Assignment 4

Date Due: September 24, 2021 Instructor: Trani

Problem 1

Use Google Earth and Airnav.com to learn about the runway features of the Virginia Tech/Montgomery County Executive Airport (BCB). The current airport is designed for Runway Design Code (RDC) group C-II and visibility minima of one mile. Last summer, the airport expanded the runway to 5,500 feet and the airport infrastructure improved to accommodate medium size corporate jets like the Bombardier Challenger 350 (see Figure 1). Because half of the passengers using the Roanoke-Blacksburg Regional Airport in Roanoke commute from Blacksburg, the future BCB airport may expand to include commercial services. Assume that such services may include flights from BCB to Atlanta and Chicago using Embraer 145-XR aircraft (see information about Embraer aircraft in the links to aircraft manufacturers on our web site).

a) Find the new RDC code of the airport if commercial services are offered with EMB-145-XR aircraft. Assume the visibility minima will stay at 1 mile using the existing Instrument Landing System Localizer system at the airport.

b) Find the runway length needed to operate Embraer 145-LR to ATL and ORD with full passengers. Is the existing runway sufficient?

c) Since the Embraer 145-XR (see Figure 2) is out of production today (many still fly with US airlines), investigate changes to runway width, runway length needed to operate Embraer 170 aircraft in the future at BCB.

d) If Embraer 170 aircraft are operated from BCB, compare the RSA and ROFA dimensions of the existing airport and the future airport if RVR is 1 mile (~5000 feet). Clearly state what is the RDC design code for Embraer 170 operations.

e) Compare the dimensions of the approach and departure RPZ surfaces of the existing and the future airport design standard. Comment.

Figure 1. Bombardier Challenger 350 (A.A. Trani).

Figure 2. Embraer E-145 XR (A.A. Trani).

Problem 2

Familiarize yourself with the FAA AC 150/5220-22B before trying this problem.

a) Review the configuration of Roanoke-Blacksburg Regional Airport using Google Earth. Specifically, look at the the runway thresholds 6 and 24. Would you justify the installation of an Engineering Materials Arresting System (EMAS) at threshold 6? Briefly explain.

b) If an EMAS system is installed on threshold 6, estimate the size of the arrestor bed if the critical aircraft operating at ROA is a Boeing 757-200 (see Figure 3). Use the standard EMAS design speed in your analysis.

c) Look at the EMAS installed on runway threshold 16 at ROA. Estimate the maximum runway exit speed supported by the EMAS system installed if the critical aircraft is the Boeing 757-200.

d) Look at the EMAS installed on runway threshold 31 at La Guardia Airport (LGA). Estimate the maximum runway exit speed supported by the EMAS system installed at LGA. The critical aircraft is also a Boeing 757-200.

Figure 3. Boeing 757-200 (A.A. Trani).

Problem 3

Use Google Earth and Airnav (www.airnav.com) as needed, to answer the following short questions.

Kansai International Airport (KIX)

a) Can the airport conduct simultaneous approaches to runways 24R and 24L in Instrument meteorological conditions? Explain the ICAO rule that applies and the distance between the two runways in question.

Dallas-Fort Worth International Airport (DFW)

a) Can DFW conduct simultaneous approaches to three runways at DFW in IMC conditions? Select the three most likely runways used for arrivals if the wind is reported from the North (0 degrees) at 8 knots. Explain the FAA rule used and the distance between the runways in question. Remember, aircraft prefer to land against the wind. State the reason for you runway selection and mention the distance between the runways selected.

b) Can ATC conduct simultaneous departures using two runways at DFW in IMC conditions? Explain the FAA rule used and the distance between the runways in question.

San Francisco International Airport (SFO)

a) Can simultaneous approaches be conducted to runways 28R and 28L in good weather (VMC) conditions? Briefly explain the procedure.

b) Is a Precision Runway Monitor necessary for operations at SFO? You can review the following document. https://www.faa.gov/training_testing/training/prm/media/PRM_training.pdf.

c) Watch movie https://www.youtube.com/watch?v=IwrUxQZPIOo to gain an appreciation of SFO Simultaneous Offset Independent Approaches (SOIA). Are the two aircraft flying the same glide slope? Comment.

Problem 4

Use Google Earth application and your knowledge of runway safety areas to answer the following questions. Figure 4 shows a section of the Runway 31L and Taxiway "Bravo" (B) at the John F. Kennedy International Airport (JFK).

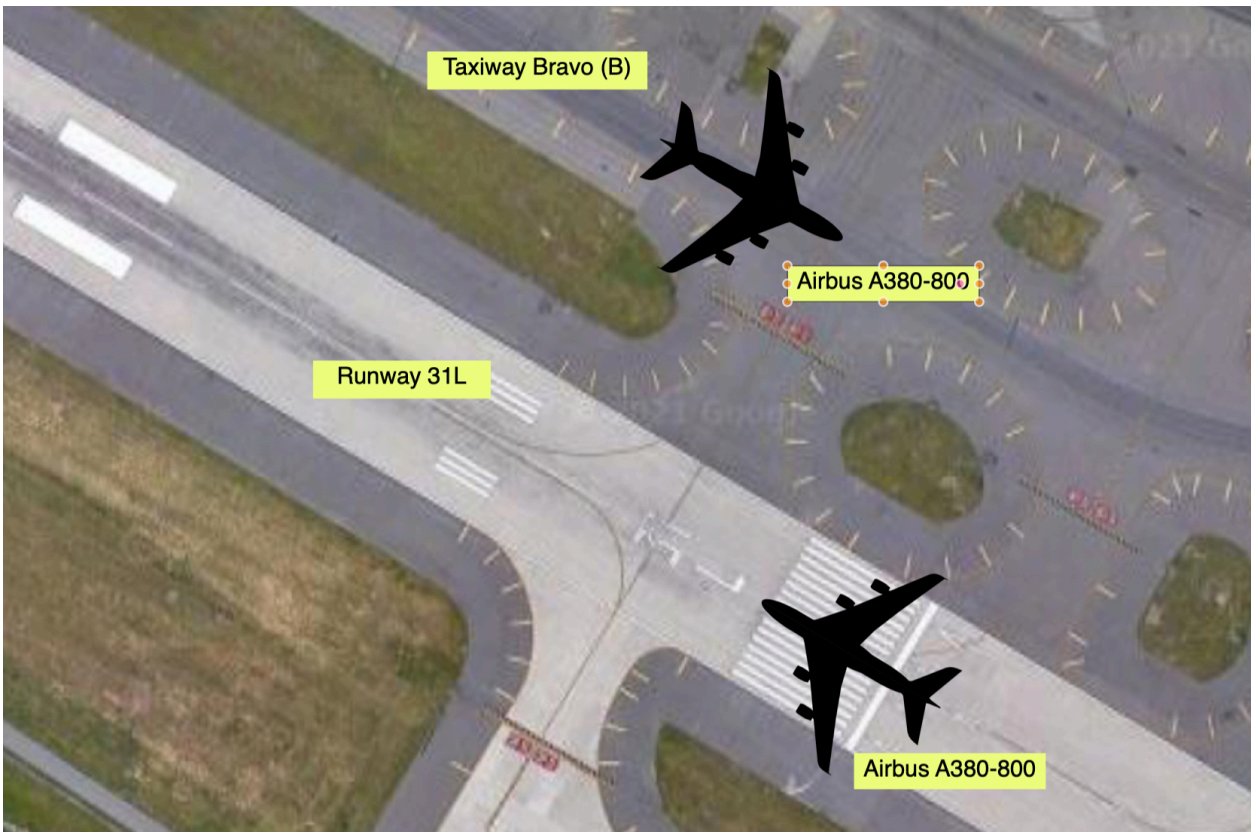

Figure 4. Layout of JFK Airport - Taxiways "Bravo" and Runway 31L.

a) Estimate (using Google Earth) the distance between runway 31L centerline and the parallel taxiway "Bravo".

b) Estimate the cross section dimensions of the inner transitional OFZ for runway 31L using the Airbus A380 as the critical aircraft. Retrieve the wingspan data from the Airbus document (or from the FAA AC 150/5300-13a) and the airport elevation from airnav.com. Determine if the vertical tail of the Airbus A380 taxiing on taxiway "Bravo" violates the inner OFZ for runway 31L. In the analysis, assume Instrument Landing System ILS Category 1 operations (i.e., low visibility at the airport).

c) If the runway 31L is used for departures (the longest runway at JFK), can a second Airbus A380 be taxiing on taxiway "Bravo" when another A380 departs from runway 31L?

d) Briefly explain the operational implications of having close taxiways to a runway.