Assignment 5

Date Due: March 5, 2015   Instructor: Trani

Problem 1

Briefly answer the following questions:

a) Explain the differences and similarities between the standard master plan approach and the integrated approach proposed by Leigh-Fisher and Associates explained in class.

b) For Philadelphia International Airport, explain the runway labeling scheme used for the three parallel runways oriented 85 degrees (magnetic). Which rule is used?

c) Use Google Earth and inspect the runway at San Diego International Airport (SAN). The Arnav database provides the following information on declared distances at the airport for runway 9.

TORA:9401 TODA:9401 ASDA:8280 LDA:7580 (all in feet)

Explain and verify that these distances are correct. Explain to me what values of RSA distance are assumed in the calculation of these distances. Assume the critical aircraft is a Boeing 787-8 and the airport has precision approaches supported by an Instrument Landing System (ILS)

Problem 2

A new airport location has been proposed and the airport would like to study the wind patterns. The airport is expected to receive commercial traffic with the Airbus A330-300 as the critical aircraft (see figure below). For this analysis use the FAA Java application for wind rose available at: https://airports-gis.faa.gov/airportsgis/publicToolbox/windroseForm.jsp. Wind data collected at the airport proposed site is shown in Table 1.

Figure 1. Airbus A330-300 Taxies to Runway 18C at CLT Airport (A. A. Trani). Note Wind Sock Located next to the Runway.

a) For the proposed airport, find the design crosswind component according to FAA criteria.

b) Find the optimal runway orientation for the runway (or runways) for the airport using the wind data provided in Table 1. Plot the runway orientation vs. the coverage achieved for every runway orientation every 10 degrees and indicate the optimal runway orientation in your plot. Show the resulting wind rose for the optimal solution indicating the coverage obtained using both runway thresholds.

c) Find the percent of the time **each runway end** can be used if a 5-knot tailwind is allowed in the calculations.

Table 1. Wind Data for New Airport. Speeds are Shown in knots (i.e., nautical miles per hour) in the Table Header.

Azimuth (degrees)	0-3	4-6	7-10	11-16	17-21	22-27	28-33	33-40	41 and over
10	460	400	129	13	0	0	0	0	0
20	320	220	169	91	34	14	0	0	0
30	560	540	400	178	40	20	5	0	0
40	534	400	230	78	11	0	0	0	0
50	632	520	240	59	17	17	17	17	17
60	418	230	120	55	44	16	14	4	2
70	635	760	540	210	120	80	33	20	13
80	634	490	320	190	45	43	14	18	2
90	569	453	198	234	36	30	12	5	3
100	539	398	329	250	129	36	20	10	2
110	320	230	84	10	0	0	0	0	0
120	287	230	145	45	13	0	0	0	0
130	415	210	129	86	33	12	0	0	0
140	457	508	142	76	25	12	8	0	0
150	524	277	143	30	0	0	0	0	0
160	390	185	182	42	0	0	0	0	0
170	148	186	191	114	6	0	0	0	0
180	131	299	151	190	12	4	0	0	0
190	405	200	197	117	67	16	5	4	1
200	515	243	213	26	13	13	13	13	7
210	432	319	213	78	24	1	0	0	0
220	667	347	236	93	62	47	41	12	3
230	286	210	123	74	31	1	0	0	0
240	85	202	198	106	35	0	0	0	0
250	190	238	178	98	21	12	0	5	0
260	461	512	146	80	29	16	12	4	4
270	236	221	141	94	29	0	0	0	0
280	436	231	150	107	54	33	21	21	6
290	198	227	185	77	8	0	0	0	0
300	548	301	167	54	24	16	12	5	3
310	258	127	107	50	8	0	0	0	0
320	98	215	211	119	48	13	8	0	0
330	269	153	119	46	30	13	5	4	2
340	289	195	99	22	0	0	0	0	0
350	238	128	128	38	0	0	0	0	0
360	267	201	105	28	9	3	1	0	0
Total	13851	10806	6758	3258	1057	468	241	142	65

Problem 3

Use the wind data provided in the file **A5_2015_all** (a text file that can be uploaded to the FAA website for Wind Rose analysis) that presents wind data for a proposed regional airport site in China. The critical aircraft for the proposed airport is the Xian MA600 which has similar performance as the ATR-72 aircraft manufactured in France by Aerospatiale/Alenia. The aircraft has a typical takeoff distance requirement of 1,350 meters at MTOW and sea level conditions. The proposed regional airport will be located at sea level.

a) Select the crosswind criteria for the design according to ICAO standards.

b) Find the optimal runway orientation for the runway (or runways) for this airport using the wind data provided. Plot the runway orientation vs. the coverage achieved for every runway orientation every 10 degrees and indicate the optimal runway orientation in your plot.

c) Show the resulting wind rose for the optimal solution indicating the coverage obtained using both runway thresholds.

Figure 2. Aerospatiale/Alenia ATR-72 at the Punta Cana International Airport (A. A. Trani).

Problem 4

Familiarize yourself with Blacksburg/Montgomery County regional Airport (BCB) using Google Earth and answer the following questions.

a) Check compliance of the **runway safety area prior to landing** on runway 30. Runway 30 has an RNAV GPS approach with visibility minima of 1 mile (check http://155.178.201.160/d-tpp/1502/05475R30.PDF) . Assume the current critical aircraft is B/II.

b) The airport would like to serve larger corporate aircraft such as those in design group B/III. Explain what changes will be required to the runway length (do the runway length assuming 75% of the fleet in weight range 12,500-60,000 lb and using the 60% load factor curves). How would the RSA change for runway 30 assuming the same RNAV approach is available in the future?