

CONTENTS

<i>List of figures</i>	xi
<i>List of tables</i>	xxv
<i>Preface</i>	xxvii

1 Pre-construction	1
1.1 Design considerations	2
1.2 Modular coordination	3
1.3 Construction contract documents	5
1.4 Planning legislation	16
1.5 Building control	19
1.6 Health and Safety	35
1.7 Building organisations	40
1.8 Building Information Modelling (BIM)	42
1.9 Building information classification systems	44
2 Site investigation	45
2.1 Desk study	47
2.2 Field study	48
2.3 Site survey and ground investigation	49
2.4 Soil analysis	54
2.5 Site soil testing techniques	56
3 Site works	64
3.1 General considerations	65
3.2 Setting out	73
3.3 Levelling	78
3.4 Road and paving	82
3.5 Landscaping	91
3.6 Personal protective equipment (PPE)	92
3.7 Demolition	94
4 Soil improvement and excavation	99
4.1 Vibro replacement	101
4.2 Vibro compaction	102

Contents

4.3	<i>Dynamic compaction</i>	103
4.4	<i>Jet grouting</i>	104
4.5	<i>Excavation support</i>	105
4.6	<i>Cofferdams</i>	108
4.7	<i>Steel sheet piling</i>	109
4.8	<i>Caissons</i>	110
4.9	<i>Culverts</i>	112
4.10	<i>Dewatering</i>	113
4.11	<i>Contaminated land</i>	117
4.12	<i>Retaining walls</i>	120
5	Materials	132
5.1	<i>Density of building materials</i>	133
5.2	<i>Concrete</i>	135
5.3	<i>Timber</i>	149
5.4	<i>Joinery production</i>	158
5.5	<i>Composite boards</i>	163
5.6	<i>Plasters and plasterboards</i>	165
5.7	<i>Plastics</i>	173
5.8	<i>Mastics and sealants</i>	174
5.9	<i>Metals</i>	177
6	Plant	178
6.1	<i>Earthmoving</i>	179
6.2	<i>Material handling</i>	186
6.3	<i>Scaffolds</i>	196
7	Foundations	206
7.1	<i>Trees</i>	209
7.2	<i>Foundation design</i>	211
7.3	<i>Strip foundations</i>	213
7.4	<i>Raft foundations</i>	220
7.5	<i>Pad foundations</i>	222
7.6	<i>Small diameter piles and ground beams</i>	225
7.7	<i>Pile foundations</i>	228
8	Basement construction	239
8.1	<i>Secant pile walls</i>	241
8.2	<i>Diaphragm walls</i>	242
8.3	<i>Top down basement construction</i>	243
8.4	<i>Waterproofing basements</i>	246
8.5	<i>Basement insulation</i>	252

9	Ground supported floors	253
9.1	Ground supported concrete floors	255
9.2	Industrial concrete floors	257
9.3	Concrete floor screeds	259
9.4	Resistance to contaminants	261
9.5	Ground floor insulation	263
9.6	Ground-bearing concrete	264
9.7	Suspended beam and block	265
9.8	Suspended timber	266
9.9	Thermal bridging ground floors	267
10	Suspended floors	268
10.1	Suspended timber ground floors	270
10.2	Beam and block floors	272
10.3	Timber upper floors	275
10.4	In-situ reinforced concrete floors	287
10.5	Precast concrete floors	290
10.6	Composite floors	293
10.7	Raised access flooring	294
11	External walls	295
11.1	Stone walls	297
11.2	Bricks	302
11.3	Blocks	309
11.4	Cement mortars	312
11.5	Damp proof courses (DPC)	314
11.6	Solid brick walls	318
11.7	Design of masonry walls	325
11.8	Jointing and pointing	337
11.9	Feature brickwork	338
11.10	Cavity wall construction	341
11.11	Cavity wall insulation	343
11.12	Thermal improvements	350
11.13	Thermal or cold bridging	353
11.14	Lintels and arches	355
11.15	Timber frame construction	360
11.16	Rendering	362
11.17	Claddings	365
12	Pitched roofs classification	369
12.1	Structure	374
12.2	Stability	387
12.3	Underlays	388
12.4	Double lap tiles	389

Contents

12.5	Single lap tiles	394
12.6	Ridges and hips	396
12.7	Slates	397
12.8	Fibre cement slates	402
12.9	Roof ventilation	403
12.10	Roof insulation	406
12.11	Vapour control layer (VCL)	411
12.12	Structural insulated panels (SIPs)	412
12.13	Thatched roofs	413
12.14	Steel roof trusses	414
12.15	Double skin, energy roof systems	419
12.16	Long span roofs	422
12.17	Membrane roof	438
12.18	Fabric	440
12.19	Rooflights	441
13	Flat roofs	443
13.1	Falls	447
13.2	Decks	451
13.3	Built up felt roofing (BUFR)	452
13.4	Mastic asphalt	453
13.5	Milled lead sheet	454
13.6	Single ply membranes	456
13.7	Glass reinforced plastic (GRP)	458
13.8	Green roofs	459
13.9	Flat roof insulation	461
13.10	Rooflights	463
14	Steel framed buildings	465
14.1	Development	466
14.2	Steel frame structure	467
14.3	Hot rolled steel sections	472
14.4	Steelwork connections	477
14.5	Fire protection	481
15	Concrete framed buildings	483
15.1	Formwork	485
15.2	Reinforcement	493
15.3	Structure	498
15.4	Fire protection	501
15.5	Precast concrete frames	503
15.6	Connections	504
15.7	Pre-stressed concrete	507
15.8	Pre-tensioning	509

- 15.9 *Post-tensioning* 510
- 15.10 *Comparison of pre-stressed and reinforced concrete* 512
- 15.11 *Portal frames* 513

16 Cladding of framed buildings **515**

- 16.1 *Non-load-bearing brick panels* 517
- 16.2 *Lightweight infill panels* 520
- 16.3 *Rainscreen cladding* 522
- 16.4 *Glazing* 525
- 16.5 *Structural glazing* 526
- 16.6 *Curtain walling* 527
- 16.7 *Concrete cladding panels* 531

17 Windows and doors **537**

- 17.1 *Casement windows* 541
- 17.2 *Sliding sash windows* 545
- 17.3 *Pivot windows* 550
- 17.4 *Bay windows* 551
- 17.5 *Security* 552
- 17.6 *Window schedules* 553
- 17.7 *Glazing* 556
- 17.8 *Double glazing* 558
- 17.9 *Triple glazing* 561
- 17.10 *Glazing health and safety* 564
- 17.11 *External doors* 566
- 17.12 *Internal doors* 571
- 17.13 *Fire doors* 576

18 Internal elements: Ceilings **580**

- 18.1 *Plasterboard ceilings* 581
- 18.2 *Suspended ceilings* 582
- 18.3 *Internal walls/partitions* 586
- 18.4 *Party walls* 593
- 18.5 *Stud partition walls* 595
- 18.6 *Demountable partitions* 598
- 18.7 *Solid plastering* 599
- 18.8 *Dry lining* 601
- 18.9 *Stairs* 605
- 18.10 *Paints and painting* 617
- 18.11 *Glazed wall tiling* 621

19 Drainage **623**

- 19.1 *Below ground drainage – drains and sewers* 625
- 19.2 *Means of access* 630

Contents

19.3	Drainage pipes	634	
19.4	Surface water drainage	636	
19.5	Sustainable urban drainage systems (SUDS)	642	
19.6	Above ground drainage	647	
19.7	Sanitary fittings	651	
20	Building services		654
20.1	Cold water supply	655	
20.2	Domestic hot water systems (DHW)	659	
20.3	Space heating	667	
20.4	Electrical services	671	
20.5	Power circuits	677	
20.6	Lighting circuits	679	
20.7	Telecommunication services and electronic installations	680	
20.8	Gas services	681	
20.9	Flues	684	
21	Insulation and U-values		686
21.1	U-values	688	
21.2	Thermal conductivity (λ) of typical building materials	691	
21.3	Floor insulation	693	
21.4	Thermal bridging	697	
21.5	Sound insulation	700	
21.6	Sound insulation improvements	709	
22	Construction defects		711
22.1	Building survey	713	
22.2	Cracking in walls	716	
22.3	Underpinning	717	
22.4	Timber rot	720	
22.5	Damp proof course remedial work	722	
	Index		724