Slope Stability And Stabilization Methods

Great strides have been made in the art of foundation design during the last two decades. In situ testing, site improvement techniques, the use of geogrids in the design of retaining walls, modified ACI codes, and ground deformation modeling using finite elements are but a few of the developments that have significantly advanced foundation engineering in recent years. What has been lacking, however, is a comprehensive reference for foundation engineers that incorporates these state-of-the-art concepts and techniques. The Foundation Engineering Handbook fills that void. It presents both classical and state-of-the-art design and analysis techniques for earthen structures, and covers basic soil mechanics and soil and groundwater modeling concepts along with the latest research results. It addresses isolated and shallow footings, retaining structures, and modern methods of pile construction monitoring, as well as stability analysis and ground improvement methods. The handbook also covers reliability-based design and LRFD (Load Resistance Factor Design)-concepts not addressed in most foundation engineering texts. Easy-to-follow numerical design examples illustrate each technique. Along with its unique, comprehensive coverage, the clear, concise discussions and logical organization of The Foundation Engineering Handbook make it the one quick reference every practitioner and student in the field needs.

Engineering geologists face the task of addressing geological factors that can affect planning with little time and with few resources. A solution is using the right tools to save time searching for answers and devote attention to making critical engineering decisions. The Handbook of Research on Trends and Digital Advances in Engineering Geology is an essential reference source for the latest research on new trends, technology, and computational methods that can model engineering phenomena automatically. Featuring exhaustive coverage on a broad range of topics and perspectives such as acoustic energy, landslide mapping, and natural hazards, this publication is ideally designed for academic scientists, industry and applied researchers, and policy and decision makers seeking current research on new tools to aid in timely decision-making of critical engineering situations.

The first comprehensive, practical guide to the selection,construction, and installation of soil bioengineering andbiotechnical slope protection Here is the ultimate guide to physically attractive,environmentally compatible, and cost-effective methods ofprotecting slopes from erosion and mass wasting. Lavishlyillustrated with more than 150 photographs and supplemented withscores of charts and tables, this book covers the entire subjectfrom general principles and background on the nature of soilerosion and mass movement to detailed information on rootstrengths, treatment selection, unit costs, critical tractivestresses, methods for harvesting and handling live cuttings, andmore. Four illustrated case studies, each addressing a different set ofproblems and solutions, demonstrate both the application ofparticular technologies and the site investigation, planning,scheduling, and organization required to complete these projectssuccessfully. This unique reference handbook * Reviews the horticultural and engineering underpinnings forbiotechnical and soil engineering treatments * Documents and explains the role of woody plants in

stabilizingslopes against both surficial erosion and mass movement * Provides details on a broad range of soil bioengineering methods,including live staking, live fascines, brushlayering, live cribwalls, branchpacking, and live slope gratings * Describes various biotechnical methods and materials, includingthe incorporation of vegetation in erosion control blankets,flexible mats, cellular revetments (geocells), rock armor (riprap), and gabion and open-front crib walls * Summarizes the findings of the National ScienceFoundation-sponsored workshop to assess the state of the art anddetermine research needs For practicing professionals, researchers, and students ingeotechnical engineering, geology, soil science, forestry andforest engineering, landscape architecture, environmentalhorticulture, and restoration ecology, this book offers thorough,up-to-date coverage that is not available from any other singlesource.

Deals with the methods of assessing the stability of rock slopes and the techniques of improving the stability conditions of natural and artificial slopes which are at risk. It also describes survey and measurement methods to model the behaviour of rock masses.

Landslides and debris flows belong to the most dangerous natural hazards in many parts of the world. Despite intensive research, these events continue to result in human suffering, property losses, and environmental degradation every year. Better understanding of the mechanisms and processes of landslides and debris flows will help make reliable predictions, develop mitigation strategies and reduce vulnerability of infrastructure. This book presents contributions to the workshop on Recent Developments in the Analysis, Monitoring and Forecast of Landslides and Debris Flow, in Vienna, Austria, September 9, 2013. The contributions cover a broad spectrum of topics from material behavior, physical modelling over numerical simulation to applications and case studies. The workshop is a joint event of three research projects funded by the European Commission within the 7th Framework Program: MUMOLADE (Multiscale modelling of landslides and debris flows, www.mumolade.com), REVENUES (Numerical Analysis of Slopes with Vegetations, http://www.revenues-eu.com) and HYDRODRIL (Integrated Risk Assessment of Hydrologically-Driven Landslides, www.boku.ac.at/igt/).

Slope stability is always a very important topic in many developed and highly congested cities, particularly for many cities in China where slope failures have killed many people with significant loss of properties. The author has also participated in different types of slope stability research and consultancy works in different countries, and has published two books entitled Soil Slope stability analysis and stabilization new methods and insights and Frontier in civil engineering, vol.1, Stability analysis of geotechnical structures which are well favoured by many students, engineers and researchers. The author also frequently receives email about the details of the more innovative slope stability analysis methods, stabilization and monitoring system, as well as the procedures in the numerical implementation of some of the stability analysis methods. In views of the various improvements in the theory of slope stability analysis over the years, the author would like to write a new book on slope stability analysis and slope reliability analysis, and the new materials will be useful to both students, engineers as well as researchers. In this book, different methods of slope stability analysis will be discussed in a broad sense. Following that, the limit equilibrium and finite element methods will be discussed in more details, as these two methods are the methods commonly used for practical works. Detailed procedures for limit

equilibrium analysis will be provided to aid the students in learning, while the program SLOPE2000 will be introduced for the solution of more complicated problems. Some interesting engineering cases will be illustrated in this book. The author will also try to introduce the use of distinct element slope stability method, which is a technique still far from practical applications, but it does offer some insights which are not possible with the other methods. Following that, the author will introduce the importance of reliability slope stability analysis, which is an important issue for cities with complicated ground conditions and high water table. Due to the intensive computation required for reliability analysis, the author has proposed many improvements to various reliability assessment methods in order to maintain a balance between accuracy and time of computation. The central core of SLOPE 2000 and SLOPE 3D for two-dimensional and three-dimensional slope stability analysis as introduced in this book are developed mainly by the author, while there are many research personnel who have helped in various works associated with the research works. The authors would like to thank Yip C.J., Wei W.B., Li N., Li L. Li D.Z. and Liu L.L. for the helps in preparing parts of the works and the preparation of some of the figures in this book.

A number of methods currently exist for the analysis and design of slopes. This book provides a critical review of these and offers several more appropriate approaches for overcoming numerical convergence and the location of critical failure surfaces in two-dimensional and three-dimensional cases. New concepts in three-dimensional stability analysis, finite element analysis and the extension of slope stability problems to lateral earth pressure problems are also addressed. It gives helpful practical advice and design resources in the form of recommendations for good analysis and design practice, design charts and tables for the engineer. Limitations are detailed of both limit equilibrium and the finite element method in the assessment of the stability of a slope, and guidance is provided for assessing the fundamental assumptions and limitations of stability analysis methods and computer modelling. The book provides ample examples to illustrate how this range of problems should be dealt with. The final chapter touches on design and its implementation on site. The emphasis is on the transfer of the design to its physical implementation on site in a holistic way, taking full account of the latest developments in construction technology. Engineering and construction problems tend to be pigeonholed into different classes of problem such as slope stability, bearing capacity and earth pressure behind retaining structures. This is quite unnecessary. This book offers a unified approach, which is conceptually, practically and philosophically more satisfying.

This new addition to the 'Short Course' series combines both soil and rock slope engineering - in effect, two short courses - in one concise volume. Like its acclaimed companion volume A Short Course in Foundation Engineering, this book focuses on the essentials, explaining simple methods of stability analysis and applying them to a wide range of practical applications. This invaluable resource provides with you: - A full explanation of the fundamentals of soil mechanics and rock mechanics involved in the understanding of slope engineering - An outline of the methods used in carrying out slope stability analysis 'by hand' to enable the checking of computer outputs - A brief introduction to software applications for slope stability analysis and where to find them - A review of the principles of investigation and stabilisation of slope failures A Short Course in Soil and Rock Slope Engineering is

an indispensable manual for practising civil engineering and engineering geologists. It is also a valuable resource for students because particular emphasis is put on explaning the basic soil and rock mechanics involved in understanding and designing soil and rock slopes. Included with this book is a CD of the software package 'SLOPE/W Student Edition' by GEO-SLOPE International Ltd.

"Physical Geology is a comprehensive introductory text on the physical aspects of geology, including rocks and minerals, plate tectonics, earthquakes, volcanoes, glaciation, groundwater, streams, coasts, mass wasting, climate change, planetary geology and much more. It has a strong emphasis on examples from western Canada, especially British Columbia, and also includes a chapter devoted to the geological history of western Canada. The book is a collaboration of faculty from Earth Science departments at Universities and Colleges across British Columbia and elsewhere"--BCcampus website.

This collection of papers covers a wide range of relevant issues and aspects of slope stability engineering from both practical and scientific points of view from the Proceedings of the International Symposium on Slope Stability Engineering : Is--Shikoku'99 : Matsuyama, Shikoku, Japan, 8-11 November, 1999.

This book aims to assist in choosing ecotechnological solutions for slopes that are prone to a variety of mass movements e.g. shallow failure or erosion. The book reviews the types of problematic slopes that may occur and describes briefly the nature of mass movements and the causes of these movements. There is focus on the use of vegetation to stabilize soil on slopes prone to mass movements. The book also introduces new ecotechnological methods, and case studies are discussed.

A major revision of the comprehensive text/reference Written by world-leading geotechnical engineers who share almost 100 years of combined experience, Slope Stability and Stabilization, Second Edition assembles the background information, theory, analytical methods, design and construction approaches, and practical examples necessary to carry out a complete slope stability project. Retaining the best features of the previous edition, this new book has been completely updated to address the latest trends and methodology in the field. Features include: All-new chapters on shallow failures and stability of landfill slopes New material on probabilistic stability analysis, cost analysis of stabilization alternatives, and state-of-the-art techniques in time-domain reflectometry to help engineers plan and model new designs Tested and FHA-approved procedures for the geotechnical stage of highway, tunnel, and bridge projects Sound guidance for geotechnical stage design and planning for virtually all types of construction projects Slope Stability and Stabilization, Second Edition is filled with current and comprehensive information, making it one of the best resources available on the subject-and an essential reference for today's and tomorrow's professionals in geology, geotechnical engineering, soil science, and landscape architecture.

Rock Slope Engineering covers the investigation, design, excavation and remediation of man-made rock cuts and natural slopes, primarily for civil engineering applications. It presents design information on structural geology, shear strength of rock and ground water, including weathered rock. Slope design methods are discussed for planar, wedge, circular and toppling failures, including seismic design and numerical analysis. Information is also provided on blasting, slope stabilization, movement monitoring and civil engineering applications. This fifth edition has been extensively up-dated, with new chapters on weathered rock, including shear strength in relation to weathering grades, and seismic design of rock slopes for pseudo-static stability and Newmark displacement. It now includes the use of remote sensing techniques such as LiDAR to monitor slope movement and collect structural geology data. The chapter on numerical analysis has been

revised with emphasis on civil applications. The book is written for practitioners working in the fields of transportation, energy and industrial development, and undergraduate and graduate level courses in geological engineering.

The new edition of this successful book has been thoroughly revised to take account of recent advances in our understanding of slope stability and instability.

Analysis and design of geotechnical structures combines, in a single endeavor, a textbook to assist students in understanding the behavior of the main geotechnical works and a guide for practising geotechnical engineers, designers, and consultants. The subjects are treated in line with limit state design, which underpins the Eurocodes and most North America design codes. Instructors and students will value innovative approaches to numerous issues refined by the experience of the author in teaching generations of enthusiastic students. Professionals will gain from its comprehensive treatment of the topics covered in each chapter, supplemented by a plethora of informative material used by consultants and designers. For the benefit of both academics and professionals, conceptual exercises and practical geotechnical design problems are proposed at the end of most chapters. A final annex includes detailed resolutions of the exercises and problems.

Earthwork projects are critical components in civil construction and often require detailed management techniques and unique solution methods to address failures. Being earth bound, earthwork is influenced by geomaterial properties at the onset of a project. Hence, an understanding of the in-situ soil properties is essential. Slope stability is a common problem facing earthwork construction, such as excavations and shored structures. Analytical methods for slope stability remain critical for researchers due to the mechanical complexity of the system. Striving for better earthwork project managements, the geotechnical engineering community continues to find improved testing techniques for determining sensitive properties of soil and rock, including stress-wave based, non-destructive testing methods. To minimize failure during earthwork construction, past case studies and data may reveal useful lessons and information to improve project management and minimize economic losses. This volume is part of the proceedings of the 1st GeoMEast International Congress and Exhibition on Sustainable Civil Infrastructures, Egypt 2017.

The idea of information on research and development carried out on bamboo has emerged with the paradigm shift in the area of utilization of natural fibres in various industries. Technological advancements in bamboo sustenance have involved chemical and physical modification that has led to products of high-performance index. This book provides the latest research developments in many aspects of bamboo process, manufacture and commercialization potential. Apart from the interest to facilitate a complete assessment of bamboo as well as assist readers in achieving their goals, this book is intended to be of value to both fundamental research and also to practicing scientists and will serve as a useful reference for researchers, agricultural practitioners and organizations involved in the bamboo-based industry.

This book is a part of ICL new book series “ICL Contribution to Landslide Disaster Risk Reduction” founded in 2019. Peer-reviewed papers submitted to the Fifth World Landslide Forum were published in six volumes of this book series. This book contains the followings: • Five keynote lectures • Recent development in physical modeling of landslides • Recent development in numerical modeling of landslides • Recent development in soil and rock testing techniques, application and analysis methods • Recent advancements in the methods of slope stability and deformation analyses • Recent development in disaster risk assessment Prof. Binod Tiwari is a Vice President of the International Consortium on Landslides (ICL). He is the Associate Vice President for research and sponsored project and Professor of civil and environmental engineering at the California State University, Fullerton, California, USA. Prof. Kyoji Sassa is the Founding President and the Secretary-General of the International Consortium on Landslides (ICL). He has been the Editor-in-Chief of International Journal

Landslides since its foundation in 2004. Prof. Peter Bobrowsky is the President of the International Consortium on Landslides. He is a Senior Scientist of Geological Survey of Canada, Ottawa, Canada. Prof. Kaoru Takara is the Executive Director of the International Consortium on Landslides. He is a Professor and Dean of Graduate School of Advanced Integrated Studies (GSAIS) in Human Survivability (Shishu-Kan), Kyoto University.

In the past decades, the scan rate range of calorimeters has been extended tremendously at the high end, from approximately 10 up to 10 000 000 °C/s and more. The combination of various calorimeters and the newly-developed Fast Scanning Calorimeters (FSC) now span 11 orders of magnitude, by which many processes can be mimicked according to the time scale(s) of chemical and physical transitions occurring during cooling, heating and isothermal stays in case heat is exchanged. This not only opens new areas of research on polymers, metals, pharmaceuticals and all kinds of substances with respect to glass transition, crystallization and melting phenomena, it also enables in-depth study of metastability and reorganization of samples on an 1 to 1000 ng scale. In addition, FSC will become a crucial tool for understanding and optimization of processing methods at high speeds like injection molding. The book resembles the state-of-the art in Thermal Analysis & Calorimetry and is an excellent starting point for both experts and newcomers in the field.

Includes Recommendations for Analysis, Design Practice, Design Charts, Tables, and More Using a unified approach to address a medley of engineering and construction problems, Slope Stability Analysis and Stabilization: New Methods and Insight, Second Edition provides helpful practical advice and design resources for the practicing engineer. This text examines a range of current methods for the analysis and design of slopes, and details the limitations of both limit equilibrium and the finite element method in the assessment of the stability of a slope. It also introduces a variety of alternative approaches for overcoming numerical non-convergence and the location of critical failure surfaces in two-dimensional and three-dimensional cases. What’s New in the Second Edition: This latest edition builds on the concepts of the first edition and covers the case studies involved in slope stability analysis in greater detail. The book adds a chapter on the procedures involved in performing limit equilibrium analysis, as well as a chapter on the design and construction practice in Hong Kong. It includes more examples and illustrations on the distinct element of slope, the relation between limit equilibrium and plasticity theory, the fundamental connections between slope stability analysis and the bearing capacity problem, as well as the stability of the three-dimensional slope under patch load conditions. Addresses new concepts in three-dimensional stability analysis, finite element analysis, and the extension of slope stability problems to lateral earth pressure problems Offers a unified approach to engineering and construction problems, including slope stability, bearing capacity, and earth pressure behind retaining structures Emphasizes how to translate the conceptual design conceived in the design office into physical implementation on site in a holistic way Discusses problems that were discovered during the development of associated computer programs This text assesses the fundamental assumptions and limitations of stability analysis methods and computer modelling, and benefits students taking an elective course on slope stability, as well as geotechnical engineering professionals specializing in slope stability

"In the United States it is estimated that 75 percent of all roads are low volume roads maintained by some 35,000 local agencies. Low volume roads often omit surface slope protection, and this can lead to slope failure, erosion, and maintenance, safety, and ecological issues. This report presents information on cost effective and sustainable road slope stabilization techniques, with a focus on shallow or near surface slope stabilization and related erosion control methods used on low volume roads. To fully address this topic, planning and site investigation are discussed, as well as erosion control techniques, soil bioengineering and biotechnical techniques, mechanical stabilization, and earthwork

techniques. Information presented in this report was obtained through an extensive literature review, and from survey and interview responses. From the survey responses, 30 individuals were interviewed based on the information they made available in the survey. A total of 25 interviews were conducted over the phone, and in two cases written responses were received"--Preface.

This volume brings together, from a wide range of experience, such information as may be useful in recognizing, avoiding, controlling, designing for, and correcting movement. Current geologic concepts and engineering principles and techniques are introduced, and both the analysis and control of soil and rock-slopes are addressed. New methods of stability analysis and the use of computer techniques in implementing these methods are included. Rock slope engineering and the selecting of shear-strength parameters for slope-stability analyses are covered in separate chapters.

This classic handbook deals with the geotechnical problems of rock slope design. It has been written for the non-specialist mining or civil engineer, with worked examples, design charts, coverage of more detailed analytical methods, and of the collection and interpretation of geological and groundwater information and tests for the mechanical properties of rock.

A comprehensive guide for mining and construction engineers responsible for rock slope stability. This book focuses on rock slope stability, with sections on geological data collection, geotechnical data collection and analysis, surface water and groundwater effects, kinematic and kinetic stability analysis, rock slope stabilization techniques, and rock slope instrumentation and monitoring. Because of the discontinuous nature of rock, the design of stable rock slopes is as much an art as it is applied engineering. Experience can only be achieved from the proper utilization of these theories of soil and rock mechanics, structural geology, and hydrology. Rock Slope Stability is invaluable for engineering geologists, geotechnical engineers, mining engineers, civil engineers, and mine managers-- as well as anyone else dedicated to engineering slopes that are stable and safe and that enable a financial return.

The field of slope engineering encompasses slope stability analysis and design, movement monitoring, and slope safety management and maintenance. Engineers in this field are concerned with landslides and other gravity-stimulated mass movements. Their job is to frequently evaluate existing and proposed slopes to assess their stability. As such, this book provides information on remote sensing in landslide detection, tunnel face stability, stability analysis and maintenance of cut slopes, design techniques in rock and soil engineering, statistical models for landslide risk mapping, slope stability analysis in open-pit mines, ecological engineering for slope stabilization, and asphalt-stabilized strengthening in open-pit coal mining.

This volume addresses the multi-disciplinary topic of engineering geology and the environment, one of the fastest growing, most relevant and applied fields of research and study within the geosciences. It covers the fundamentals of geology and engineering where the two fields overlap and, in addition, highlights specialized topics that address principles, concepts and paradigms of the discipline, including operational terms, materials, tools, techniques and methods as well as processes, procedures and implications. A number of well known and respected international experts contributed to this authoritative volume, thereby ensuring proper geographic representation, professional credibility and

reliability. This superb volume provides a dependable and ready source of information on approximately 300 topical entries relevant to all aspects of engineering geology. Extensive illustrations, figures, images, tables and detailed bibliographic citations ensure that the comprehensively defined contributions are broadly and clearly explained. The Encyclopedia of Engineering Geology provides a ready source of reference for several fields of study and practice including civil engineers, geologists, physical geographers, architects, hazards specialists, hydrologists, geotechnicians, geophysicists, geomorphologists, planners, resource explorers, and many others. As a key library reference, this book is an essential technical source for undergraduate and graduate students in their research. Teachers/professors can rely on it as the final authority and the first source of reference on engineering geology related studies as it provides an exceptional resource to train and educate the next generation of practitioners.

Numerical Methods in Geotechnical Engineering IX contains 204 technical and scientific papers presented at the 9th European Conference on Numerical Methods in Geotechnical Engineering (NUMGE2018, Porto, Portugal, 25—27 June 2018). The papers cover a wide range of topics in the field of computational geotechnics, providing an overview of recent developments on scientific achievements, innovations and engineering applications related to or employing numerical methods. They deal with subjects from emerging research to engineering practice, and are grouped under the following themes: Constitutive modelling and numerical implementation Finite element, discrete element and other numerical methods. Coupling of diverse methods Reliability and probability analysis Large deformation – large strain analysis Artificial intelligence and neural networks Ground flow, thermal and coupled analysis Earthquake engineering, soil dynamics and soil-structure interactions Rock mechanics Application of numerical methods in the context of the Eurocodes Shallow and deep foundations Slopes and cuts Supported excavations and retaining walls Embankments and dams Tunnels and caverns (and pipelines) Ground improvement and reinforcement Offshore geotechnical engineering Propagation of vibrations Following the objectives of previous eight thematic conferences, (1986 Stuttgart, Germany; 1990 Santander, Spain; 1994 Manchester, United Kingdom; 1998 Udine, Italy; 2002 Paris, France; 2006 Graz, Austria; 2010 Trondheim, Norway; 2014 Delft, The Netherlands), Numerical Methods in Geotechnical Engineering IX updates the state-of-the-art regarding the application of numerical methods in geotechnics, both in a scientific perspective and in what concerns its application for solving practical boundary value problems. The book will be much of interest to engineers, academics and professionals involved or interested in Geotechnical Engineering.

Slope Stability and Stabilization MethodsJohn Wiley & Sons

GSP 151 contains 42 papers on research and practical applications in earth structures that were presented at the GeoShanghai Conference, held in Shanghai, China, June 6-8, 2006.

This book is aimed at the practising engineer and engineering geologist working in tropical environments, where lands lides are mainly triggered by rain fall. This book is based on a similar work published in 1999 in Portuguese, which became the Rio de Janeiro Slope Manual. This book is an engineering guide for the design of slopes and stabilisation works in rocks and residual soils. It evolves from the cumulative experience gathered by several engineers and geologists who faced severe slope problems. The authors' experience throughout Central and South America (Costa Rica, Argentina, Bolivia, Peru, Ecuador and Venezuela) and the Far East, especially Hong Kong and Malaysia, was used as a foundation for writing this book. The work also benefits enormously from the time spent in Hong Kong in 1996 and 1997 by the first editor on sabbatical at the City University of Hong Kong, and the discussions he had with many colleagues from the Geotechnical Engineering Office (GEO) of the Hong Kong Government, especially Dr. A. Malone, Mr. w.K. Pun, Dr. A. Li, Mr. K. Ho, and Mr. y.c. Chan among others.

"Soil Strength and Slope Stability is the essential text for the critical assessment of natural and man-made slopes. Extensive case studies throughout help illustrate the principles and techniques described, including a new examination of Hurricane Katrina failures, plus examples of soil and slope engineering from around the world. Extraneous theory has been excluded to place the focus squarely on the practical application of slope design and analysis techniques, including information about standards, regulations, formulas, and the use of software in analysis."--pub. desc.

This text includes an introduction to the concepts used in slope stability studies, a discussion of the geologic features that usually give slopes their personality, groundwater and seepage issues that frequently cause slope stability problems, and slope s

This seventh edition of Soil Mechanics, widely praised for its clarity, depth of explanation and extensive coverage, presents the fundamental principles of soil mechanics and illustrates how they are applied in practical situations. Worked examples throughout the book reinforce the explanations and a range of problems for the reader to solve provide further learning opportunities.

Slope Stability Analysis by the Limit Equilibrium Method: Fundamentals and Methods presents basic principles for the safe design of constructed or natural earth slopes. The limit equilibrium method is the most common approach for analyzing slope stability in both two and three dimensions. This method identifies potential failure mechanisms and derives factors of safety for a particular geotechnical situation. It is an appropriate choice for assessing the stability of retaining walls shallow and deep foundations earth and rock dams surface mining sites and potential landslides. The fundamentals of slope stability encompass slope movements and methods for stability analysis mechanics of slope failure and factors of safety laboratory and field methods to determine the shear strength of soils estimation of phreatic surfaces and remedial measures for correcting slides. Methods of stability analysis cover simple formulas for determining the factor of safety for plane failures stability charts methods of slices for two-dimensional analysis three-dimensional analysis techniques and reliability of slope design. An appendix provides a preview of a companion

product LEAME Software and Usera's Manual: Analyzing Slope Stability by the Limit Equilibrium Method a computer program for performing the slope stability analysis presented in this work (available from American Society of Civil Engineers). The clear presentation of the principles of slope stability analysis ensures that this work will be a frequently consulted reference for practicing engineers. The wealth of worked examples and problem sets make this a suitable textbook for senior and graduate students in soil mechanics and geotechnical engineering.

This book is an up-to-date review of research and practice on the use of vegetation for slope stabilization and control of surface erosion caused by water and wind. From a basic understanding of the principles and practices of vegetation growth and establishment, it describes how vegetation can be treated as an engineering material and used to solve erosion and slope stability problems.

This Geotechnical Special Publication contains 35 peer-reviewed technical papers presented at the GeoHunan International Conference: Challenges and Recent Advances in Pavement Technologies and Transportation Geotechnics, which took place in Changsha, Hunan, China, from August 3 to 6, 2009. This proceedings examines topics such as: Ø soil stabilization Ø dynamic behavior of soils and foundations Ø earth retaining walls Ø slope stability This publication will be valuable to geotechnical engineering professors and students, as well as geotechnical engineers and professionals

The stability of rock slopes is an important issue in both civil and mining engineering. On civil projects, rock cuts must be safe from rock falls and large-scale slope instability during both construction and operation. In open pit mining, where slope heights can be many hundreds of meters, the economics of the operation are closely related to the steepest stable slope angle that can be mined. This extensively updated version of the classic text, Rock Slope Engineering by Hoek and Bray, deals comprehensively with the investigation, design and operation of rock slopes. Investigation methods include the collection and interpretation of geological and groundwater data, and determination of rock strength properties, including the Hoek Brown rock mass strength criterion. Slope design methods include the theoretical basis for the design of plane, wedge, circular and toppling failures, and design charts are provided to enable rapid checks of stability to be carried out. New material contained in this book includes the latest developments in earthquake engineering related to slope stability, probabilistic analysis, numerical analysis, blasting, slope movement monitoring and stabilization methods. The types of stabilization include rock anchors, shotcrete, drainage and scaling, as well as rock fall protecting methods involving barriers, ditches, nets and sheds. Rock Slopes: Civil and Mining Engineering contains both worked examples illustrating data interpretation and design methods, and chapters on civil and mining case studies. The case studies demonstrate the application of design methods to the construction of stable slopes in a wide variety of geological conditions. The book provides over 300 carefully selected references for those who wish to study the subject in greater detail. It also includes an introduction by Dr. Evert Hoek.

This Special Report is a greatly expanded edition of a previous report on landslides (Special Report 176, "Landslides: Analysis and Control") published in 1978. The new report, which has been designed with an even broader international scope, contains

comprehensive, practical discussions of field investigations, laboratory testing, and stability analysis procedures and technologies; comprehensive references to the literature; and discussions of case studies, state-of-the-art techniques, and research directions. The report is presented in five sections: (1) Principles, Definitions, and Assessment; (2) Investigation; (3) Strength and Stability Analysis; (4) Mitigation; and (5) Special Cases and Materials.