Quiz 2 - Take Home

Date: March 31, 2016

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Instructions

Write your solutions in a single PDF file. Cut and Paste all your answers using screen captures. Show all your work. Label your file with your last name and CEE4674. Create a PDF file and email your solutions to vuela@vt.edu. In the email header use the words CEE 4674 Quiz.

Honor Code Pledge

The information provided in this exam is my own work. I have not received information from another person while doing this exam.

_____ (your signature/name)

Problem #1 (30 points)

A site is under development for a small General Aviation airport. Wind data is available for this site and is contained in the PRN file accompanying this exam. A sample of the wind data is shown below:

Hourly Observations of Wind Speed (knots)

Direction	0-3	4-6	7-10	11-16	17-21	22-27	28-33	34-40	> 41	Total
10°	874	929	846	970	149	17	2	2	0	3789
20°	198	894	608	436	42	6	2	0	0	2186
30°	147	749	985	560	14	1	2	0	0	2458
40°	129	603	578	435	13	0	1	2	0	1761
50°	116	645	347	203	92	1	0	0	0	1404
60°	89	616	589	360	98	1	0	0	0	1753
70°	119	668	289	163	11	1	0	0	0	1251
80°	129	725	928	175	27	1	0	0	0	1985
90°	113	748	311	185	31	2	1	2	0	1393
100°	102	860	378	229	27	5	0	0	0	1601
110°	116	802	494	353	47	1	1	0	0	1814

The airport will have a 4500 foot runway and the critical aircraft is the Cessna CitationJet 3 (shown in Figure 1).

a) Find the design crosswind component for this new airport.

b) Find the optimal runway orientation for the runway at the airport.

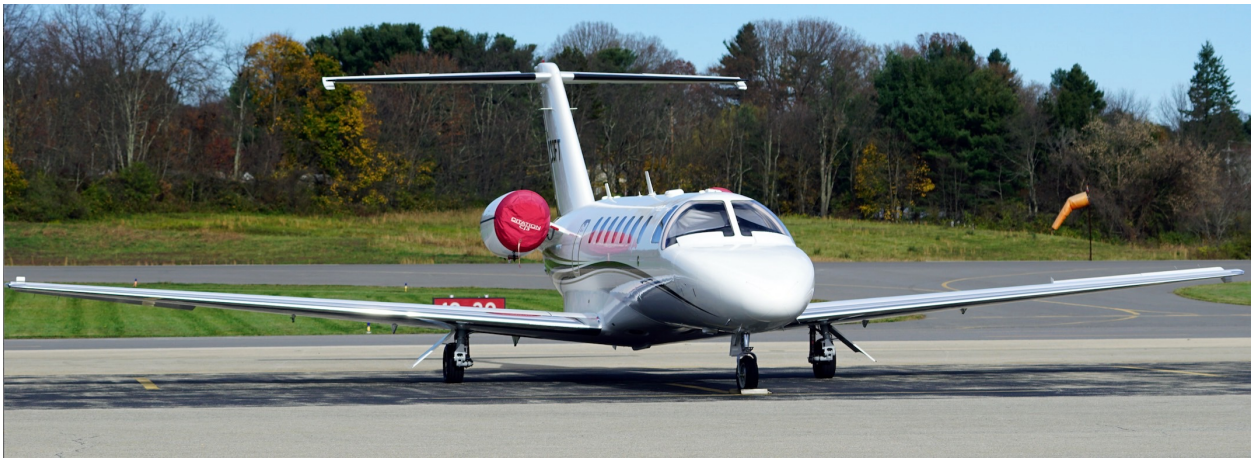

Figure 1. Cessna Citation CJ3. (source: A. Trani)

Problem # 2 (40 points)

A regional airport has two runways as shown in Figure 2. The primary runway is a non-precision runway with length of 6500 feet (visibility minima is 3/4 miles). The crosswind runway is 5000 feet long. The crosswind runway is also a non-precision runway with a approaches with visibility of 1 mile. The critical aircraft operating at the airport is the Boeing 717-200. The airport is located 1,400 feet above sea level.

a) Draw to scale the plan view of the imaginary surface for this airport.

b) Determine if any of the four man-made objects shown in the figure are obstacles to navigation. If they are propose a mitigation alternative. State which surface is the critical surface at the location of the object.

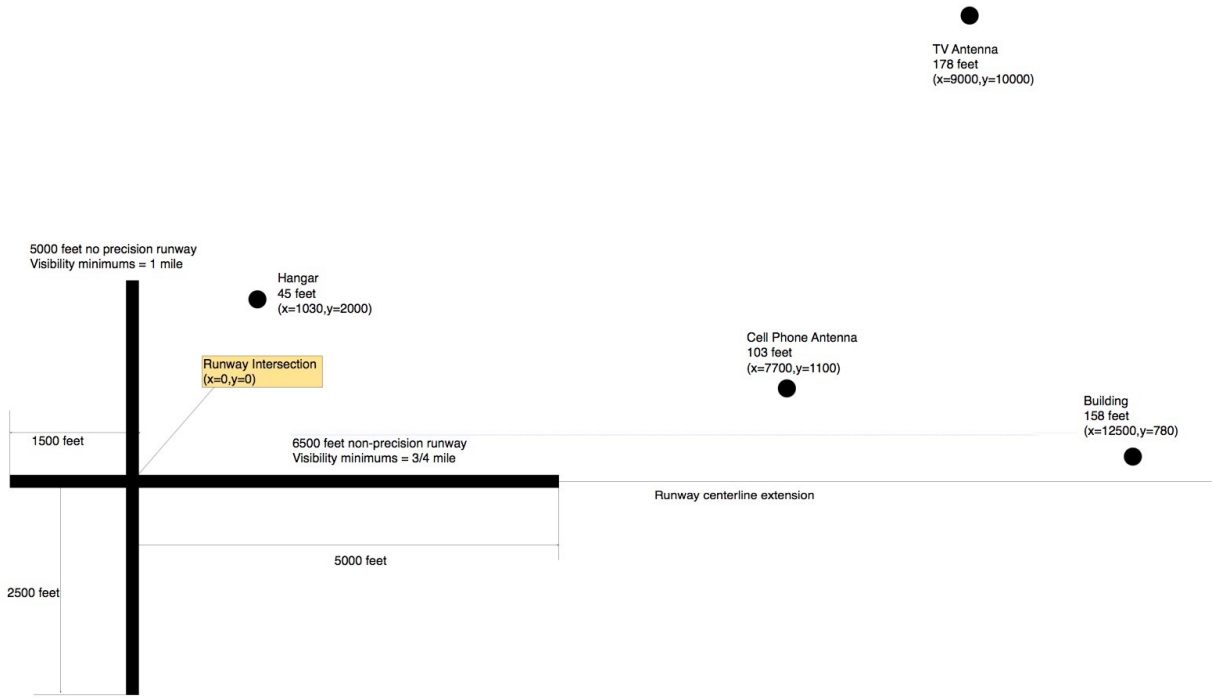

Figure 2. Runway Configuration for Problem 2. X and Y Coordinates are Referenced to the Intersection Point of the two Runways.

Problem #3 (30 points)

a) For Problem 2 draw the visibility polygon for the two intersecting runways.

b) The airport owner would like to build another 45 foot tall hangar located at coordinates x = 1000 and y = 500 feet. Will the new structure violate the visibility polygon?

c) Will the hangar violate any other surface at that location? Comment.