

Contents			
Introduction		8	
Structure and Form		10	
Structural Physics	13	Structural Elements	33
		Structural Logic	
		54	
Materials Science	14	Bearing Elements	34
Forces:	14	Bearing Walls:	34
Stress		Stacked Masonry	
Strain		Composite Construction	36
Properties of Materials:	16	Columns	38
Strength		Foundations:	40
Stiffness and Flexibility		Strip	
Reactions:	18	Pad	
Bending		Raft	
Shear		Pile	
		Retaining Walls	
Structural Integrity	20	Linear Spanning	42
Loads:	20	Elements	
Live and Dead Loads		Beam:	42
Lateral Loads		Cross-Sections	
Bracing		Linear Profiles	44
Torsion		Profiled Plate:	46
Stability:	22	Reinforced-Concrete Slab	
Anchorage		Profiled-Sheet	
Height		Composite	
Centre of Gravity		Wafer/Laminate	
Cantilever Principle			
Materials Technology	24	Multidirectional Spanning	48
Stone	24	Elements:	
Wood	25	Reinforced-Concrete Slab	
Steel	26	Coffer	
Reinforced Concrete	27	Space Frame	
Glass	28	Wafer/Laminate	
Fabrics	29		
Fibre-Reinforced Plastic	30	Connections and Joints:	50
Sheet Materials	31	Dry Joint	
		Stone	
		Nail	
		Screw	
		Bolt	
		Rivet	52
		Turnbuckle	
		Adhesives (Glue)	
		Welding	
		Brazing	

Climate and Shelter		70	
Human Comfort	73	Building Performance	
		79	
Thermal Comfort	74	Climatic Envelope	80
		Thermal Mass	80
		Thermal Insulation	82
Solar Geometry	76	Air Movement:	84
		Natural Ventilation	
		Passive Control	86
		Climate Zones	88
		Weathering:	90
		Windows and Glazing	
		Masonry	92
		Cladding Systems	94
		Membranes	96
		Bonded Surfaces	98
		Construction Details I	100
		Construction Details II	102
		Sound and Light	104
		Acoustics:	104
		Properties of Sound	
		Acoustic Control	106
		Daylight	108
		Building Services	110
		Heating	110
		Mechanical Ventilation	112
		Air-Conditioning:	114
		Principles	
		Systems	116
		Integrated Systems	118
		Sanitation	120

Computational Tools and Techniques		123	
Building Information Modelling	124	Case Studies	132
Structural Analysis	126	Mud House	134
Form Finding		Tepee	136
Finite Element Analysis		Igloo	138
		Obelisk	140
Environmental Analysis	128	The Pantheon	142
Thermal		The Ironbridge	144
Daylight		The Bell Rock Lighthouse	146
Air Movement	130	The Crystal Palace	148
Acoustic		Clifton Suspension Bridge	150
		Tropical House	152
		(Pavillon Démontable)	
		Kresge Auditorium	154
		Palazzetto Dello Sport	156
		Church of Jesus Christ the Worker	158
		The Houston Astrodome	160
		The German Pavilion	162
		The USA Pavilion	164
		Self-Build House	166
		Sydney Opera House	168
		HSBC Headquarters	170
		The Pavilion of the Future	172
		The Portugal Pavilion	174
		The Lord's Media Centre	176
		Leaning Tower of Pisa:	178
		Remedial Works	
		30 St Mary Axe	180
		'D' Tower	182
		Davies Alpine House	184
		International Space Station	186
		Mapungubwe Interpretive Centre	188
		Media-ICT	190
		Stedelijk Museum Extension	192
		Glass Lantern, Apple Zorlu	194
		432 Park Avenue	196
		Grandview Heights Aquatic Centre	198
		Building Codes	201
		Rules Governing Construction	202
		Technology: UK	
		World Commission on Environment	204
		and Development (WCED) Guidelines on	
		Sustainable Construction	
		European Guidelines on	205
		Sustainable Construction	
		Rules Governing Construction	206
		Technology: US/Green Building Rating	
		System	
		Timeline: Evolution	208
		of Structural Form	
		Glossary	210
		Further Reading	213
		and Resources	
		Index	216
		Picture Credits	224
		Acknowledgements	224