Indice237 Building with earth: a handbook

Contents

Preface by Paul Oliver	vii
1 Introduction	1
How this handbook might help you	1
Terminology	1
2 General considerations	3
What earth is	3
Strength and weakness	3
Strong in compression, weak in tension	3
Weak in the sustained presence of water	4
Climatic performance and comfort	4
Earthquake resistance	5
Choosing whether and how to build with earth	6
Costs and aftercare	6
Resource availability	7
Climate and environment	8
Socio-cultural acceptability	8
Legislation and institutional acceptability	8
3 Choosing a suitable soil	9
Soil composition	9
Particle gradation	9
Particle characteristics	9
Laterites	9
Expansive soils	10
Soil analysis	10
Observing existing buildings	10
Choosing which level of testing to carry out	10
The soil sample	11
Initial sensory observation	12
Visual observation	12
Touch	12
Smell	12
Field tests	12
Soil composition	13
Optimum water content	14
Plasticity	14
Field laboratory tests	15
Soil composition	15
Plasticity	17
Optimum water content	20
4 How to determine and improve quality	22
Standards	22
Visual assessment	22
Compressive strength	23
Pocket penetrometer	23
Bending strength or 'modulus of rupture'	24
Resistance to water erosion	25

Drip test	25
Spray test	25
Moisture absorption	26
Soil improvement	26
Stabilization	26
Choosing a stabilizer	26
Changing the granular composition of the soil	27
5 Wall construction	32
Combination walls	32
Wattle and daub	32
Infill between temporary or permanent formwork	34
Load-bearing walls	35
Direct moulding	35
Mud bricks or adobe	37
Rammed earth	43
Compressed blocks	49
6 Roofs	55
Self-supporting earth vaults built on shuttering	55
Vaults and domes without formwork	55
Vaults	56
Domes	58
Finishing the vault or domed roof	60
Flat and pitched roofs	60
Short span earth components between supporting beams	62
Reinforced earth roofs	62
7 Foundations and floors	63
Foundations	63
Floors	64
8 Protection	66
Preliminary considerations	66
Sites	66
Building design	66
Rising damp	67
Termites	67
Impact	67
Renders	67
Preparation	67
Types of render	68
Caring for your building	72
9 Openings, joinery, finishes and furniture	73
Openings	73
Joinery	73
Finishes	73 74
Furniture	74
Electricity and plumbing.	74
10 References and notes	74 75
11 Bibliography	73 77
	11