Engineering Properties Of Soil And Rock

Introductory technical guidance for civil and geotechnical engineers and construction managers interested in engineering properties of soils. Here is what is discussed:1. GENERAL2. SHEAR STRENGTH3. VOLUME CHANGE4. PERMEABILITY5. ENGINEERING CHARACTERISTICS OF SOIL GROUPS6. CHANGES IN SOIL PROPERTIES7. WORKABILITY8. FROST ACTION9. ERODIBILITY10. DISPERSIVE CLAY11. DYNAMIC PROPERTIES.

Introductory technical guidance for civil and geotechnical engineers and construction managers interested in soils engineering. Here is what is discussed: 1. GENERAL 2. TERMS AND UNITS OF MEASURE 3. GRADATION 4. ATTERBERG LIMITS 5. POROSITY AND VOID RATIO 6. SPECIFIC GRAVITY 7. MOISTURE CONTENT 8. DENSITY AND UNIT WEIGHT

This first volume of a specialty 2-volume work contains 34 papers pertaining to the natural behaviour of diverse geomaterials found in different parts of the world. Each paper is organized along the outline: location and distribution, engineering geology, composition, state and index properties, structure, engineering properties, quality / reliability of data with reference to methods of sampling and testing, and relation to engineering problems. This extensive body of collated knowledge is integrated by three overview papers covering engineering geology, mechanical behaviour and engineering implications. Topics: Overview papers; Marine clays; Eastuarine Clays; Lacustrine clays; Stiff clays; Sands and other cohesionless soils; Residual and other tropical Soils; Weak rock.

From bridges and tunnels to nuclear waste repositories, structures require that soils maintain their design engineering properties if the structures are to reach their projected life spans. The same is true for earth dams, levees, buffers, barriers for landfills, and other structures that use soils as engineered materials. Yet soil, a natural resource, continues to change as a result of natural and anthropogenic stresses. As the discipline of soil properties and behaviours matures, new tools and techniques are making it possible to study these properties and behaviours in more depth. What Happens to Soil Under Weathering, Aging, and Chemical Stress? Environmental Soil Properties and Behaviour examines changes in soil properties and behaviour caused by short- and long-term stresses from anthropogenic activities and environmental forces. Introducing new concepts of soil behaviour, soil maturation, and soil functionality, it integrates soil physics, soil chemistry, and soil mechanics as vital factors in soil engineering. The book focuses on environmental soil behaviour, with particular attention to two main inter-related groups of soil–environment issues. The first is the use of soil as an environmental tool for management and containment of toxic and hazardous waste materials. The second is the impact of ageing and weathering processes and soil contamination on the properties and behaviour of soils, especially those used in geotechnical and geoenvironmental engineering projects. A Transdisciplinary Look at Soil-Changing Processes To determine short- and long-term soil quality and soil functionality, the authors emphasize the need to be aware of the nature of the stressors involved as well as the kinds of soil-changing processes that are evoked. This book takes a first step toward a much-needed transdisciplinary effort to develop a broader and deeper understanding of what happens to soil and how we can determine and quantify the effect of biogeochemical processes. It offers a timely resource for the study of soil properties and behaviours, effects of environmental changes, and remediation of contaminated soil.

Sand, clay and rock have to be excavated for a variety of purposes, such as dredging, trenching, mining (including deep sea mining), drilling, tunnel boring and many other applications. Many excavations take place on dry land, but they are also frequently required in completely saturated conditions, and the methods necessary to accomplish them consequently vary widely. This book provides an overview of cutting theories. It begins with a generic model, valid for all types of soil (sand, clay and rock), and continues with the specifics of dry sand, water-saturated sand, clay, atmospheric rock and hyperbaric rock. Small blade angles and large blade angles are discussed for each soil type, and for each case considered the equations/model for cutting forces, power and specific energy are given. With models verified by laboratory research, principally from the Delft University of Technology, and data from other recognized sources, this book will prove an invaluable reference for anybody whose work involves major excavations of any kind.

Engineering Properties of Soils and Rocks, Third Edition serves as a guide to the engineering properties and behavior of soils and rocks. The text also complements other texts on rock and soil mechanics. The book covers topics such as the properties and classification of soils such as tills and other kinds of soils related to cold climates, tropical soils, and organic soils such as peat. The text also includes the engineering behavior and properties, classification and description, discontinuities, and weathering of rocks and rock masses. The monograph is recommended for engineers who would like to know about the properties of soils and rocks and the application of their study in the field of engineering.

The improved, new edition of the classic book on the physical properties of soil Fundamentals of Soil Behavior, Third Edition is the thoroughly updated, expanded, and revised edition of this highly distinguished publication in geotechnical engineering. Filled with useful tables and graphs illustrating correlations among composition, classification, state, and static and dynamic properties, this Third Edition continues the tradition of providing the latest information on the physical properties of soil and the fundamentals of its behavior over time. Students and busy professionals will connect with this new edition's timesaving, streamlined format and its greater emphasis on practical exercise problems involving advanced concepts of soil behavior. Other must-read features of this Third Edition include: New, expanded material on micro-mechanical behavior at the particulate level and its influences on engineering properties at the macro-scale A new chapter on time effects on soil deformation at different stress and strain levels New coverage of such important topics as environmental geotechnics, biological influences on soil behavior, soil fracturing, the effects of time, and geochemical problems Sets of questions and problems at the end of each chapter, a feature not available in prior editions Fundamentals of Soil Behavior, Third Edition is an essential text for graduate students and researchers as well as a peerless reference for geotechnical, environmental, and civil engineers and geologists.

High pile rebound (HPR) has been identified by Florida Department of Transportation (FDOT) to occur during the installation of square prestressed concrete piles at many sites in Florida. Significant pile rebound values of up to 1.5 inch/blow were measured resulting in increased blow counts. Pile refusal is a common occurrence when blow count exceeds 240 blow/ft; leading to pile redesign and economic consequences. The overall objective of this research is to identify the engineering properties of soil deposits which may cause HPR and develop improved correlations that may be used to predict HPR during the design process. Seven sites were studied in this research. Pile driving analyzer (PDA) data was used to identify the rebound zones. Cone penetration tests (CPT) and Standard penetration tests (SPT) were conducted near the associated test piles. The SPT data was used to develop soil profile for each site. The CPT data was used to estimate profiles of engineering soil properties. An existing correlation between the CPT pore pressure and pile rebound was evaluated and improved. High CPT pore pressures measured at the rebound zones were found to correlate linearly with pile rebound. Using the CPT the rebound soils were classified as dense silty sands and highly overconsolidated or cemented silty clays. These soils are dilative under shear loading increasing the shear strength of the surrounding soil and the pile skin friction. As a result higher blow counts are required to reach pile penetration. The HPR soils have very low permeability; therefore, high compression-induced pore pressures may be generated near the pile tip during driving. These pore pressures at the pile tip may provide upward forces leading to rebound. The SPT data showed that cemented silty fine sand (SM) and clayey fine sand (SC) with trace phosphate and shell with fines content of 25 % to 40 % were found in the rebound zones. The CPT data superimposed on soil behavior type (SBT) charts provides an engineering method to predict pile

rebound soils.
This book presents a one-stop reference to the empirical correlations used extensively in geotechnical engineering. Empirical correlations play a key role in geotechnical engineering designs and analysis. Laboratory and in situ testing of soils can add significant cost to a civil engineering project. By using appropriate empirical correlations, it is possible to derive many design parameters, thus limiting our reliance on these soil tests. The authors have decades of experience in geotechnical engineering, as professional engineers or researchers. The objective of this book is to present a critical evaluation of a wide range of empirical correlations reported in the literature, along with typical values of soil parameters, in the light of their experience and knowledge. This book will be a one-stop-shop for the practising professionals, geotechnical researchers and academics looking for specific correlations for estimating certain geotechnical parameters. The empirical correlations in the forms of equations and charts and typical values are collated from extensive literature review, and from the authors' database.
Biochar is a carbon-rich product that is created by heating organic biomass in the absence of or little oxygen. Past studies have investigated the effects of biochar addition, to the nutrient removal and saturated conductivity properties of soils. However, not many studies have been devoted to studying the effect of biochar addition on strength and volume change properties. In this work, an experimental program is designed and run in the laboratory to study the strength and volume change properties of a silty sand. Differing biochar percentages, by volume, are added to the soil and relative comparisons of the observations are made. Results are interpreted and discussed in terms of biochar's potential as a viable geo-material for engineering applications other than those that have been scrutinized. It was found that the addition of biochar increases the soil mixture's compressibility and cohesion. Using the Mohr-Coulomb criterion, it was found that soil's shear strength increased with the percentage of biochar amendment. Overall assessment of results indicated the viability of biochar as a geo-environmental amendment in engineering applications.
Measurement of Engineering Properties of SoilsNew Age International
This is an easily accessible account of critical state of soil mechanics, geotechnical centrifuge testing and the original Cam-Clay model invented by the author.
This Book Highlights The Procedures For 30 Tests Used To Measure The Engineering Properties Of Soil In Both Laboratory And Field Including Dynamic Testing Of Soils. All The Test Procedures Are Based On Indian Standard Practice And Are Very Close To Astm Standards. Features Of This Book Include: * Test Procedures And Tabular Forms For A Maximum Number Of Field And Laboratory Tests. * Classification Of The Soil Tests Based On Type Of Project And Type Of Soil. * A Set Of Questions Is Presented At The End Of Each Chapter For Self Examination. * For Each Test, Theoretical Principles And The Precautions To Be Followed During The Test Are Explained.This Book Will Be Useful To B.Tech./B.E. (Civil Engineering) And M.E./ M.Tech. (Geotechnical Engineering) Students As Laboratory Manual And Reference Book. It Is Hoped That This Book Will Also Be Useful To Field Engineers As Handbook In Soil Mechanics As It Helps In Deciding The Test Programme For A Given Project. Similarly, The Book Will Be Helpful For Quality Control Engineers.
This document presents state-of-the-practice information on the evaluation of soil and rock properties for geotechnical design applications. This document addresses the entire range of materials potentially encountered in highway engineering practice, from soft clay to intact rock and variations of materials that fall between these two extremes. Information is presented on parameters measured, evaluation of data quality, and interpretation of properties for conventional soil and rock laboratory testing, as well as in situ devices such as field vane testing, cone penetration testing, dilatometer, pressuremeter, and borehole jack. This document provides the design engineer with information that can be used to develop a rationale for accepting or rejecting data and for resolving inconsistencies between data provided by different laboratories and field tests. This document also includes information on: (1) the use of Geographical Information Systems (GIS) and Personal Data Assistance devices for the collection and interpretation of subsurface information; (2) quantitative measures for evaluating disturbance of laboratory soil samples; and (3) the use of measurements from geophysical testing techniques to obtain information on the modulus of soil. Also included are chapters on evaluating properties of special soil materials (e.g., loess, cemented sands, peats and organic soils, etc.) and the use of statistical information in evaluating anomalous data and obtaining design values for soil and rock properties. An appendix of three detailed soil and rock property selection examples is provided which illustrate the application of the methods described in the document.
This publication contains the papers presented at the 15th European Conference on Soil Mechanics and Geotechnical Engineering (ECSMGE), held in Athens, Greece. Considerable progress has been made in recent decades in understanding the engineering behavior of those hard soils and weak rocks that clearly fall into either the field of soil or of rock mechanics, and there have been important developments in design and construction methods to cope with them. Progress would be even more desirable, however, for those materials which fall into the ‘grey’ area between soils and rocks. They present particular challenges due to their diversity, the difficulties and problems arising in their identification and classification, their sampling and testing and in the establishment of suitable models to adequately describe their behavior. The publication aims to provide an updated overview of the existing worldwide knowledge of the geological features, engineering properties and behavior of such hard soils and weak rocks, with particular reference to the design and construction methods and problems associated with these materials. Part 4 was published post-conference and includes Conference Reports.
Introductory technical guidance for civil and geotechnical engineers interested in engineering properties of soil and rock. Here is what is discussed: 1. SCOPE 2. COMPACTION CHARACTERISTICS OF SOIL 3. DENSITY OF COHESIONLESS SOILS 4. PERMEABILITY 5. CONSOLIDATION 6. SWELLING, SHRINKAGE AND COLLAPSIBILITY 7. SHEAR STRENGTH OF SOILS 8. ELASTIC PROPERTIES 9. MODULUS OF SUBGRADE REACTION 10. COEFFICIENT OF AT-REST EARTH PRESSURE.
Soil Properties and Behavior defines the structure of the soil-water system. This book provides the background of the nature of mineral particles and the existing forces between the particles in the soil system. It also examines the structure and fabric of soil, as well as their relationship with water. Furthermore, the book explores water movement and soil performance, which are related to the physics of soil-water movement and volume changes. This book illustrates the common clay minerals in soils and discusses the methods for their identification. It also reviews the theory of one-dimensional consolidation and discusses the soil structure in consolidation and compression. The book also presents the concepts of yield and failure in soils, yield criteria, and failure theories. It also focuses on granular and cohesive soil strength, including friction properties, the intrinsic friction angle, the volumetric strain, and pore-water pressure. The last part of the book discusses soil freezing and permafrost.
Introductory technical guidance for civil, structural and geotechnical engineers interested in engineering properties of soil an rock. Here is what is discussed: 1. SCOPE 2. COMPACTION CHARACTERISTICS OF SOIL 3. DENSITY OF COHESIONLESS SOILS 4. PERMEABILITY 5. CONSOLIDATION 6. SWELLING, SHRINKAGE AND COLLAPSIBILITY 7. SHEAR STRENGTH OF SOILS 8. ELASTIC PROPERTIES 9. MODULUS OF SUBGRADE REACTION 10. COEFFICIENT OF AT-REST EARTH PRESSURE.
This laboratory manual is a simplified digest of the principal details of the most common laboratory soil tests you will encounter in geotechnical practice.

Soil Properties and their Correlations, Second Edition Michael Carter, Geotechnical Consultant (Retired), UK Stephen P Bentley, Reader in Engineering Geology, Cardiff University, UK An essential guide to improving preliminary geotechnical analysis and design from limited data Soil Properties and their Correlations, Second Edition provides a summary of commonly-used soil engineering properties and gives a wide range of correlations between the various properties, presented in the context of how they will be used in geotechnical design. The book is divided into 11 chapters: Commonly-measured properties; Grading and plasticity; Density; Permeability, Consolidation and settlement; Shear strength; California bearing ratio; Shrinkage and swelling characteristics; Frost susceptibility; Susceptibility to combustion; and Soil-structure interfaces. In addition, there are two appendices: Soil classification systems; and Sampling methods. This new, more comprehensive, edition provides material that would be of practical assistance to those faced with the problem of having to estimate soil behaviour from little or no laboratory test data. Key features: • Soil properties explained in practical terms. • A large number of correlations between different soil properties. • A valuable aid for assessing design values of properties. • Clear statements on practical limitations and accuracy. An invaluable source of reference for experienced professionals working on geotechnical design, it will also give students and early-career engineers an in-depth appreciation of the appropriate use of each property and the pitfalls to avoid.

This publication provides introductory technical guidance for civil engineers, geotechnical engineers and other professional engineers and construction managers interested in soils engineering. Here is what is discussed: 1. BEARING CAPACITY ANALYSIS, 2. DISTRIBUTION OF STRESSES IN SOIL, 3. ENGINEERING PROPERTIES OF SOIL AND ROCK, 4. LABORATORY TESTING OF SOILS, 5. SEEPAGE AND DRAINAGE, 6. SETTLEMENT AND VOLUME EXPANSION, 7. SLOPE STABILITY ANALYSIS, 8. SOIL GROUTING.

This book, first published in 1978, provides a comprehensive guide to soil properties in any major world region. It emphasizes the significance of the spatial changes in soil patterns, the environmental influence on soils, and their temporal changes, but focuses attention on the systematic examination of soil properties and their reciprocal effects. It covers such important topics as the mineral composition of different soils, their organic matter, structure and porosity, chemical make-up and mechanical properties.

An essential guide to improving preliminary geotechnical analysis and design from limited data Soil Properties and their Correlations, Second Edition provides a summary of commonly-used soil engineering properties and gives a wide range of correlations between the various properties, presented in the context of how they will be used in geotechnical design. The book is divided into 11 chapters: Commonly-measured properties; Grading and plasticity; Density; Permeability, Consolidation and settlement; Shear strength; California bearing ratio; Shrinkage and swelling characteristics; Frost susceptibility; Susceptibility to combustion; and Soil-structure interfaces. In addition, there are two appendices: Soil classification systems; and Sampling methods. This new, more comprehensive, edition provides material that would be of practical assistance to those faced with the problem of having to estimate soil behaviour from little or no laboratory test data. Key features: Soil properties explained in practical terms. A large number of correlations between different soil properties. A valuable aid for assessing design values of properties. Clear statements on practical limitations and accuracy. An invaluable source of reference for experienced professionals working on geotechnical design, it will also give students and early-career engineers an in-depth appreciation of the appropriate use of each property and the pitfalls to avoid.