## Contents

Chanton 1.	Economic and planning considerations	Page 7
chapter 1.	Economic consequences of instability Planning stability investigations Chapter 1 references	8 13 17
Chapter 2:	Basic mechanics of slope failure	18
	Continuum mechanics approach to slope stability Maximum slope height - slope angle relationship for excavated slopes Role of discontinuities in slope failure Friction, cohesion and unit weight Sliding due to gravitational loading Influence of water pressure on shear strength The effective stress law The effect of water pressure in a tension crack Reinforcement to prevent sliding Factor of safety of a slope Slope failures for which factors of safety can be calculated Critical slope height versus slope angle relationships Slopes for which a factor of safety cannot be calculated Probabilistic approach to slope design Chapter 2 references	18 19 22 24 25 26 26 27 28 29 31 33 35
Chapter 3:	Graphical presentation of geological data	37
	Definition of geological terms Definition of geometrical terms Graphical techniques for data presentation Equal-area projection Construction of a great circle and a pole representing a plane Determination of the line of intersection of two planes To determine the angle between two specific lines Alternative method for finding the line of intersection of two planes Plotting and analysis of field measurements Evaluation of potential slope problems Suggested method of date presentation and analysis for open pit planning	37 39 40 40 45 45 46 47 47 55
	Chapter 3 references	62
Chapter 4:	Geological data collection	64
	Regional geological investigations Mapping of exposed structures Photographic mapping of exposed structures Measurement of surface roughness Diamond drilling for structural purposes Presentation of geological information Chapter 4 references	65 69 71 71 79 81
Chapter 5:	Shear strength of rock	83
	Shear strength of planar discontinuities Influence of water on shear strength of planar discontinuities Shearing on an inclined plane Surface roughness Shear testing on discontinuities in rock Estimating joint compressive strength and friction angle Shear strength of filled discontinuities Shear strength of closely jointed rock masses Testing closely jointed rock masses Shear strength determination by back analysis of slope failures Sample collection and preparation	83 84 85 86 89 96 10 10

## CONTENTS

		Page
Chapter 6:	Groundwater flow; permeability and pressure	127
	Groundwater flow in rock masses Flow nets Field measurement of permeability Measurement of water pressure General comments Chapter 6 references	128 134 136 143 146
Chapter 7:	Plane failure	150
	General conditions for plane failure Plane failure analysis Graphical analysis of stability Influence of groundwater on stability Critical tension crack depth The tension crack as an indicator of instability Critical failure plane inclination Influence of under-cutting the toe of a slope Reinforcement of a slope Analysis of failure on a rough plane Practical example No. 1 Practical example No. 2 Practical example No. 3 Practical example No. 4 Practical example No. 5 Chapter 7 references	150 150 157 157 161 164 165 166 167 168 174 179 196
Chapter 8:	Wedge failure	199
	Definition of wedge geometry Analysis of wedge failure Wedge analysis including cohesion and water pressure Wedge stability charts for friction only Practical example of wedge analysis Chapter 8 references	202 202 203 209 210 224
Chapter 9:	Circular failure	226
	Conditions for circular failure Derivation of circular failure charts Groundwater flow assumptions Production of circular flow charts Use of the circular failure charts Location of critical failure circle and tension crack Practical example No. 1 Practical example No. 2 Practical example No. 3 Bishop's and Janbu's methods of slices Chapter 9 references	226 228 229 230 230 242 243 244 247 254
Chapter 10:	Toppling failure	257
	Types of toppling failure Secondary toppling modes Analysis of toppling failure Factor of safety for limiting equilibrium analysis of toppling failure General comments on toppling failure Chapter 10 references	257 259 259 269 <b>2</b> 69

## CONTENTS

Chapter 11:	Blasting	Page
	Production blasting Production blasting design Evaluation of a blast Modification of blasting methods Blasting damage and its control Special blasting techniques for improving slope stability Chapter 11 references	271 282 288 290 291 301 307
Chapter 12:	Miscellaneous topics	309
	Influence of slope curvature upon stability Slope de-pressurisation Surface protection of slopes Control of rockfalls Monitoring and interpretation of slope displacements A look into the future Chapter 12 references	309 313 317 321 323 326 330
Appendix 1:	Analysis of laboratory strength test data	
	Wedge solution for rapid computation	333
	Factor of safety for reinforced rock slopes	337
	Conversion factors	352
ndex		355
		356