
Contents

Acknowledgements	xi
Preface	xiii
Chapter 1. Physical Parameters	1
1.1. Unit weights and volumes	1
1.2. Soil behavior type index and soil classification index	3
1.3. Consistency or Atterberg limits	3
1.4. Consistency and liquidity indices	4
1.5. Rigidity index	5
1.6. Relative density of sands	5
1.7. Wave velocity	7
1.8. Cation exchange capacity	8
Chapter 2. Identification of Soil Types	11
2.1. From identification tests	11
2.2. From cone soil index * I_c	12
2.3. From CPT	12
2.4. From PMT	15
2.5. From SPT	17
2.6. From DMT	18
Chapter 3. Hydraulic Parameters	21
3.1. Hydraulic conductivity	21
3.2. Water storage capacity	23
3.2.1. For a free water table	23
3.2.2. For a confined aquifer	24

Chapter 4. Strength Parameters of Saturated and Dry Soils	25
4.1. Undrained shear strength and cohesion	25
4.1.1. From identification tests	25
4.1.2. From laboratory tests	26
4.1.3. From CPT	27
4.1.4. From PMT	28
4.1.5. From SPT	29
4.1.6. From SCPT	29
4.1.7. From DMT	30
4.1.8. From VST	30
4.1.9. Overconsolidated soils	31
4.1.10. Miscellaneous: peats and remolded soils	32
4.2. Effective cohesion	33
4.3. Internal friction angle	33
4.3.1. From identification tests	33
4.3.2. From CPT and CPTu	35
4.3.3. From SCPT	36
4.3.4. From PMT	36
4.3.5. From SPT	37
4.3.6. From DMT	38
4.3.7. Peak, critical state and residual friction angles	39
4.3.8. Influence of intermediate stress	40
4.4. The angle of dilatancy	41
4.5. Sensitivity	42
Chapter 5. Soil Deformations	43
5.1. Compression and swelling	43
5.1.1. Compression index	43
5.1.2. Constants of compressibility	47
5.1.3. Swelling index	48
5.2. Soil moduli	48
5.2.1. From CPT	49
5.2.2. From DMT	51
5.2.3. From SPT	52
5.2.4. From CBR	53
5.2.5. Influence of loading rate	54
5.3. Small strain modulus	54
5.4. Poisson's ratio	58
5.5. Modulus of subgrade reaction	59
5.6. Resilient modulus	60
5.7. Collapse and expansion	60

Chapter 6. Soil State Parameters	63
6.1. Preconsolidation pressure	63
6.2. Overconsolidation ratio	66
Chapter 7. Consolidation	69
7.1. Primary consolidation coefficient	69
7.2. Secondary consolidation coefficient	70
7.3. Consolidation of peats	71
7.4. Degree of consolidation	72
Chapter 8. Coefficient of Earth Pressure at Rest	73
Chapter 9. Soil Compaction Tests	77
9.1. Proctor tests	77
9.1.1. Standard Proctor test	77
9.1.2. Modified Proctor test	78
9.2. CBR	79
Chapter 10. Unsaturated Soils	81
10.1. Suction	81
10.2. Bishop's coefficient	83
10.3. Quasi-saturated domain	84
10.4. Stress dependency of suction	84
10.5. Drying path of quasi-saturated soils	85
10.6. Capillary or apparent cohesion	86
10.7. Estimation of porosity and degree of saturation from compression wave velocity	87
Chapter 11. Cross Relations between In Situ Test Parameters	89
11.1. CPT	89
11.1.1. Correction factors and correlations between different CPT tests or parameters	89
11.1.2. CPT and DPT	91
11.1.3. CPT and PMT	92
11.1.4. CPT and DMT	93
11.1.5. CPT and SPT	94
11.2. PMT	97
11.2.1. PMT and DPT	97
11.2.2. PMT and DMT	98
11.2.3. PMT and SPT	98

11.3. DMT	99
11.3.1. DMT and SPT	99
11.4. SPT	100
11.4.1. SPT and DPT	100
11.5. PANDA dynamic penetration test	100
11.5.1. PANDA and CPT	100
11.5.2. PANDA and DPT	101
11.5.3. PANDA and PMT	101
11.5.4. PANDA and VST	101
Chapter 12. Rocks	103
12.1. Introduction	103
12.2. Fundamental properties of intact minerals	106
12.3. Rock material (rm)	108
12.3.1. UCS	109
12.3.2. Abrasiveness	117
12.3.3. Attrition	119
12.3.4. Polished stone value (PSV)	122
12.4. Rock masses (RMs)	124
12.4.1. Shear strength of discontinuities	124
12.4.2. RM classification systems	126
Chapter 13. Usual Values of Soils and Rock Parameters	141
13.1. Physical parameters	141
13.1.1. Plasticity, unit weights and porosity	141
13.1.2. Consistency and related strength parameters	142
13.1.3. Soil indices	142
13.1.4. Soil and rock resistivity	143
13.1.5. Wave velocity	143
13.1.6. Clay minerals and CEC	144
13.2. Hydraulic parameters	144
13.2.1. Hydraulic conductivity	144
13.2.2. Water storage capacity	145
13.3. Strength parameters	145
13.4. Deformation parameters	145
13.4.1. Compression index	145
13.4.2. Soil modulus	146
13.4.3. Poisson's ratio	146
13.4.4. Small strain modulus	147
13.5. Consolidation parameters	147
13.5.1. Primary consolidation	147
13.6. <i>In situ</i> test parameters	148

13.6.1. CPT	148
13.6.2. PMT	148
13.6.3. DMT	149
13.6.4. SPT	149
13.7. Rock parameters	149
13.7.1. Rock materials	150
13.7.2. Rock masses	153
List of Symbols	159
List of Equations	169
List of Abbreviations and Acronyms	173
Bibliography	177
Index	205