

## Assignment 7: Geometric Design Standards

Date Due: March 26, 2013

### Problem #1

A new airport is expected to serve Boeing 787-800 aircraft (see picture below). the runway length is expected to be 2,900 meters. The airport is located at an elevation of 3,460 feet above sea level conditions. The airport will have an instrument landing system and serve approaches with visibility minima down to 1/2 miles (ILS Category I equivalent approach). Determine the following dimensions for your design:

- a) The width and length of runway blast pad area.
- b) The width of the runway and taxiway shoulders.
- c) Distance from the runway to a parallel **taxiway** if high-speed runway exits are to be constructed.
- d) Distance from the runway to a parallel **taxiway** if only right-angle runway exits are to be provided.
- e) Distance from runway centerline to holding line on a right-angle runway exit.
- f) Width of taxiway safety area.
- g) Minimum distance from the taxiway centerline to a fixed object.
- h) Minimum perpendicular distance from the runway centerline to a fixed object with height 45 meters.
- i) The width of a dual taxilane between two terminal concourses. Account for one service road on each terminal (for a total of four 12-foot lanes).



Figure 1. Boeing 787-800 at SFO International Airport (A.A. Trani)

### Problem #2

A 2,900 meter long runway at an airport has three longitudinal grades (**from right to left**): at 0.45%, -0.67% and 0.55% with the points of intersection located at metric stations 780 and 1,890 from the right threshold. Assume the right threshold is station 0+00.

- a) Test the suitability of this runway to be used at airport with Boeing 787-800 operations. Comment on your answers.

- b) Design the second transition curve for this runway using a symmetric parabola. Specify the elevations (every 10 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.
- c) Find the transverse grade for this runway. Also state the typical grade of the shoulders for maximum drainage.

### Problem #3

Consider the Roanoke Regional Airport in Virginia . Use Google Earth and the Airnav Database to construct a simple drawing or sketch of the airport two runways. The largest aircraft operating at ROA is an Airbus A300 cargo aircraft.

- a) Construct a visibility polygon for the airport two runways. State the dimensions of the polygon in the drawing and the rule used to construct the polygon.
- b) Use Google Earth to locate any buildings, hangars or other fixed objects that could compromise the visibility at the airport.

### Problem #4

a) Design a 120 degree, taxiway-taxiway intersection for the Boeing 777-300ER using the latest FAA criteria for taxiway-taxiway intersections considering the aircraft ADG and TDG groups.

b) Draw your solution using the CAD program of your choice. Label the main dimensions.

c) Compare your solution to the solution stated in the Boeing Document with Aircraft Characteristics for Airport Planning. Comment on any discrepancies observed.

### Problem #5

Examine the information about the ATL International Airport in Arnav, Google Earth and the the FAA airport diagrams link on our web site to answer the following short questions.



a) In 2013 Korean Airlines introduced Airbus A380 service between Atlanta and Seoul. Find the most likely runway to be used for A380 operations. Use runway dimensions (length and width), shoulder dimensions and taxiways leading to Terminals E and F (see map) to make this assessment.

b) Are there any gates at Terminal F (based on Google Earth) to service an Airbus A380? Comment.

c) Using maximum flexibility to the airline, is the service ATL-ICN a challenge to the Airbus A380 in the summer months? Comment.

source: Google Earth 2015