Assignment 7: Airport Geometric Design Standards

Date Due: October 30, 2023
Instructor: Trani

Problem 1

A new airport is designed with two satellite terminal buildings as shown in Figure 1. The buildings are designed to accommodate aircraft up to the size of a **Boeing 787-10** and the Airbus **A350-1000**.

a) Find the dimensions A through R in Figure 1. Make sure that your design allows pilots entering the gate position to maneuver with steering angles no more than 50 degrees. Assume the service roads have 12-foot wide lanes.
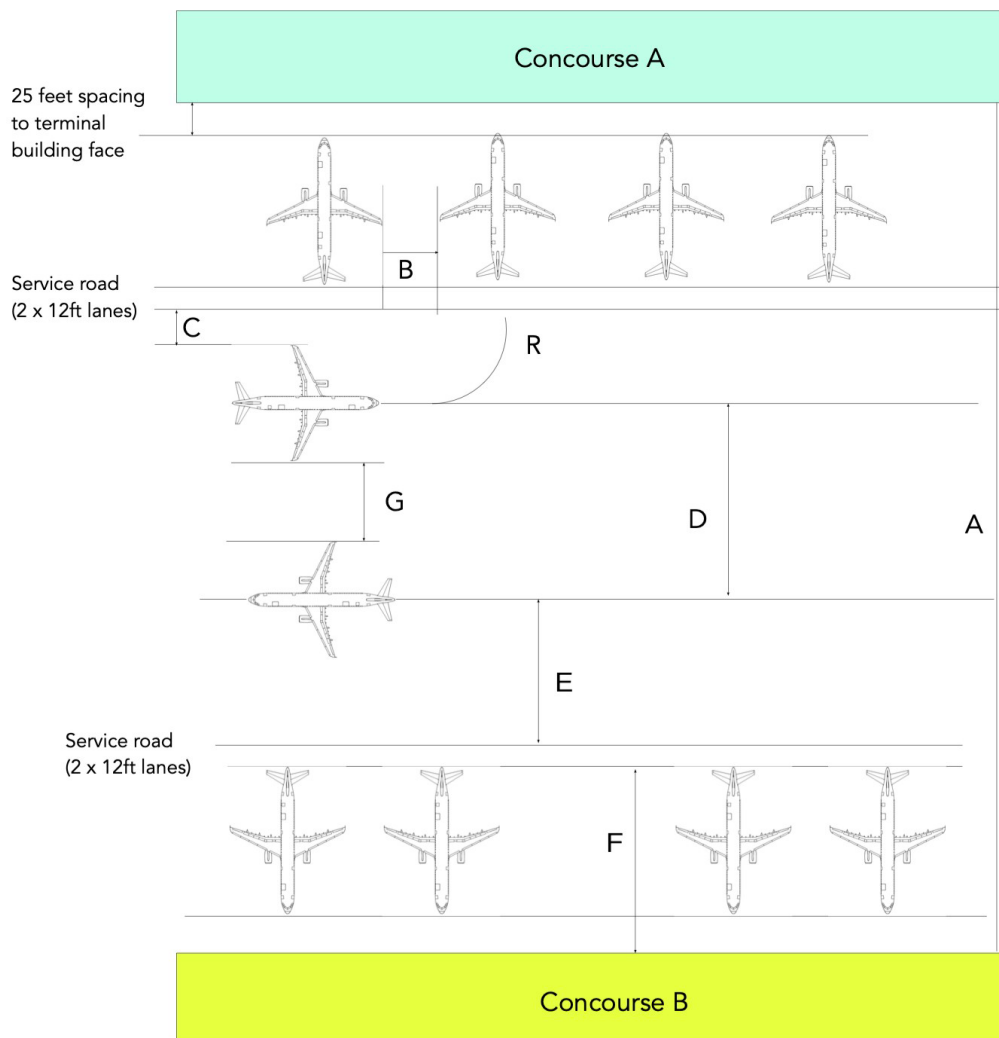

Figure 1. Airport Dual-Taxilane Configuration for Problem 1.

Based on its longer length and wider wingspan, the Airbus A350-1000 (A35K) is the critical aircraft

A35K:
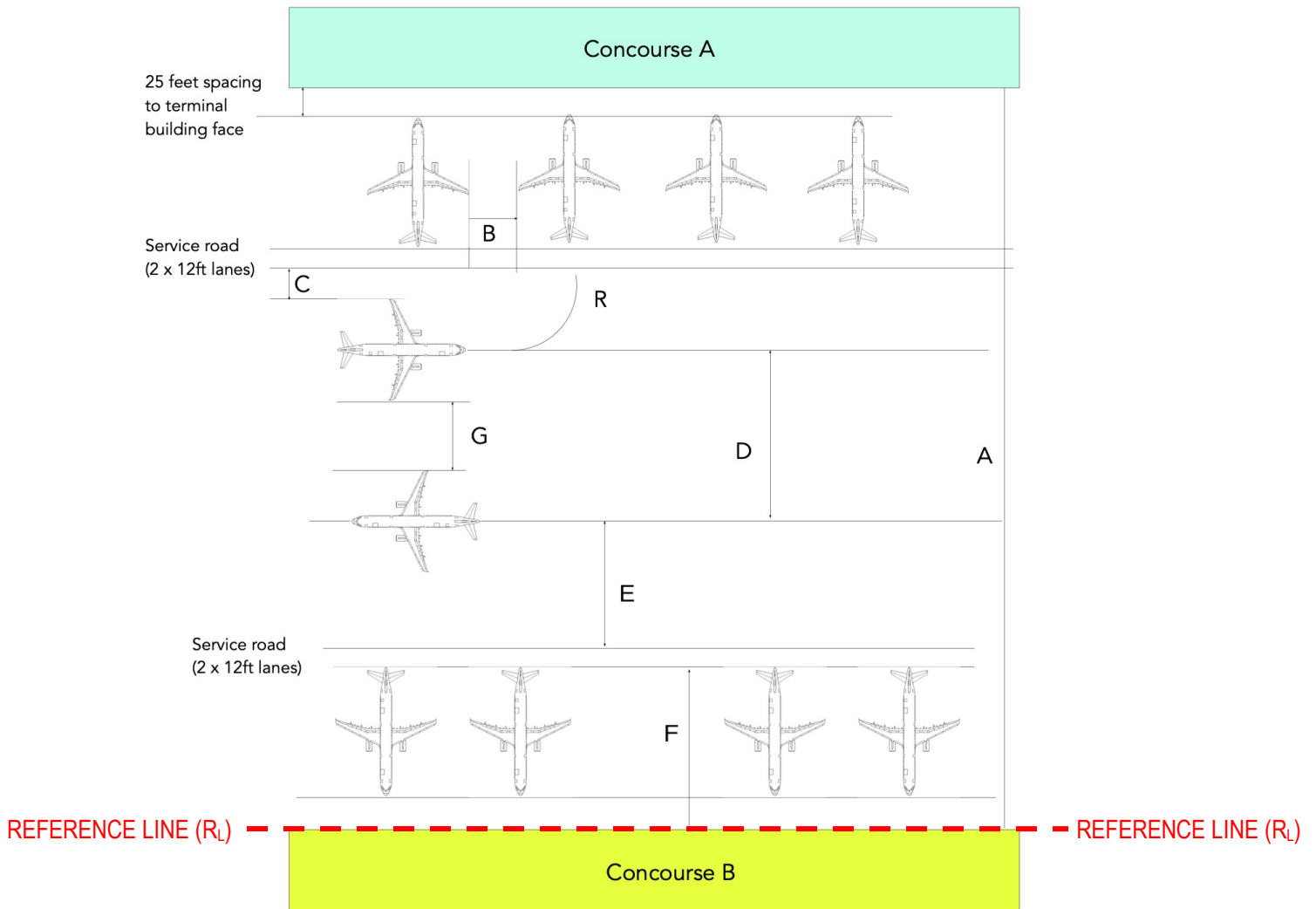Length (L): 242.1 ft
Wingspan (W): 212.4 ft
Approach speed: 154 kts
Tail Height: 57.1 ft
CMG: 111.8 ft
MGW: 42.1 ft

Therefore, AAC D | ADG V | TDG 6

Beginning at the reference line in the annotated figure above:

F = 25 ft + Aircraft Length
  = 0 ft + 25 ft + 242.1 ft
  = 267.1 ft

E = 135 ft (required separation for ADG-V aircraft from taxilane centerline to fixed or moveable object, per Table 4-1)

D = 242 ft (required separation for ADG-V aircraft from taxilane centerline to parallel taxilane centerline, per Table 4-1)

G = 28 ft (Separation for ADG-V aircraft from wingtip to wingtip, per Table 4-1)

Alternatively,

G = D – Aircraft Wingspan / 2 – Aircraft Wingspan / 2

   = D – Aircraft Wingspan

   = 242 ft – 212.4 ft

   = 29.6 ft

C = 30 ft (required separation for TDG-6 aircraft from wingtip to taxiway shoulder, per Table 4-2)

Alternatively,

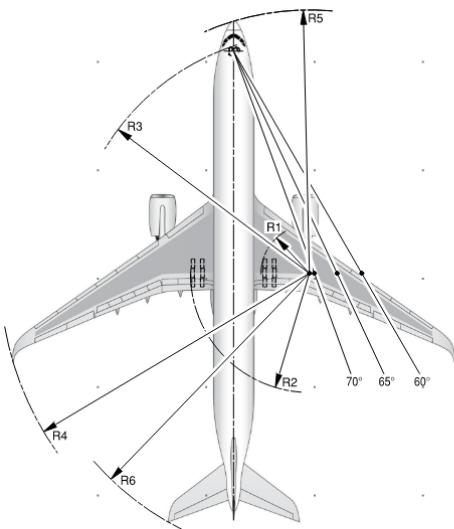C = E – Aircraft Wingspan / 2

   = 135 ft – 212.4 ft / 2

   = 28.8 ft

A = 25 + Aircraft Length + (2 x 12) + E + D + Aircraft Wingspan / 2 + C + (2 x 12) + Aircraft Length + 25

   = 25 ft + 242.1 ft + 24 ft + 135 ft + 242 ft + 212.4 ft / 2 + 30 ft + 24 ft + 242.1 ft + 25 ft

   = 1095.4 ft

B = 25 ft (required separation for ADG-V aircraft from wingtip to wingtip, per Table 5-1)

R = 163 ft

**ON A/C A350-1000

A350-1000 TURNING RADII									
TYPE OF TURN	STEERING ANGLE (deg)	EFFECTIVE STEERING ANGLE (deg)		R1 RMLG	R2 LMLG	R3 NLG	R4 WING	R5 NOSE	R6 TAIL
2	20	14.7	m	119.4	130.2	123.6	156.8	129.3	138.2
			ft	392	427	422	514	424	453
2	25	19.8	m	85.9	96.6	91.4	123.3	97.6	106.2
			ft	282	317	316	405	320	348
2	30	24.2	m	67.9	78.6	71.8	105.5	81.3	89.5
			ft	223	258	232	346	267	294
2	35	28.5	m	55.5	66.2	61.6	93.2	70.4	78.3
			ft	182	217	225	306	231	257
2	40	33.3	m	45.1	55.8	51.6	82.9	61.8	69.3
			ft	148	183	196	272	203	227
2	45	37.4	m	38.1	48.8	51.9	76.1	56.4	63.5
			ft	125	160	177	250	185	208
2	50	41.4	m	32.5	43.2	49.6	70.5	52.3	59.0
			ft	107		163	231	172	194
2	55	45.6	m	27.4	38.2	45.9	65.6	48.9	55.2
			ft	90	125	150	215	160	181
2	60	49.2	m	23.7	34.4	43.3	61.9	46.5	52.4
			ft	78	113	142	203	153	172
2	65	52.6	m	20.5	31.2	41.2	58.8	44.7	50.2
			ft	67	102	135	193	147	165
2	70	56.0	m	17.5	28.3	39.5	55.9	43.1	48.2
			ft	58	93	130	183	141	158
2	75 (MAX)	63.7	m	11.7	22.4	36.5	50.3	40.4	44.6
			ft	38	74	120	165	133	146
1	50	45.4	m	27.7	38.4	46.0	65.8	49.0	55.3
			ft	91	126	151	216	161	182
1	55	51.2	m	21.7	32.5	42.0	60.0	45.4	51.1
			ft	71	107	138	197	149	167
1	60	56.1	m	17.5	28.2	39.5	55.9	43.1	48.2
			ft	57	92	129	183	141	158
1	65	60.6	m	13.9	24.7	37.6	52.4	41.4	46.0
			ft	46	81	123	172	136	151
1	70	65.4	m	10.5	21.2	36.0	49.1	40.0	44.0
			ft	34	70	118	161	131	144
1	75 (MAX)	68.7	m	8.3	19.0	35.1	47.0	39.2	42.8
			ft	27	62	115	154	129	140

NOTE:
ABOVE 50°, AIRLINES MAY USE TYPE 1 OR TYPE 2 TURNS DEPENDING ON THE SITUATION.
TYPE 1 TURNS USE: ASYMMETRIC THRUST DURING THE WHOLE TURN;
      AND DIFFERENTIAL BRAKING TO INITIATE THE TURN ONLY.
TYPE 2 TURNS USE: SYMMETRIC THRUST DURING THE WHOLE TURN;
      AND NO DIFFERENTIAL BRAKING AT ALL.