

CONTENTS

Paragraph		Page
Chapter 1. REGULATORY REQUIREMENTS AND DEFINITION OF TERMS		
1. GENERAL		1
2. DEFINITIONS		1
3. RELATED/REFERENCED READING MATERIAL.....		3
4. AIRPORT REFERENCE CODE (ARC).....		5
5. AIRPORT LAYOUT PLAN		5
6. MODIFICATION OF AIRPORT DESIGN STANDARDS TO MEET LOCAL CONDITIONS		5
7. NOTICE TO THE FAA OF AIRPORT DEVELOPMENT.....		5
8. NOTICE TO THE FAA OF PROPOSED CONSTRUCTION		6
9. FAA STUDIES.....		6
10. FEDERAL ASSISTANCE.....		6
11. ENVIRONMENTAL ASSESSMENTS.....		6
12. STATE ROLE		6
13. LOCAL ROLE		6
14. to 199. RESERVED		6
Chapter 2. AIRPORT GEOMETRY		
200. INTRODUCTION		9
201. PRINCIPLES OF APPLICATION		9
202. RUNWAY LOCATION AND ORIENTATION		9
203. ADDITIONAL RUNWAYS		10
204. TAXIWAY SYSTEM		10
205. AIRPORT APRONS		10
206. SEPARATION STANDARDS		10
207. PARALLEL RUNWAY SEPARATION--SIMULTANEOUS VFR OPERATIONS.....		11
208. PARALLEL RUNWAY SEPARATION--SIMULTANEOUS IFR OPERATIONS		11
209. RUNWAY TO PARALLEL TAXIWAY AND TAXILANE SEPARATION.....		12
210. BUILDING RESTRICTION LINE (BRL)		12
211. OBJECT CLEARING CRITERIA		12
212. RUNWAY PROTECTION ZONE (RPZ).....		13
213. to 299. RESERVED		13
Chapter 3. RUNWAY DESIGN		
300. INTRODUCTION		21
301. RUNWAY LENGTH		21
302. RUNWAY WIDTH.....		21
303. RUNWAY SHOULDERS.....		21
304. RUNWAY BLAST PAD.....		21
305. RUNWAY SAFETY AREA (RSA).....		21
306. OBSTACLE FREE ZONE (OFZ).....		22
307. RUNWAY OBJECT FREE AREA		23
308. CLEARWAY STANDARDS.....		23
309. STOPWAY STANDARDS.....		23
310. RESCUE AND FIREFIGHTING ACCESS.....		24
311. to 399. RESERVED		24
Chapter 4. TAXIWAY AND TAXILANE DESIGN		
400. INTRODUCTION		33
401. DIMENSIONAL STANDARDS		33
402. TAXIWAY SHOULDERS.....		33
403. TAXIWAY SAFETY AREA (TSA).....		33
404. TAXIWAY AND TAXILANE OBJECT FREE AREA (OFA)		33
405. FULL-LENGTH PARALLEL TAXIWAY		34
406. TAXIWAY INTERSECTIONS		34

407. ENTRANCE TAXIWAYS.....	34
408. BYPASS TAXIWAYS.....	35
409. TAXIWAY AND RUNWAY INTERFACE	35
410. HOLDING BAYS.....	35
411. TURNAROUNDS	35
412. DUAL PARALLEL TAXIWAYS.....	35
413. TAXIWAY BETWEEN PARALLEL RUNWAYS.....	36
414. EXIT TAXIWAYS.....	36
415. APRON TAXIWAYS AND TAXILANES.....	36
416. END-AROUND TAXIWAYS	36
417. to 499. RESERVED.....	39

Chapter 5. SURFACE GRADIENT AND LINE OF SIGHT

500. INTRODUCTION	49
501. BACKGROUND	49
502. SURFACE GRADIENT STANDARDS	49
503. LINE OF SIGHT STANDARDS.....	56
504. to 599. RESERVED.....	56

Chapter 6. SITE REQUIREMENTS FOR NAVAID AND ATC FACILITIES

600. GENERAL.....	59
601. MICROWAVE LANDING SYSTEM	59
602. INSTRUMENT LANDING SYSTEM.....	61
603. NONDIRECTIONAL BEACON.....	63
604. VERY HIGH FREQUENCY OMNIRANGE	64
605. APPROACH LIGHTING SYSTEMS	64
606. OMNIDIRECTIONAL APPROACH LIGHTING SYSTEMS.....	65
607. LEAD-IN LIGHTING SYSTEMS	65
608. AIRPORT ROTATING BEACONS	65
609. AIRPORT TRAFFIC CONTROL TOWERS.....	65
610. AIRPORT SURVEILLANCE RADAR	66
611. AIRPORT SURFACE DETECTION EQUIPMENT	66
612. RUNWAY VISUAL RANGE FACILITIES	66
613. AUTOMATIC WEATHER OBSERVATION STATIONS (AWOS).....	66
614. PHYSICAL SECURITY	67
615. CABLE PROTECTION.....	67
616. to 699. RESERVED.....	67

Chapter 7. RUNWAY AND TAXIWAY BRIDGES

700. INTRODUCTION	69
701. SITING PRECEPTS	69
702. DIMENSIONS.....	69
703. LOAD CONSIDERATIONS.....	69
704. DECK DESIGN	69
705. MARKING AND LIGHTING.....	69
706. OTHER CONSIDERATIONS.....	69
707. PASSENGER AND BAGGAGE TUNNELS	70
708. to 799. RESERVED.....	70

Chapter 8. THE EFFECTS AND TREATMENT OF JET BLAST

800. INTRODUCTION	77
801. JET BLAST EFFECTS.....	77
802. BLAST FENCES	77
803. SHOULDERS AND BLAST PADS	78

Appendix 1. WIND ANALYSIS

1.	OBJECTIVE.....	87
2.	CROSSWINDS	87
3.	COVERAGE AND ORIENTATION OF RUNWAYS	87
4.	ASSEMBLING WIND DATA.....	87
5.	ANALYZING WIND DATA.....	88
6.	CONCLUSIONS	88
7.	ASSUMPTIONS	88
8.	COMPUTER WIND ANALYSIS.....	88

Appendix 2. RUNWAY END SITING REQUIREMENTS

1.	PURPOSE.....	100
2.	APPLICATION	100
3.	LIMITATIONS	100
4.	EVALUATION CONSIDERATIONS.....	100
5.	CLEARANCE REQUIREMENTS	101

Appendix 3. AIRPORT REFERENCE POINT

1.	DISCUSSION.....	109
2.	SAMPLE COMPUTATION	109
3.	ACCURACY	109

Appendix 4. COMPASS CALIBRATION PAD

1.	PURPOSE.....	111
2.	BACKGROUND	111
3.	APPLICATION	111
4.	DESIGN OF COMPASS CALIBRATION PAD.....	111
5.	LOCATION OF COMPASS CALIBRATION PAD	112
6.	CONSTRUCTION OF COMPASS CALIBRATION PAD.....	112
7.	VOR CHECKPOINT	113

Appendix 5. SMALL AIRPORT BUILDINGS, AIRPLANE PARKING, AND TIEDOWNS

1.	GENERAL	117
2.	TRANSIENT APRON	117
3.	APRON FOR BASED AIRPLANES.....	117
4.	TIEDOWNS	118
5.	OTHER CONSIDERATIONS	118
6.	HANGARS.....	118
7.	ADMINISTRATION BUILDING	118
8.	AIRPORT SURVEY	122
9.	BUILDING PLAN	122
10.	EXPANSION	122
11.	CIRCULATION	122
12.	WAITING ROOM.....	122
13.	MANAGER'S OFFICE	123
14.	EATING FACILITIES.....	123
15.	PUBLIC RESTROOMS	123
16.	ROADS AND AUTO PARKING	123

Appendix 6. METRIC CONVERSION AND TYPICAL AIRPORT LAYOUT PLAN

Appendix cancelled (pp. 125-130)

Appendix 7. AIRPORT LAYOUT PLAN COMPONENTS AND PREPARATION

Appendix cancelled (pp. 131-138)

Appendix 8. RUNWAY DESIGN RATIONALE

1.	SEPARATIONS	139
2.	OBSTACLE FREE ZONE (OFZ)	139
3.	RUNWAY SAFETY AREA	139
4.	RUNWAY OBJECT FREE AREA (ROFA)	139
5.	RUNWAY SHOULDERS AND BLAST PADS	140
6.	CLEARWAY	140
7.	STOPWAY	140
8.	RUNWAY PROTECTION ZONE (RPZ)	140

Appendix 9. TAXIWAY AND TAXILANE DESIGN RATIONALE

1.	INTRODUCTION	141
2.	BACKGROUND AND RATIONALE	141
3.	EXIT TAXIWAY LOCATION	142
4.	WINGTIP TRACE	146

Appendix 10. TAXIWAY FILLET DESIGN

1.	INTRODUCTION	149
2.	EXAMPLE NO. 1, JUDGMENTAL OVERSTEERING	150
3.	EXAMPLE NO. 2, MAINTAINING COCKPIT OVER CENTERLINE	150

Appendix 11. COMPUTER PROGRAM

Appendix cancelled (pp. 153-164)

Appendix 12. AIRPLANE DATA

1.	BACKGROUND	165
2.	EXPLANATORY INFORMATION	166

**Appendix 13. AIRPLANES ARRANGED BY AIRPLANE MANUFACTURER AND
AIRPORT REFERENCE CODE**

Section 1. Alphabetical Listing (U.S. customary units)	251
Section 2. Alphabetical Listing (SI units)	257
Section 3. Listing Small Airplanes by Airport Reference Code (U.S. customary units)	263
Section 4. Listing Large Airplanes by Airport Reference Code (U.S. customary units)	264
Section 5. Listing Small Airplanes by Airport Reference Code (SI units)	269
Section 6. Listing Large Airplanes by Airport Reference Code (SI units)	270

Appendix 14. DECLARED DISTANCES

1.	APPLICATION	275
2.	BACKGROUND	275
3.	FAA APPROVAL FOR APPLYING DECLARED DISTANCES IN AIRPORT DESIGN	275
4.	RUNWAY SAFETY AREA (RSA) AND RUNWAY OBJECT FREE AREA (ROFA) LENGTHS	276
5.	RUNWAY PROTECTION ZONE (RPZ) LOCATION AND SIZE	276
6.	CLEARWAY LOCATION	276
7.	NOTIFICATION	276

Appendix 15. TRANSFER OF ELECTRONIC DATA

Appendix cancelled (pp. 283-290)

Appendix 16. NEW INSTRUMENT APPROACH PROCEDURES

1.	BACKGROUND	291
2.	INTRODUCTION.....	291
3.	ACTION	291
4.	DEFINITIONS	291

Appendix 17. MINIMUM DISTANCES BETWEEN CERTAIN AIRPORT FEATURES AND ANY ON-AIRPORT AGRICULTURE CROPS (1 page).

Appendix 18. ACRONYMS (1 page).

Appendix 19. INDEX (4 pages).

Table		Page
1-1.	Increases in airport design standards associated with an upgrade in the first component (aircraft approach category) of the airport reference code	7
1-2.	Increases in airport design standards to provide for lower approach visibility minimums	8
2-1.	Runway separation standards for aircraft approach categories A & B	14
2-2.	Runway separation standards for aircraft approach categories C & D	15
2-3.	Taxiway and taxilane separation standards.....	16
2-4.	Runway protection zone (RPZ) dimensions	19
3-1.	Runway design standards for aircraft approach category A & B visual runways and runways with not lower than 3/4-statute mile (1 200 m) approach visibility minimums	25
3-2.	Runway design standards for aircraft approach categories A & B runways with lower than 3/4-statute mile (1 200 m) approach visibility minimums	26
3-3.	Runway design standards for aircraft approach categories C & D	26-1
4-1.	Taxiway dimensional standards	38
4-2.	Taxiway fillet dimensions.....	40
4-3.	Wingtip clearance standards	40
4-4.	Visual screen height calculation formula (same elevation as runway)	48-5
4-5.	Visual screen height calculation formula (EAT below DER elevation) for Design Group III	48-6
4-6.	Visual screen height calculation formula (EAT below DER elevation) for Design Group IV	48-7
4-7.	Visual screen height calculation formula (EAT below DER elevation) for Design Groups V and VI.....	48-8
4-8.	Visual screen vertical height calculation tables	48-9
4-9.	Visual screen panel wind-loading deflection allowance	48-12
4-10.	CIE chromaticity coordinate limits	48-12
4-11.	Minimum reflection levels	48-13
A2-1.	Approach/Departure Requirements Table.....	103
A9-1.	Exit taxiway cumulative utilization percentages.....	142
A16-1A	ILS and LPV approach requirements	292
A16-1B	Approach procedure with vertical guidance	293
A16-1C	Nonprecision approach requirements	294
A16-2.	Survey requirements for instrument approach procedures.....	295
A17-1.	Minimum Distances Between Certain Airport Features and Any On-Airport Agriculture Crops	296
Figure		Page
2-1.	Typical airport layout.....	17
2-2.	Parallel runway separation.....	18
2-3.	Runway protection zone	20
3-1.	Runway safety area	27
3-2.	Obstacle free zone (OFZ) for visual runways and runways with not lower than 3/4 statute mile (1,200 m) Approach visibility minimums	28
3-3.	Obstacle free zone (OFZ) for runways serving small airplanes exclusively with lower than 3/4-statute mile (1,200 m) approach visibility minimums	29
3-4.	Obstacle free zone (OFZ) for runways serving large airplanes with lower than 3/4-statute mile (1,200 m) approach visibility minimums	30
3-5.	Obstacle free zone (OFZ) for runways serving large airplanes with lower than 3/4-statute mile (1,200 m) approach visibility minimums and displaced threshold.....	31
3-6.	Precision object free zone	32
3-7.	Clearway	32-1
3-8.	Stopway	32-2
4-1.	Taxiway intersection details	40
4-2.	Maintaining cockpit over centerline	42
4-3.	Problematic taxiway geometry	43
4-5.	Entrance taxiway.....	44
4-6.	Bypass taxiway	44
4-7.	Dual parallel taxiway entrance	45
4-8.	Typical holding bay configurations	46

4-9.	Taxiway turnaround	46
4-10.	Crossover taxiway	47
4-11.	Right-angled exit taxiway	47
4-12.	Acute-angled exit taxiway	48
4-15.	Typical end-around taxiway layout	48-3
4-16.	End-around taxiway visual screen width calculations	48-4
4-17.	Visual screen width calculation formula	48-5
4-18.	Examples of mounting screen to vertical column	48-10
4-19.	Examples of panel layout for 13-foot-high screen	48-11
4-20.	Diagonal stripe orientation	48-12
4-21.	Examples of fragility connections	48-14
5-1.	Longitudinal grade limitations for aircraft approach categories A & B	50
5-2.	Transverse grade limitations for aircraft approach categories A & B	51
5-3.	Longitudinal grade limitations for aircraft approach categories C & D	52
5-4.	Transverse grade limitations for aircraft approach categories C & D	53
5-5.	Runway safety area grade limitations beyond 200 feet (60 m) from the runway end	55
5-6.	Runway visibility zone	57
6-1.	AZ antenna siting	59
6-2.	Typical NAVAID placement	60
6-3.	AZ antenna critical area	61
6-4.	EL antenna siting	61
6-5.	EL antenna critical area	61
6-6.	ILS LOC siting and critical area	62
6-7.	GS siting and critical area	62
6-8.	Marker beacon site	63
6-9.	NDB site	63
6-10.	A TVOR installation	64
6-11.	TVOR Clearances	64
7-1.	Full width runway-taxiway bridge	71
7-2.	Cross-section full width runway-taxiway bridge	72
7-3.	Minimum width taxiway bridge with positive edge protection, O'Hare Airport, Chicago, IL	73
7-4.	Example structural deck and depressed roadway, O'Hare Airport, Chicago, IL	74
7-5.	Suggested shoulder marking of minimum width taxiway bridge	75
7-6.	Controlled use service road, Los Angeles International Airport, Los Angeles, CA	76
8-1.	Velocity distance curves, DC-8	79
8-2.	Velocity distance curves, B-727	80
8-3.	Velocity distance curves, B-747	81
8-4.	Velocity distance curves, DC-10	82
8-5.	Blast velocities of business jet airplanes	83
8-6.	Typical blast deflector fences, metal	84
8-7.	Typical blast deflector fences, concrete	85
A1-1.	Wind vector diagram	89
A1-2.	Typical environmental data service wind summary	90
A1-3.	Windrose blank showing direction and divisions	91
A1-4.	Completed windrose using figure A1-2 data	92
A1-5.	Windrose analysis	93
A1-6.	Windrose analysis--estimating area not included	94
A2-1.	Approach slopes	105
A2-2.	Offset approach course	106
A2-3.	Departure surface for Instrument Runways TERPS (40:1)	107
A2-4.	Nominal One-Engine Inoperative (OEI) Obstacle Identification Surface	108
A3-1.	Sample layout	109

A3-2.	Sample computation - airport reference point.....	110
A4-1.	Marking layout and details of wheel block	114
A4-2.	Type I. compass calibration pad	115
A4-3.	Type II. compass calibration pad	116
A5-1.	Parking apron area	119
A5-2.	Tiedown layouts.....	120
A5-3.	T-hanger layout	121
A8-1.	Approximate distance airplanes undershoot and overrun the runway end.....	140
A9-1.	Wingtip clearance - parallel taxiways	143
A9-2.	Wingtip clearance from taxiway	144
A9-3.	Wingtip clearance from apron taxiway	144
A9-4.	Wingtip clearance from taxilane	145
A9-5.	Pavement edge clearance on tangent	146
A9-6.	McDonnell-Douglas MD-88 wingtip clearance trace for a 100-foot (30.5 m) radius centerline	147
A9-7.	McDonnell-Douglas MD-88 wingtip clearance trace for a 120-foot (36.5 m) radius offset centerline	147
A9-8.	Boeing 727-200 wingtip clearance trace for a 120-foot (36.5 m) radius offset centerline	148
A9-9.	Boeing 727-100 wingtip clearance trace for a 120-foot (36.5 m) radius offset centerline	148
A10-1.	Taxiway intersection details	151
A10-2.	Depiction of symbols	152

A12-1.	Single engine, high wing, tailwheel airplanes 8,000 lb. (3,628 Kg) or less	167
A12-2.	Single engine, high wing, tailwheel airplanes 8,000 lb. (3,628 Kg) or less (cont'd)	168
A12-3.	Single engine, high wing, tricycle gear airplanes 8,000 lb. (3,628 Kg) or less	169
A12-4.	Single engine, low wing, tricycle gear airplanes 8,000 lb. (3,628 Kg) or less	170
A12-5.	Single engine, low wing, tricycle gear airplanes 8,000 lb. (3,628 Kg) or less (cont'd)	171
A12-6.	Twin engine, low or mid wing, tricycle gear airplanes 8,000 lb. (3,628 Kg) or less	172
A12-7.	Twin engine, low or mid wing, tricycle gear airplanes 8,000 lb. (3,628 Kg) or less (cont'd)	173
A12-8.	Twin engine, high or mid wing, tricycle gear airplanes 8,000 lb. (3,628 Kg) or less	174
A12-9.	Aerospatiale Nord 262	175
A12-10.	Aerospatiale/Sud SE-210 Caravelle	177
A12-12.	Avions de Transport Regional ATR-42 & -72	178
A12-13.	Avions Marcel Dassault Mystere 20 (Fan Jet Falcon)	179
A12-14.	BAe 1-11	180
A12-15.	B.A.C./SNIAS Concorde	181
A12-16.	B.A.C./Vickers VC-10	182
A12-17.	B.A.C./Vickers Viscount	183
A12-18.	Beech Starship	184
A12-19.	Beechcraft Airliner	185
A12-20.	Beechcraft King Air	186
A12-21.	Beechcraft Model 18 and Conversions	187
A12-22.	Beechcraft Queen Air	188
A12-23.	Boeing B-52 Stratofortress	189
A12-24.	Boeing KC-97L	190
A12-25.	Boeing KC-135A	191
A12-26.	Boeing 707-720	192
A12-27.	Boeing 727	193
A12-28.	Boeing 737	194

A12-29. Boeing 747	195
A12-30. Boeing 757	196
A12-31. Boeing 767	197
A12-32. British Aerospace 146	198
A12-33. Canadiar CL-44	199
A12-34. Canadiar CL-66	200
A12-35. Cessna Citation	201
A12-36. Construcciones Aeronauticas CASA C-212 and 235	202
A12-37. Convair-liner and Turboprop Conversions	203
A12-38. De Havilland Canada C-7 Caribou	204
A12-39. De Havilland Canada DASH 7 & DASH 8	205
A12-40. Douglas C-124 Globemaster	206
A12-41. De Havilland Canada DHC-6 Twin Otter	207
A12-42. Dornier Gmb H	208
A12-43. Douglas DC-3	209
A12-44. Douglas DC-4/6/7	210
A12-45. Embraer EmB 110	211
A12-46. Embraer EmB 120	212
A12-47. Fairchild C-119K Flying Boxcar	213
A12-48. Fairchild C-123K Provider	214
A12-49. Fairchild F-27	215
A12-50. Fokker F-27	216
A12-51. Fokker F-28	217
A12-52. Gates Learjet	218
A12-53. General Dynamics/Convair 880/990	219
A12-54. Grumman Gulfstream I	220
A12-55. Grumman Gulfstream II	221
A12-56. Grumman G-64/G-III	222
A12-57. Grumman G-73	223
A12-58. Hamburger-Flugzeubau HFB-320 Hansa	224
A12-59. Hawker Siddeley DH. 104 Dove	225
A12-60. Hawker Siddeley DH. 114 Heron	226
A12-61. Hawker Siddeley HS-125	227
A12-62. Hawker Siddeley HS-748	228
A12-63. Ilyushin IL-62	229
A12-64. Israel Aircraft Industries Westwind	230
A12-65. Lockheed Constellation and Super Constellation	231
A12-66. Lockheed C-5B Galaxy	232
A12-67. Lockheed C-141 Starlifter	233
A12-68. Lockheed L-188 Electra II	234
A12-69. Lockheed L-100 Hercules	235
A12-70. Lockheed L-1011 Tristar	236
A12-71. Lockheed L-1329 Jetstar	237
A12-72. Martin 404	238
A12-73. McDonnell-Douglas DC-8	239
A12-74. McDonnell-Douglas DC-9 and MD-80	240
A12-75. McDonnell-Douglas DC-10	241
A12-76. McDonnell-Douglas MD-11	242
A12-77. Mitsubishi MU-2	243
A12-78. Nihon/N.A.M.C. YS-11A	244
A12-79. Rockwell International NA-265 Sabreliner	245
A12-80. SAAB SF 340	246
A12-81. Short Brothers	247
A12-82. Shorts SC. 5/10 Belfast	248
A12-83. Swearingen Merlin	249
A12-84. Swearingen Metro	250
A14-1. Takeoff run available (TORA)	277
A14-2. Takeoff distance available (TODA)	278

A14-3. Accelerate-stop distance available (ASDA).....	279
A14-4. Landing distance available (LDA)	280