Contents

1.1	The Need for National and International Organizations 1
1.2	The International Civil Aviation Organization 1
1.3	Nongovernmental Organizations 4
1.4	U.S. Governmental Organizations 4
1.5	Aviation Planning and Regulation at State Level 6
1.6	Patterns of Airport Ownership 7
1.7	Revenues and Expenditures at U.S. Airports 9
1.8	Sources of Capital Financing for U.S. Airports 11
1.9	Federal Financing 15
1.10	The U.S. National Plan of Integrated Airport Systems: A Classification
	of Airports 18
Refer	ences 20
3 D	
2 F	orecasting Air Transport Demand 21
2.1	Introduction 21
2.2	Components of Air Transport Demand 25
2.3	Conventional Airport Forecast Methods 26
2.4	Integrated Demand Forecast Framework 33
2.5	Multiairport Region Forecast Framework 43
2.6	Air Trip Distribution Models 60
2.7	Modal Choice Models 62
2.8	Generation–Distribution Models 63
2.0	
	Air Freight Demand Forecasts 66
2.9 2.10	Air Freight Demand Forecasts 66 General Aviation Forecasts 68
2.9	•
2.9 2.10 2.11	General Aviation Forecasts 68
2.9 2.10 2.11 Refer	General Aviation Forecasts 68 Route Choice Models 70 ences 71
2.9 2.10 2.11 Refer	General Aviation Forecasts 68 Route Choice Models 70 ences 71 Characteristics of Aircraft As They Affect Airports 74
2.9 2.10 2.11 Refer 3.1	General Aviation Forecasts 68 Route Choice Models 70 ences 71 Characteristics of Aircraft As They Affect Airports 74 Relationships between Aircraft and Airports 74
2.9 2.10 2.11 Refer 3 C 3.1 3.2	General Aviation Forecasts 68 Route Choice Models 70 ences 71 Characteristics of Aircraft As They Affect Airports 74 Relationships between Aircraft and Airports 74 The Influence of Aircraft Design on Runway Length 76
2.9 2.10 2.11 Refer 3.1 3.2 3.3	General Aviation Forecasts 68 Route Choice Models 70 ences 71 Characteristics of Aircraft As They Affect Airports 74 Relationships between Aircraft and Airports 74 The Influence of Aircraft Design on Runway Length 76 Other Airport Layout Factors 94
2.9 2.10 2.11 Refer	General Aviation Forecasts 68 Route Choice Models 70 ences 71 Characteristics of Aircraft As They Affect Airports 74 Relationships between Aircraft and Airports 74 The Influence of Aircraft Design on Runway Length 76

4 A	Airport System Planning 105
4.1	Aviation System Planning 105
4.2	Levels of Planning 106
4.3	Planning Airport Systems under Different States of Industry 106
4.4	Effect of Airline Hubs and Deregulation on U.S. Airport System 110
4.5	Air Transport Planning in the United States 115
4.6	Airport System Planning in Europe 129
4.7	Airport System Plan Analysis 131
4.8	Data Structure for Airport System Planning 145
Refe	rences 148
5 A	Airport Master Planning 150
5.1	Airport Master Plan: Definition and Objectives 150
5.2	Hierarchy of Planning 151
5.3	Elements of Airport Master Plan: FAA 151
5.4	ICAO Guidelines for Structure of Master Plan 160
5.5	Airport Layout Design 162
5.6	Data Requirements for Master Planning 163
5.7	Structure of Master Plan Report 167
5.8	Airport Site Selection 177
Refe	rences 178
6 (CNS/ATM 179
6.1	Evolution of the System 179
6.2	U.S. National Airspace System (NAS) 183
6.3	CNS/ATM of the NAS 193
6.4	Next-Generation Systems 230
Refe	rences 232
_	
7	Airport Capacity 234
7.1	Introduction 234
7.2	Capacity, Level of Service, and Demand Peaking 235
7.3	Airside Capacity 237
7.4	Factors Affecting Airside Capacity and Delay 241
7.5	Determination of Runway Capacity and Delay 245
7.6	Annual Service Volume 256
7.7	Preliminary Capacity Analyses 258
7.8	Calculating Aircraft Delay 260
7.9	Taxiway Capacity 264
7.10	
7.11	Assessing System Capacity–Delay for Airport Development 266
7.12	
	rences 294

8 A	irside Configuration and Geometric Design of the Airside 297
8.1	Introduction 297
8.2	Principles of Airport Layout 298
8.3	Airfield Configuration 298
8.4	Runway Orientation 301
8.5	Obstructions to Airspace: FAA and ICAO Standards 309
8.6	Runway Length 312
8.7	Clearways and Stopways 318
8.8	ICAO Reference Code 319
8.9	FAA Airport Reference Code 321
8.10	Separation of Parallel Runways 322
8.11	Runway and Taxiway Cross Section 323
8.12	Object-Clearing Criteria 330
8.13	Longitudinal-Grade Design for Runways and Stopways 332
8.14	Longitudinal-Grade Design for Taxiways 335
8.15	Taxiway Design 336
8.16	Holding Aprons 340
8.17	Terminal Aprons 340
8.18	Summary 349
Refer	ences 349
9 S	afeguarding the Airport 351
9.1	Airport Safety 351
9.2	Airport Security 359
9.3	Airport Emergency Planning 361
9.4	Planning of Airport Security 367
9.5	Safeguarding the Airspace 373
Refer	ences 412
10 P	Passenger Terminal 414
10 1	
10.1	Function of Airport Passenger Terminal 414
10.2	Terminal User 414
10.3	Facilities Required at Passenger Terminal 415
10.4	Passenger and Baggage Flow 417
10.5	Security Considerations in Passenger Terminal Design and Layout 418
10.6	Terminal Design Concepts 420
10.7	Vertical Distribution of Activities 424
10.8	Passenger Behavior in Terminal 426
10.9	Importance of Passenger Terminal Expenditures 428
	Space Requirements for Individual Facilities 429
	Baggage Handling 438
10.12	2 Terminals for Low-Cost Carriers 444

10.13	Expandability, Modularity, and Flexibility 444
10.14	Number of Aircraft Gates 447
10.15	Parking Configurations and Apron Layout 452
10.16	Apron Facilities and Requirements 454
Refere	ences 456
11 A	ir Cargo Facilities 457
11.1	Importance of Air Cargo 457
11.2	Functions of Cargo Terminal 457
11.3	Factors Affecting Size and Form of Cargo Terminal 458
11.4	Flow through Airport Cargo Terminal 462
11.5	Pallets, Containers, Igloos, and Other Unitized Systems 465
11.6	Freight-Carrying Aircraft 469
11.7	Documentation and Control 469
11.8	Apron Cargo Handling 471
11.9	Elements to Be Considered in Design of Air Freight Terminals 472
11.10	Example of Design of Middle-Technology Freight Terminal 474
	Design of Highly Mechanized Cargo Terminal with Container Stacks and ETV 479
	Mail and Express Parcels Facilities 485
	Conclusion 486
Refer	ences 488
12 A	irport Drainage and Pavement Design 489
AIRP	ORT DRAINAGE 489
12.1	Introduction 489
12.2	Estimation of Runoff 490
12.3	Collection and Disposal of Runoff 496
12.4	Subsurface Drainage 504
STRU	JCTURAL PAVEMENT DESIGN 508
12.5	Introduction 508
12.6	Flexible-Pavement Design Methods (U.S. Practice) 516
12.7	Rigid-Pavement Design Methods (U.S. Practice) 527
12.8	Pavements for Light Aircraft 536
12.9	Aircraft and Pavement Classification Numbers 538
Refer	
	irport Access 543
13.1	Access Problem 543
13.2	Determining Mix of Access Modes 547
13.3	Available Access Modes 548

13.4 Access Modal Choice Models 557				
13.5 Parking Space at Airports 559				
13.6 Curbfront Design 562				
13.7 Capacity of Access Routes 564				
13.8 Layout of Access 564				
13.9 Summary 571				
References 571				
References 5/1				
14 Heliports, STOLports, and Vertiports 573				
14.1 Introduction 573				
14.2 Helicopter Characteristics and Trends 573				
14.3 Planning and Design of Heliports 577				
14.4 Planning and Design of STOLports 595				
14.5 Planning and Design of STOL Facilities 596				
14.6 Planning and Design of Vertiports 600				
References 601				
15 Airport Modeling and Simulation 602				
15.1 Introduction 602				
15.2 Definitions and Concepts 603				
15.3 Airport Simulations 609				
15.4 Airfield–Airspace Simulation 610				
15.5 Environmental Simulation Models 635				
15.6 Airport–Landside Simulation 644				
15.7 Airport GIS 653				
References 655				
16 Airmant C'4 (50)				
16 Airport City 659				
16.1 Introduction 659				
16.2 Global City 660				
16.3 Building Blocks of Airport City 662				
16.4 Anatomy of Aerotropolis 666				
16.5 Airport Cities of the World 673				
16.6 Planning of Airport City and Aerotropolis 700				
References 703				
17 Environmental Impacts of Airports 704				
17.1 Introduction 704				
17.2 Environmental Legislation 705				
17.3 Airport Environmental Guidance 706				
17.4 Environmental Review Process 707				
17.5 Air Emissions/Quality 714				

x Contents

17.6	Biodiversity and Natural Resources 720	
17.7	Historic, Archaeological, Architectural, and Cultural Resources	72
17.8	Noise and Land Use 721	
17.9	Social and Socioeconomic Resources 729	
17.10	Waste Management 731	
17.11	Water Resources 732	
17.12	Sustainable Development 733	
Refere	ences 736	

Index 739