Assignment 6: Geometric Design Standards

Date Due: March 16, 2018

Instructor: Trani

Problem #1

a) Use the Boeing 777-300ER (see Figure 1) as the critical aircraft to determine the following dimensions at a new airport. The airport will have two parallel runways with Instrument Landing System Category 2 (visibility below 1/2 mile). The airport will be located at 2,340 feet above sea level.

Figure 1. Cathay Pacific Boeing 777-300ER at Tokyo Narita Airport (A. Trani) .

Item	**Dimension(s)** **State length and width if applicable**
Approach RPZ	
Departure RPZ	
Runway Safety Area	
Runway OFA	
Distance between runway to parallel taxiway	
Distance between runway centerline and runway exit hold line	
Distance between two parallel taxiways	
Distance between a taxiway and a taxi lane	
Distance between a taxi lane and a fixed or movable object	
Distance between a runway centerline and parking area	
Runway width	

Item	Dimension(s) State length and width if applicable
Runway shoulder width	
Taxiway width	
Taxiway shoulder width	
Taxiway safety area	
Taxiway safety distance	
Runway blast pad area	
Precision obstacle free zone (POFZ)	

Problem #2

Assume the same critical aircraft and airport used in Problem 1. Find the closest distance from the runway that a Fixed-Based Operator could build a 60-foot tall hangar. Explain the controlling surfaces and dimensions considered in your analysis. Consider both Part 77 and inner transitional OFZ surfaces to answer this question.

Problem #3

a) Design a 135 degree taxiway-taxiway connector for a new airport using the Airbus A350-900 as the critical aircraft (see Figure 2). In your design use the latest FAA criteria for taxiway-taxiway intersections considering the aircraft TDG group.
b) Draw your solution using the CAD program of your choice. Label the main dimensions of the geometric design (dimensions .
c) Compare your design with the dimensions offered by Airbus in the Airport Compatibility Document (see Figure 4.5.5 in the Airbus A350 planning document).

Figure 2. Finnair Airbus A350-900 at Seoul Incheon International Airport (A. Trani).

Problem # 4

A 3,050 meter long runway at an airport has three longitudinal grades (from left to right): at -0.32%, 0.51% and 0.43% with the points of intersection located at metric stations 1235 and 2006 from the left threshold. Assume the left threshold is located at station 0.

a) Test the suitability of this runway to be used at airport with Airbus A350-900 operations. Comment on your answers.

b) Design the first transition curve for this runway using a symmetric parabola. Specify the elevations (every 20 meters) as a function of the station (in meters). Refer to the formulas in the handout Geometric Design to create a symmetrical parabola. Use Excel or Matlab to simplify your work. You are allowed to use the Matlab script provided in class.

Problem # 5

A new airport is expected to have commercial airline operations using aircraft such as the Boeing 737-700 aircraft (see Figure 3). The longest runway length needed has been set to be 2,300 meters. The airport is located at an elevation 345 feet above mean sea level conditions. The airport will have a precision runway and serve approaches with visibility minima down to 1/2 mile. Determine the following dimensions for your design:

a) The length and width of the approach and departure surfaces for the airport
b) The elevation of the horizontal surface above mean sea level conditions
c) The slope of the Obstacle Clearance Surface (OCS).
d) The town company proposes building a 69 foot parking deck to be located 3,800 feet from the approach end of the precision runway. Determine if the proposed water tank is an obstruction to navigation. Does the tank violates the OCS surface?

Figure 3. Alaska Airlines Boeing 737-700 on Short Final at San Jose International Airport (A. Trani).