Assignment 4

Date Due: February 16, 2018 Instructor: Trani

Problem 1

Familiarize yourself with Chapter 6 of the AC 150/5300-13A before trying this problem.

Research in the internet and in Chapter 6 of the FAA AC 150/5300-13a the following airport systems.

a) In a short statement explain what is the purpose of the system and wether or not the system can be located inside the Runway Object Free Area (ROFA) and Runway Safety Area (RSA).

1. Precision Runway Monitor (PRM)

2. ILS Localizer Antenna (LOC) and ILS Glide-slope antenna (GS)

b) Read the FAA document https://www.faa.gov/training_testing/training/prm/media/PRM_training.pdf and explain why Chicago ORD Airport can conduct PRM procedures to runways 10C and 10R. Explain the distance between runways and comment on the FAA runway separation criteria used.

Problem 2

Use Google Earth software and Airnav (www.airnav.com) when applicable, to answer the following short questions.

Seoul International Airport (ICN)

a) Can simultaneous approaches be conducted on runways 34 and 33R in Instrument conditions? Explain the ICAO rule that applies and the distance between the two runways in question.

Chicago O'Hare International Airport (ORD)

a) Can ATC conduct simultaneous approaches to three runways at ORD in IMC conditions? Select the three most likely runways used for arrivals if the wind is reported from 270 degrees at 10 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.

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

Baltimore-Washington International Airport (BWI)

b) Can simultaneous approaches be conducted to runways 33R and 33L in IMC conditions? Explain the FAA rule used and the distance between the two runways in question.

c) Can the airport operate simultaneous arrivals on runway 10 and departures on runway 15L in VMC conditions? Explain the FAA rule that controls operations from Open-V runways.

Raleigh-Durham International (RDU)

b) Can aircraft fly simultaneous approaches to runways 23L and 23R in IMC conditions? RDU has a precision runway monitor radar (PRM). Explain the FAA rule used and the distance between the two runways in question.

c) Can the airport operate simultaneous departures from runways 5L and 5R in IMC conditions? Explain the FAA rule used.

Problem 3 - Airport Operations in Close Parallel Runways

Use Google Earth application and your knowledge of runway safety areas to answer the following question. Figure 1 shows two simultaneous departures from San Francisco International Airport runways 1L and 1R. You are required to watch the movie https://www.youtube.com/watch?v=PLiZCkVQwqk to get an appreciation of the procedure used at SFO.

a) Estimate (using Google Earth) the distance between runway centerlines between runways 1R and 1L.

b) Estimate the dimensions of the OFZ for runway 1L using the Boeing 737-700 as the critical aircraft for this analysis. Is the Airbus A320-200 outside of the OFZ for runway 1L as the planes depart (Category 1)? Is the A320 outside of the ROFA and the RSA areas for runway 1R? Comment.

c) Based on the movie (skip to 2:00 minutes into the movie to see the actual takeoff), do the aircraft start the takeoff roll simultaneously? Comment on the operational implications of simultaneous departures in the context of wake vortex effects between the aircraft. The movie shows an Airbus A320 taking off from runway 1R and a Boeing 737 (United) taking off from runway 1L.

d) After the aircraft are in the air, what sort of maneuver is conducted to maintain the safety of the operations?

e) 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.

f) During the morning period, the number of departures at George Bush Intercontinental/Houston Airport (IAH) conducts simultaneous (paired) departures using runways 15L and 15R in VMC conditions. Find the separation between the runways and comment on the rule for simultaneous departures using close parallel runways in the US.

Figure 1. Simultaneous Departures at SFO Airport. Alaska Airlines Boeing 737-700 Departs from Runway 1R and Virgin America uses Runway 1L. VMC Conditions (A. Trani).

Problem 4

Briefly answer the following questions:

a) Estimate the percent of runways in the US constructed with Asphalt.

b) Estimate the percent of paved runways in the US whose length is equal or less than 5,000 feet.

c) An American Airlines A320 departs Chicago O'Hare Airport (ORD). The destination is Los Angeles (LAX). The pilot requests an initial altitude to be flown. Which of the two altitudes blow is allowed for this flight?

   i. 37,000 feet

   ii. 38,000 feet

   Explain the reason for your selection.

d) An aircraft traffic controller separates traffic 20 nm from Roanoke, Virginia. If two aircraft are 20 nm from the radar antenna, what is the minimum horizontal separation used? Assume no wake vortex effects.

e) ATC controllers observe an aircraft flying at flight level 330 over West Virginia. What is the altitude - in feet - of this aircraft above sea level? What is the general direction of this flight (i.e., North, South, East, West, lets.). Explain.