Solution   Instructor: Trani

Problem 1

Briefly answer the following questions:

> a) For Philadelphia International Airport, explain the runway labeling scheme used for the three parallel runways oriented 85 degrees (magnetic).

Two close parallel runways (CSP) + one stand-alone runway that is also parallel to the CSP set.

> b) 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)

Boeing 787-8 belongs to ADG group V and D (approach speed).Use RSA of 600 feet prior to the landing and 1000' past the runway for RSA protection. The distances are credible.

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.

20 knots.

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.

70/250 degrees is the optimal solution. 99.4% coverage is possible.

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

Runway 07 can be used 87%. Runway 25 can be used 81%.

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.

13 knots

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.

Orientation is 50/230 degrees for optimal coverage (96.3%).

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.

Airport is compliant with 300 foot RSA prior to the arriving threshold. This is required for group BII.

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?

The runway has to be extended. The new RSA requirement prior to landing is increased to 600 feet.