soils. The reviewer would have appreciated a more thorough coverage of this subject. An alternate form to the effective shear strength equation (i.e., eq. [3.4]) is presented with little mention of how it is to be used.

Information to assist the practicing geotechnical engineer in the selection of shear strength parameters would have been useful. At the same time, the reviewer recognizes that this is a difficult task to perform on a global scale.

Chapter 4 is entitled "Measurement of shear strength." The authors have been brief in their coverage of the measurement of shear strength. They discuss the use of the direct shear box and the ring shear test, along with a discussion of residual strength. There is essentially no mention of triaxial testing or the testing of soft and sensitive soils.

Chapter 5, "Principles of stabilization analysis," presents several commonly used methods to compute the factor of safety. The final form of the factor of safety equation is presented for Bishop's, Spencer's, Janbu's, Morgenstern-Price's, Maksumnic's, and Sarma's methods. Throughout the book, the terms Bishop's method and Janbu's methods are used to refer to what is more commonly referred to as Bishop's simplified method and Janbu's simplified method. In each case, the final factor of safety equations are presented with limited derivation detail. The details on the Maksumnic and Sarma methods are particularly useful to have summarized in the textbook. At the same time, the reviewer feels it would have been useful to have reference to other recent theoretical research at the international level.

Chapter 6 is entitled "Techniques used in stability analysis," and provides a smooth transition from chap. 5. Typical topics covered include the search for the most critical slip surface, tension cracks, partial submergence, and seismic forces. There is an extensive section on the use of stability charts. Stability charts are included in the book and this is of value to the practicing engineer. The assumptions associated with each of the graphs are clearly presented.

The cover of the text contains the statement, "Computer programs to facilitate analysis and design are included where appropriate." These programs are found in chap. 6 and consist of two programs: one for Bishop's method and one for Janbu's methods. Each has less than 150 executable statements and is of value in considering problems with simplistic geometrics.

Chapter 7 is entitled "Water pressures in slopes." The first part of the chapter deals with steady state seepage and primarily uses the example of an earth dam. There is some discussion on the use of the finite element method as it pertains to saturated-only flow. There is also a section on the rapid drawdown of a reservoir. An attempt is made in this chapter to show the transition between a seepage analysis and the preparation of the information for a slope stability analysis. For example, the conversion of a flownet into pore-pressure coefficient isolines is shown. Probably, other forms such as pressure isolines would have been useful. The present availability of slope stability computer software makes the use of more elaborate data handling systems attractive.

Chapter 8 is entitled "Remedial and corrective measures for slope stabilization." This chapter is 48 p. long and contains descriptions of numerous techniques and procedures for slope stabilization. The explanation of the neutral line theory provides a good basis for examining potential remedial and corrective measures. The methods range from the use of rock and soil anchors to various drainage systems. Design charts are provided for trench drains. There is also a section on the use of geogrids. This chapter is particularly useful to the practicing geotechnical engineer.

Chapter 9 is entitled "Investigation of landslides" and contains information on how best to isolate the zone of movement and measure pore-water pressures.

Chapter 10 is entitled "Case history." A series of well-known landslides are discussed in considerable detail. A few of the examples are Aberfan, Carsington Dam, Vaiont Dam, Seven-

oaks, Panama Canal, and Folkstone Warren. Each of the case histories forms an extremely useful synthesis of the published research.

The final chapter (i.e., chap. 11) is entitled "Design recommendations for man-made slopes." There is a valuable discussion on the choice of the factor of safety for various design works. The final section of this chapter discusses the checking and validation of computer analysis. This section is brief but communicates some useful philosophical comments relative to the use of computer programs.

The reviewer strongly endorses the acquisition of this book for one's library. The authors have written with authority from a thorough knowledge of the subject matter. The book has a coherent presentation, with smooth transitions from one subject to another. Many readers may find that they would have liked more-complete derivations of equations and some examples to illustrate analytical aspects. This book has assumed that the basic theories are already understood by the reader.

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Underpinning

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Underpinning. By Sam Thorburn and Jack Hutchison. Surrey University Press, The Blackie Publishing Group, Glasgow, United Kingdom. 295 p. $65.00 Cdn. (approx.).

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This book presents a series of contrasting and varied techniques, of underpinning systems, with examples. Each chapter presents a particular technique including sufficient basic information for the reader to understand the principles involved.

The contents of this book include discussion of the following: the philosophy of underpinning, simple methods of excavation, coventional piles in underpinning, pali radice' and reticulated pali radice,' micropiling, the Pynford underpinning method, ground freezing, underpinning by chemical grouting, and soil improvement by chemical grouting.

The natural deterioration in the condition of old buildings in Great Britain as well as the rest of Europe, along with the necessity of incorporating old and new foundations in rehabilitation projects, prompted the penning of this book. As well, attention has recently been focused on the art and practices of underpinning.

The authors are both experienced civil engineers in Great Britain. Mr. Thorburn has spent many years in the design and construction of heavy civil engineering works, and is particularly concerned with geotechnical and foundation engineering. Mr. Hutchinson, being a contractor as well as an engineer, has logged a considerable amount of experience in actual fieldwork involving the use of a number of underpinning methods.

This writing can act as a guide to practising geotechnical and foundation engineers, civil and structural engineers, and contractors, and will provide interesting reference material for students and researchers.

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Construction of and on compacted fills

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Construction of and on compacted fills. By Edward J. Monahan. John Wiley & Sons, New York, NY, U.S.A. 1986. 200 p. $37.95

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This book is part of the Wiley Series of practical construction guides, written primarily to be helpful to the construction contractor and other nonspecialists involved in earthworks construction. The author has focused on describing first-hand experiences to illustrate principles of soil compaction, mostly for the benefit of nonspecialists and "aspiring young and inexperienced geotechnicians."

The rationale for the book is the frequent damage caused by the construction of defective earthworks structures. The author attributes this to the points that earthfill operations are frequently considered relatively straightforward and thus do not require the attention (and expense) of specialists, and that soil compaction and compaction control are neglected topics in many undergraduate and technology courses in civil engineering.

The book departs from conventional format. The historical