Contents

List of Tables		X
Preface by Gus W. Van Beek		xi
Acknowledgments		XV
Introduction by Gus W. Van Beek		
Terminology		1 2
Geographical Regions Defined		
The Beginnings of Mud Construction		_
Developments in the Near East and Medite	rranean Region	_
Mesolithic (Natufian) Period		7
Epipaleolithic Period		7
Neolithic Period		7
Chalcolithic Period and Bronze Age		9
Later Developments		10
Mud Construction in the New World		12
Mud Architecture for Today and the Future		14
Secondary Reanyy Bandron Charleston		THE S
Part I: Overview of Mud Construction		
1 Advantages of Mud Construction		19
Low Cost		19
Comfortable Interior Temperature		25
Beauty and Flexibility		28
Strength and Durability		36
2 Factors in Building Design		
2 Factors in Building Design Environmental Considerations		40
Effects of Cultural Mores		40
Influence of Tradition		43
Function		49
Human Creativity		52
Tullian Creativity		53

3 A Sampling of Near Eastern and Southwest Asian E Pakistan India	Building Designs	56 56 78
Syria and Jordan Valley Yemen		83 90
Part II: Preparing to Build		
4 Layout and Foundation		107
Building Orientation and Site Preparation		108
To Build with or without a Foundation		108
Excavation Types		110
Trench Foundations		110
Hole Foundations		111
Archaeological Evidence of Foundations		113
Materials Used for Foundations		115
Mud		116
Ashlar, Rubble, and Stolen Materials		117
Poured Concrete		126
Reused Walls		126
5 Soils and Mud		129
Types of Soil		129
Quarrying Soil		130
Tempering Materials		135
Tools and Equipment		137
Mixing Mud		138
Making Mud Brick		141
Hand Molding		142
Brick Molds and Molding		148
Pressed-Earth Blocks		152
Drying Bricks		153
Stacking Bricks		156
Archaeological Characteristics		157
Part III: Methods of Earthen Wall Construction		
		161
6 Wattle-and-Daub Overview of Wall Construction Methods		161
Ancient and Recent Examples of Wattle-and-Daub		162
Children's Models		
More Examples of Wattle-and-Daub Structures		1.70
Infilling with Wattle and Daub		174
Advantages and Disadvantages		179
(A)		104
	And Interest More	184
Differences between Layered-Mud and Rammed-Ear	th Walls	184 186
Construction		186
Building Layers		100

Contents	vii
Contents	vii

Drying Layers	191
Architectural Features and Variations	192
Geographical and Chronological Distribution	197
Old World Sites	197
New World Sites	202
Advantages and Disadvantages	203
8 Rammed Earth	209
Construction without Forms	209
Revetments	209
Building Vertical Rammed-Earth Walls without Forms?	215
Construction Using Forms	218
Origins of Form-Built Rammed Earth	219
Geographical Distribution	222
Form-Built Construction in Morocco and Elsewhere in the Old World	231
Form-Built Construction in North America and Australia	246
Advantages and Disadvantages	250
9 Mud Brick	257
Brief History	257
Construction with Form-Molded Brick	258
Brick Shapes and Sizes	258
Wall Thickness	264
Bonding Patterns	266
Structural Decoration of Walls	272
Mud Mortar	275
Laying Mud Brick	278
Nogging	280
Advantages and Disadvantages	280
Part IV: Roof Construction	
10 Flat and Raised-Frame Roofs	287
Flat-Roof Construction Techniques	288
Primary Beams	288
Secondary Beams: Bamboo Poles and Branches	293
Lining: Woven Mats and Reeds	293 294
Insulation: Branches and Straw	294
Compressed Mud	295
Finish New World Innovations	298
New World Innovations Raised-Frame Roofs	299
Framing	299
Covering Materials	304
Advantages and Disadvantages	307
11 Curved Roofs: Domes, Arches, and Vaults	311
Terminology	311
History of Domes	312

Contents

History of Arches and Vaults		316
Characteristics of Curved Roofs		328
Snapes		328
Brick Sizes		329
Wall Requirements		330
Techniques of Erecting Domes, Arches	s, and Vaults	330
Corbel Construction		330
Radial Construction		339
Pitched-Brick Construction		345
Ribbed Construction		357
Radial, Timber-reinforced Domica	l Vault	359
Advantages and Disadvantages		365
ne Hole Foundations		303
Part V: Finishing Details and Solutions		
12 Walls, Columns, and Stairways		
Walls		369
Plaster		369
Paint		369
Stucco		389
		392
Orthostats		394
Glazed Brick		395
Ceramic Tiles		396
Wood Paneling		399
Other Decorations of Walls		400
Columns		400
Stairways		400
Carlo	dyentages and Disadvantages	408
13 Floors, Windows, Doors, Ceilings, an Floors	nd Utilities	413
Earth		413
Lime Plaster		413
Mud Brick		416
Fired Brick		418
Stone		420
Concrete and Cement		421
Wood		424
Ceramic Tile		426
Terrazzo and Mosaic		426
Windows		427 429
Doors		435
Ceilings		445
Utilities		447
Electricity		447
Plumbing	surved Roofs: Domes, Arches, and N	
Heating and Cooking	Reminology	
Cooling		431

	te	

Contents	ix
14 Problems and Solutions	463
Water Erosion	464
Curbing	468
Benches	469
Tops of Walls	471
Drains through Walls	474
Buttresses	478
Wall Surfaces in Rainy Zones	480
Eaves	481
Earthquakes	482
Conclusion by Gus W. Van Beek	501
Mud Architecture in the Twenty-first Century	501
A Need for Affordable and Environmentally Friendly Housing	g 501
Transitioning to Mud	504
Glorious Mud	505
Appendix A: Maps	507
Southern Levant	508
Near East	509
Saudi Arabia and Yemen	510
Morocco	511
Pakistan Pakistan Pakistan Republikan Republ	512
India India	
Syria	514
Appendix B: Excavation Techniques by Gus W. Van Beek	515
Excavation of Archaeological Foundations	515
Differentiating Wall Types	517
Care and Documentation of Mud-Brick Walls	518
References and all 12 will you be used to be a second of the second of t	519
Index = and another and another and another and a blue	321
About the Author	541