

Assignment 6: Geometric Design Standards

Partial Solution

Problem #1

The Airbus A320 belongs to ADG C-III and TDG 3 design groups. Use the Table A7-8 to find some of the dimensions needed in this problem.

Problem #2

A 2,760 meter long runway at an airport has three longitudinal grades (from left to right): at 0.3%, -0.90% and 0.65% with the points of intersection located at metric stations 740 and 1680 from the left threshold. Assume the left threshold is station 0+0 metric.

- a) Test the suitability of this runway to be used at a commercial airport with Airbus A320 operations. Comment on your answers.

The runway longitudinal slope violates the 1.5% maximum grade change rule. Some small grading will need to overcome this problem.

- b) Design the first 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.

Problem #5

Estimate the best runway exit location for regional aircraft such as the Bombardier CRJ-1000 Nextgen. The parameters of the aircraft are shown in Table 1.

Table 1. Aircraft Parameters for Problem 5. Refer to Matlab Code in Notes 9 Handout for Explanations. All other Parameters are Assumed to Take the Values Defined in the Handout.

Aircraft Group	Parameters	Representative Aircraft
Regional aircraft	Touchdown location = 430 meters Average deceleration = -1.9 m/s-s Free roll time = 2.0 seconds	Bombardier CRJ-1000 Nextgen

- a) In your solution assume the approach speeds vary from 125 to 135 knots (uniformly distributed).

The best solution for right angled exit is at 1,400 meters using 8 m/s as the design exit speed.

Using a high-speed runway exit we could design the exit location at 1,200 meters using 21 m/s.