Assignment 4: Runway Separations and Safety Areas

Date Due: February 27, 2017 Instructor: Trani

Problem 1

Briefly answer the following questions:

a) An airport has two parallel runways separated by 4.100 feet and zero stagger. Under instrument meteorological conditions, can simultaneous independent parallel operations be conducted to both runways? The airport has a standard surveillance radar with a scan rate of 4.5 seconds. could be approved for simultaneous independent arrivals.

1) Normally we would need 4,300 feet. However, with a PRM system, the airport

2) Simultaneous departures can be conducted with 4,100 feet

3) Simultaneous segregated arrivals and departures can be conducted

b) Use Google Earth and determine if three runways at Charlotte (CLT) can support tripe independent parallel operations in IMC conditions. If the airport can do this, state the runways that can support triple independent approaches.

CLT can conduct triple simultaneous arrivals. Use runways 18L, 18C and 18R for example.

c) Los Angeles International Airport (LAX) has two Northern runways spaced 720 feet apart (see Google Earth): Runways 24R and 24L. Can simultaneous operations with small aircraft (say FAA design groups II or lower) be conducted at these two runways in VMC conditions? State the rule that applies.

Technically LAX can conduct simultaneous arrivals to runways 24R and 24L in VMC conditions. 700 feet separation is required assuming no wake vortex effect.

d) Find if Philadelphia International Airport can conduct independent arrival and departure procedures from runways 27L and 27R in marginal weather conditions (3 nm visibility). The airport has a fast-scan PRM radar. Sate the rule that applies.

e) Can Boston Logan airport conduct simultaneous independent arrivals to runways 4R and 4L in bad weather conditions? Explain.

f) What air traffic control service is responsible for separating aircraft 100 nm from the nearest airport?

Either TRACON or ARTCC service.

g) Name the air traffic control service that does not control flights directly. Only supplies aviation information to pilots.

Flight Service Station (FSS)

Problem 2

Answer briefly the following questions.

Airnav.com webs site lists the following declared distances (in feet) for Runway 33L at Boston Logan airport:

TORA:10083 TODA:10083 ASDA:10083 LDA:10083

a) Use Google Earth to verify the values for all four declared distances. Comment any discrepancies observed. Assume the critical aircraft is a Boeing 747-400. Runway 33L is a precision runway with approach visibility minima of less than 3/4 mile.

b) Suppose we want to protect the runway safety area prior to the landing threshold and also the runway safety area after the landing on runway 33L. Is the value of LDA 10,083 feet? Explain.

Roanoke Regional Airport (ROA) lists the following declared distances (in feet) for runway 24 (taken from airnav.com):

TORA:6800 TODA:6800 ASDA:6800 LDA:6010

c) Explain why is the LDA 6,010 feet vs. 6800 feet for the ASDA.

There is a displaced threshold for aircraft landing on runway 24 at ROA. Aircraft departing runway 24 can use the displaced threshold section for a full length departure.

Use Google Earth to study LGA runway thresholds 22 and 13. Answer the following questions:

d) Determine the runway safety area dimensions for both runways if a Boeing 757-200 is the largest aircraft flying to LGA.

e) What could you do to improve this airport with special emphasis on runways ends 22 and 13? Explain.

Problem 3

a) An airline operates Boeing 787-8 aircraft to an airport with a single precision runway as shown in Figure 1. The airline is proposing building a 90-foot tall hangar to be located 500 feet perpendicular from the runway centerline as shown in Figure 1. Perform the necessary analysis to determine if the proposed hangar violates the runway Obstacle Free Zone (OFZ) (see Figure 1). The runway is a precision runway with a Category 1 Instrument Landing System (ILS). State the dimensions of the OFZ for this runway.

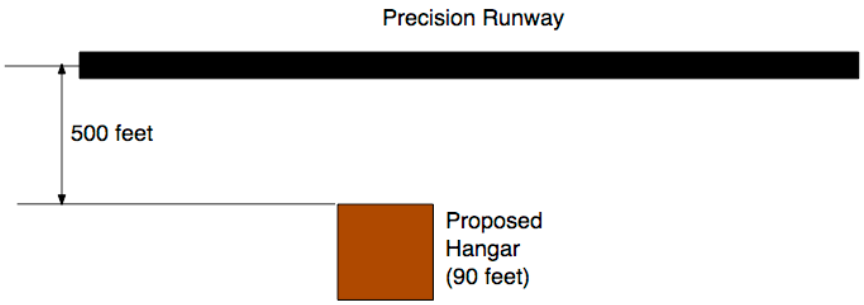
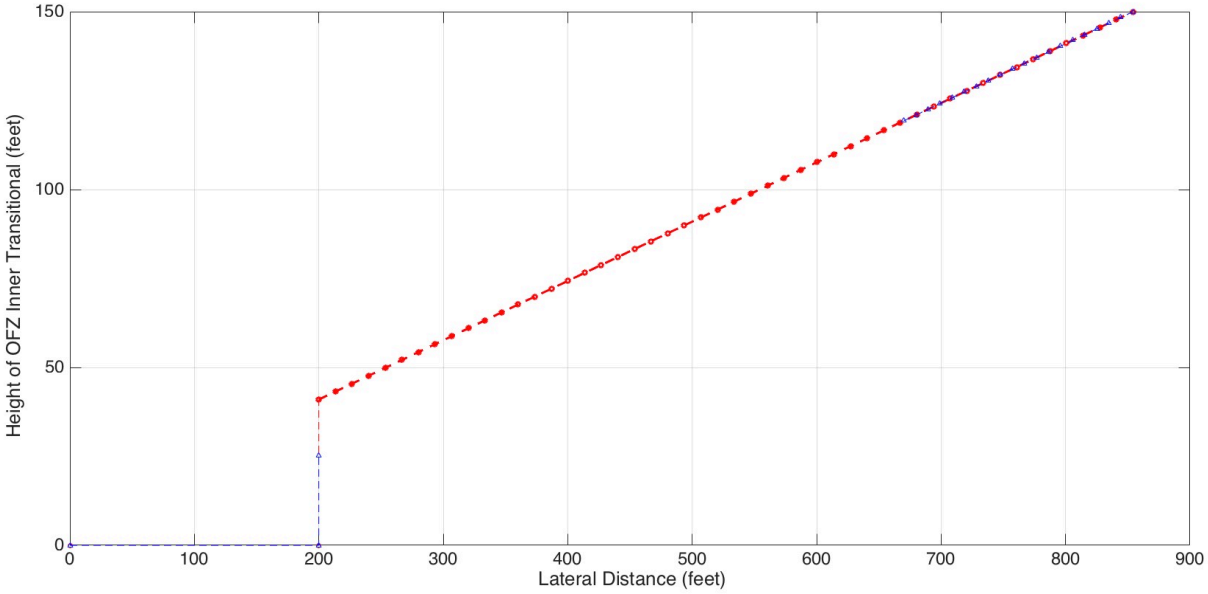


Figure 1. Proposed Hangar Location.

The inner transitional OFZ is shown below for Cat 1 and ADG V (213 feet critical wingspan). Note that when you solve this problem you need to use the critical aircraft for the group in question. Your solution should not attempt a modification of standard unless that is the only alternative.

At 500 feet the critical height of the OFZ surface is 91 feet. The hangar is technically legal.



b) Draw to scale the cross section of the inner transitional OFZ surface for this problem and show the dimension of the proposed hangar. Refer to Figure 3-4 of FAA Advisory Circular AC 150/5300-13 for details or consult out course notes.

Problem 4

A well-known airport in the West Coast of the United States has a runway configuration shown in Figure 2.

For this solution I used the LAX airport field elevation.

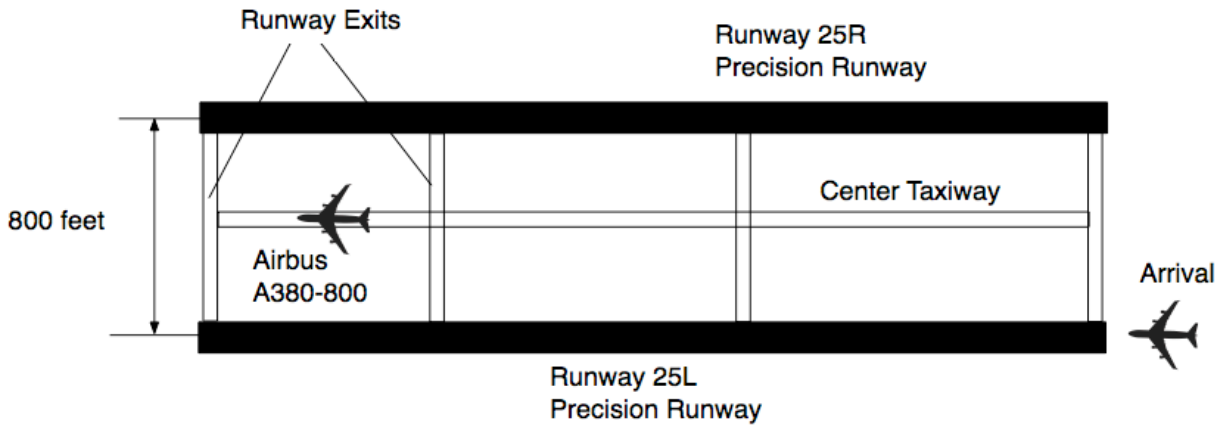


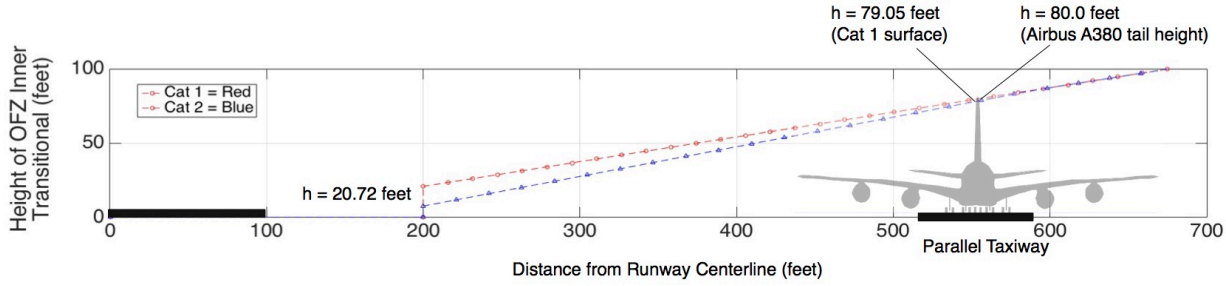
Figure 2. Airport Runway Configuration.

In paragraph 306 of the AC 150/5300-13, the FAA defines the Obstacle Free Zone (OFZ) as:

" 306. OBSTACLE FREE ZONE (OFZ). The OFZ clearing standard precludes taxiing and parked airplanes and object penetrations, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function."

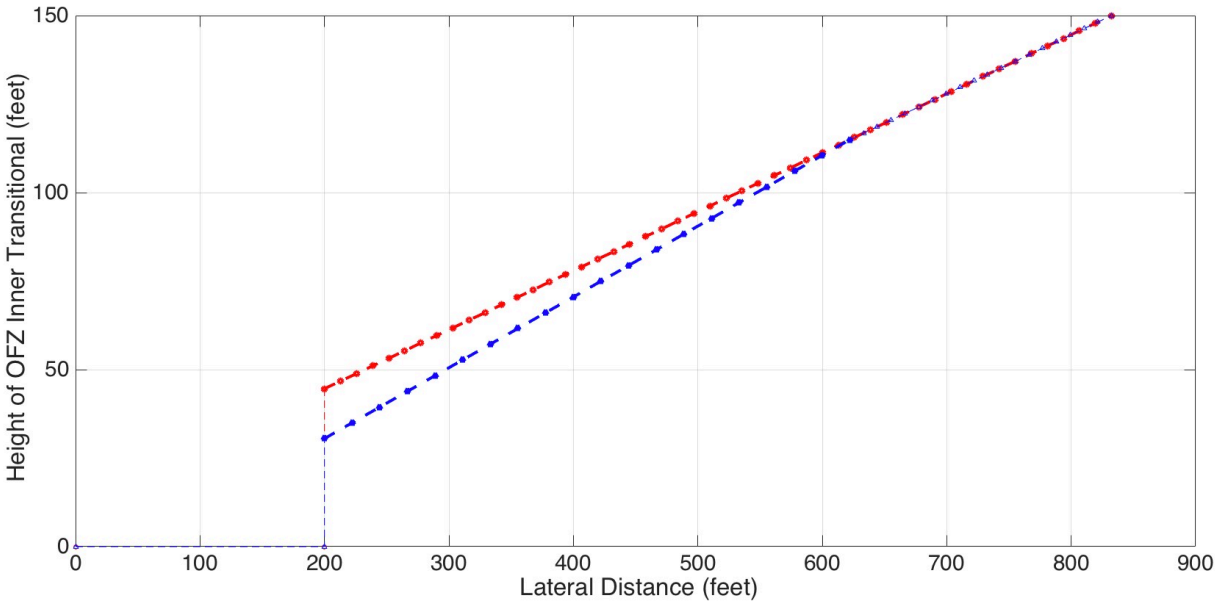
a) An Airbus A380-800 taxies in the center taxiway after landing. Does the vertical tail of the A380-800 penetrates the runway OFZ if both runways are precision runways (assume Category 1 ILS)?

Yes this is a violation of the inner transitional OFZ. See the diagram below.



b) What should be the minimum separation between parallel runways allowing a Boeing 767-400 aircraft to taxi on the center taxiway without penetrating runway 25L OFZ?

Use the critical wingspan for aircraft in ADG Group IV (170 feet). Draw the inner transitional surface as shown below. At 400 feet distance the OFZ is 78 feet tall for Category 1 ILS conditions. The tail height of the Boeing 767-400 is 63.7 feet. The OFZ is not violated if the taxiway is located 400 feet from the runway.


Height of OFZ Inner Transitional (feet)
150
100
50
0
0
100
200
300
400
500
600
700
800
900
Lateral Distance (feet)