

Quiz 2 - Take Home

Open Notes and Internet

Instructor: A.A. Trani

Due: December 1, 2023 at midnight

Instructions

Create a solution file using the word processor of your choice. Convert to PDF and submit to Canvas. Include all screen captures of all your work including aircraft manufacturer's tables and figures, FAA nomographs and others.

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)

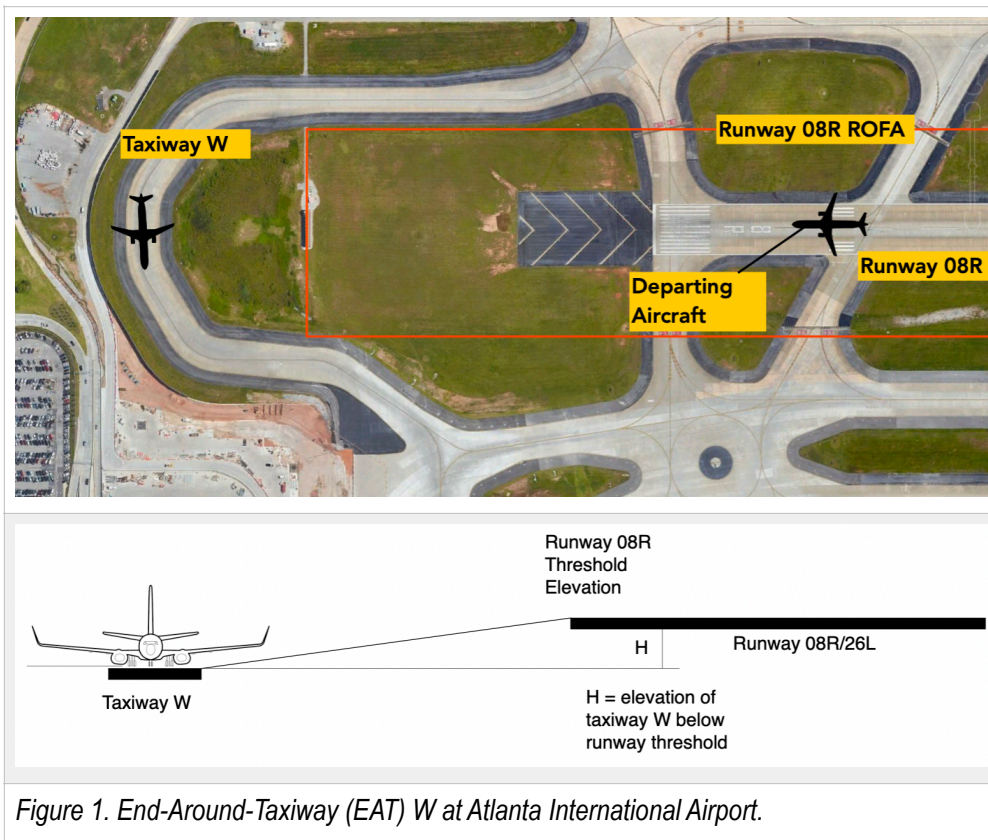
Problem 1 (30 Points)

You can rely on Google Earth or Google Maps to measure distances at the Atlanta International Airport (ATL) to help you solve this problem.

The first part of the problem analyzes an End-Around-Taxiway (called taxiway W) at the Atlanta International Airport (see Figure 1). Runway 8R/26L is a precision runway with visibility minima below 1/2 mile. Taxiway W is **depressed** below the elevation of runway 8R. The difference in elevation (see Figure 1) avoids a violation to the Part 77 approach surface of runway 8R/26L when aircraft taxi on taxiway W while an aircraft departs from runway 26L (see Figure 1 for top and side views of the end-around-taxiway and the runway).

The airport designer constructed the end-around-taxiway **allowing ADG III aircraft** to taxi on taxiway W without interrupting the departure operations on runway 26L (see Figure 1).

- Estimate the height H (see Figure 1) to satisfy the condition that the Part 77 approach surface is not violated when the critical aircraft (ADG III) taxis on taxiway W.
- Calculate the slope of the RSA and ROFA beyond the runway threshold 8R to satisfy the required height H in part (a). Assume the slope between the end of the blast pad area and the taxiway W is constant.
- A 125-foot antenna is located 2.1 nautical miles from the runway threshold 08R and aligned with the extended runway centerline. Determine if the antenna is an obstruction to navigation.
- Figure 2 shows the location of a 12-story hotel (Renaissance Concourse Hotel) on the North side of ATL airport. The hotel is estimated to be 125 feet tall to the roof. The hotel management wants to install a 28-foot antenna to improve internet service at the hotel. Determine if the antenna will be considered an obstruction to navigation. Tell me the critical surface in question.



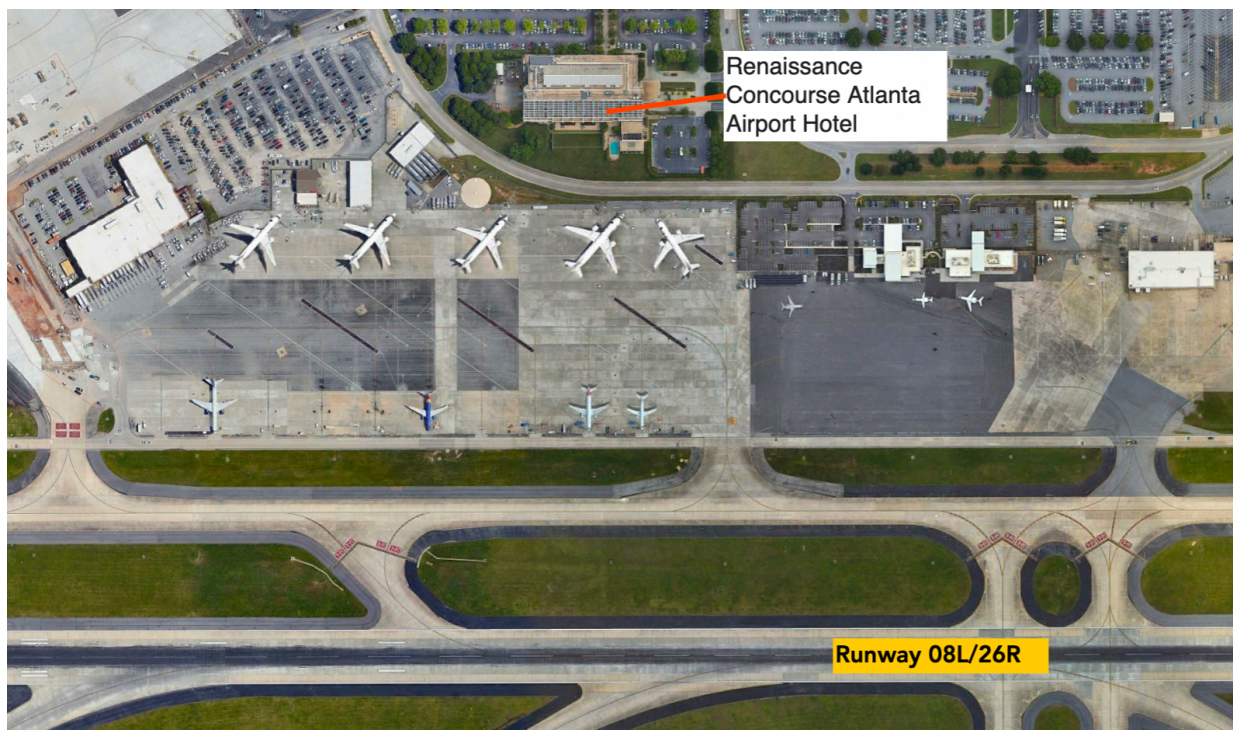


Figure 2. Location of Renaissance Concourse Hotel near Runway 8L/26R at the Atlanta International Airport.

Problem 2 (40 Points)

Figures 3 and 4 show two design runway configurations to be studied. The critical aircraft at the airport is the Embraer 190 (see Figure 5). The airport is planned to have an Instrument Landing System category 1 with approaches down to 200 feet decision height and 2400 feet runway visual range. The airport is to be constructed at a site located 925 feet above sea level conditions.

- e) Find the RDC class for the airport.
- f) Determine the minimum distance between centerline distance between runway 5/23 and taxiway "Bravo".
- g) Use the Runway Exit Design Model (REDIM 4) to determine the runway occupancy time for the configuration shown in Figure 3. Table 1 has the aircraft fleet mix at the airport. Report the following results:
 - a. Weighted average ROT (seconds)
 - b. Percent of the critical aircraft (E190) using Exit E3
 - c. The highest utilization exit
 - d. Show the runway utilization table produced by the model.
- h) A second design configuration is being considered. Figure 4 shows the alternative configuration with two standard acute angle runway exits (labeled E3 and E4). Determine the runway occupancy time for the configuration shown in Figure 4. Table 1 has the aircraft fleet mix at the airport. Report the following results:
 - a. Weighted average ROT (seconds)
 - b. Report the percent of aircraft using both acute-angle runway exits
 - c. The highest utilization exit
 - d. Show the runway utilization table produced by the model.
- i) The airport client would like to know if the high-speed exits are necessary. The peak hour landing rate at the airport is 35 aircraft per hour. Make a recommendation based on the reductions in ROT and the expected traffic.

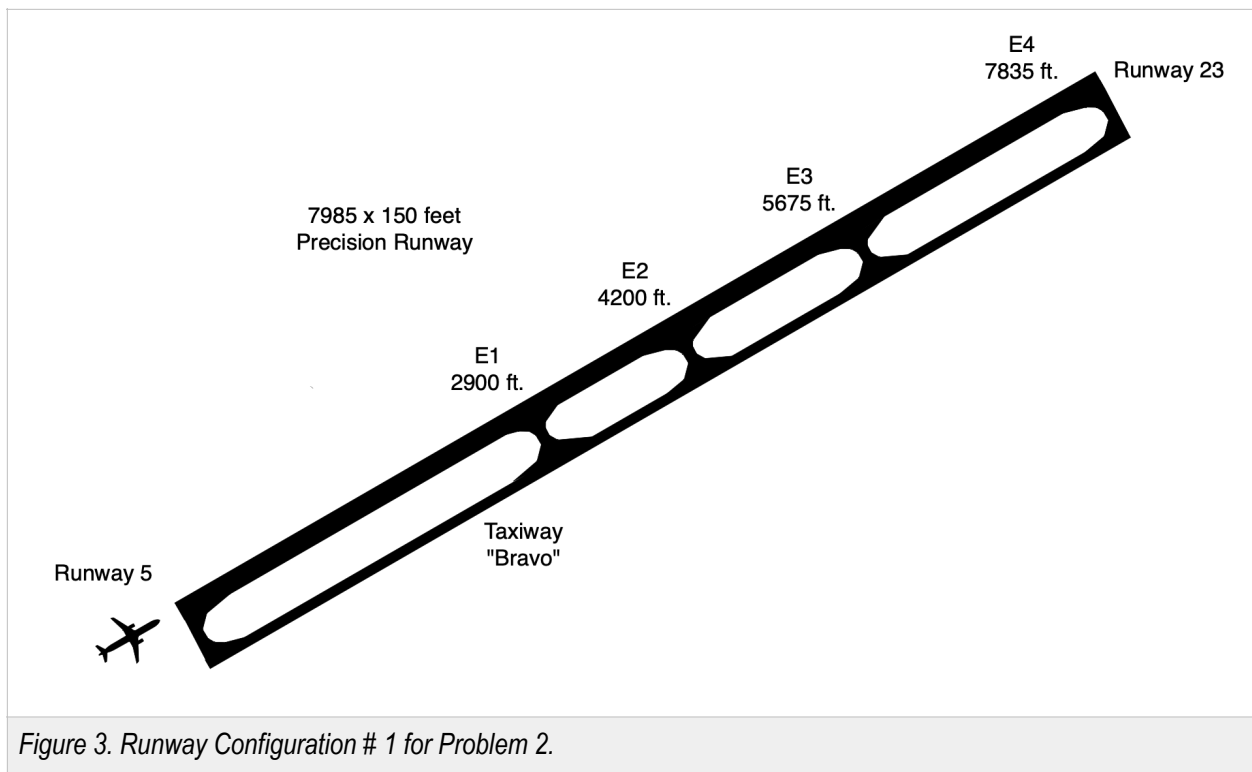


Table 1. Aircraft Fleet Mix for Problem 2.

Aircraft ID	Aircraft	Fleet Mix (%)
C172	Cessna 172	20
BE58	Beechcraft Baron 58	18
C25B	Cessna Citation CJ2	10
C56X	Cessna Citation Excel	5
GLF5	Gulfstream G-V	15
E170	Embraer 170	10
E190	Embraer 190	22
Totals		100

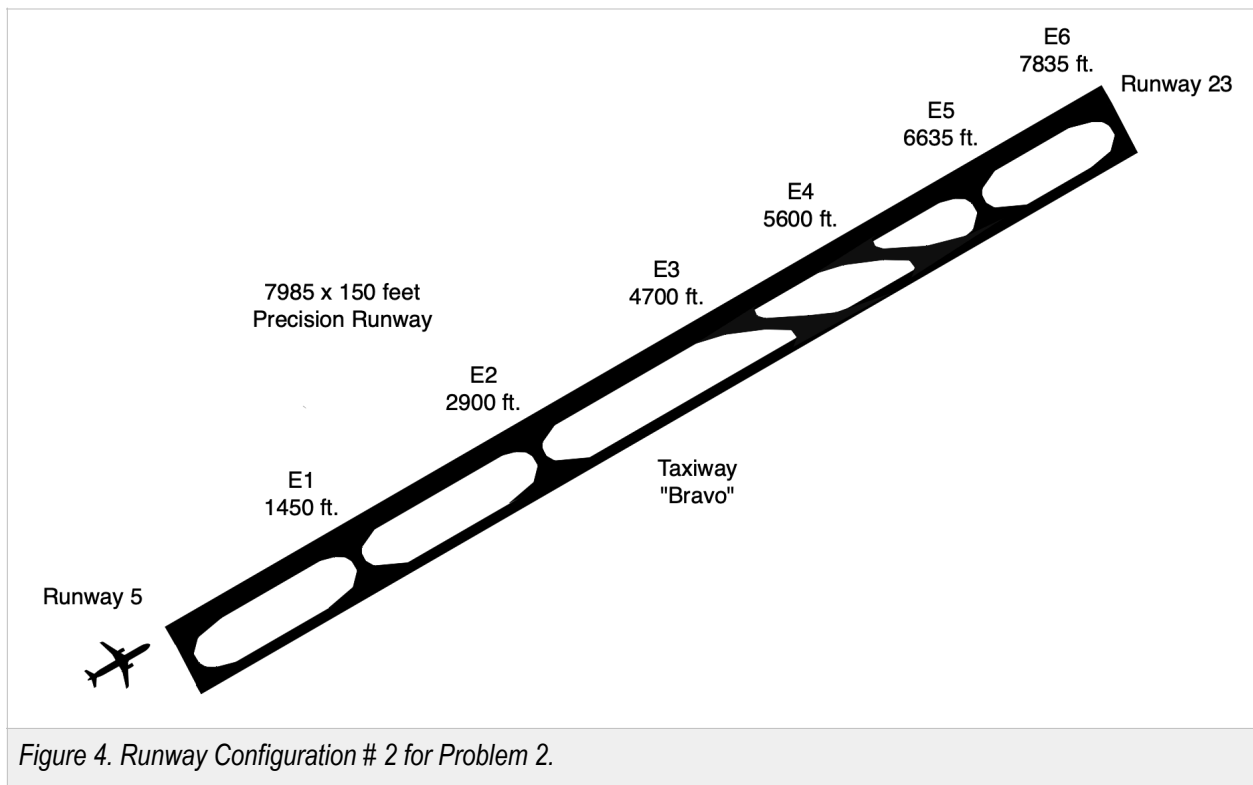


Figure 4. Runway Configuration # 2 for Problem 2.



Figure 5. Critical Aircraft for Problem 2. Embraer 190 Landing at DCA Airport (A. Trani).

Problem 3 (30 Points)

After reviewing both preliminary designs (Figures 3 and 4), the design team tasks you to specify and draw in CAD, a bypass taxiway bay configuration as shown in Figure 6.

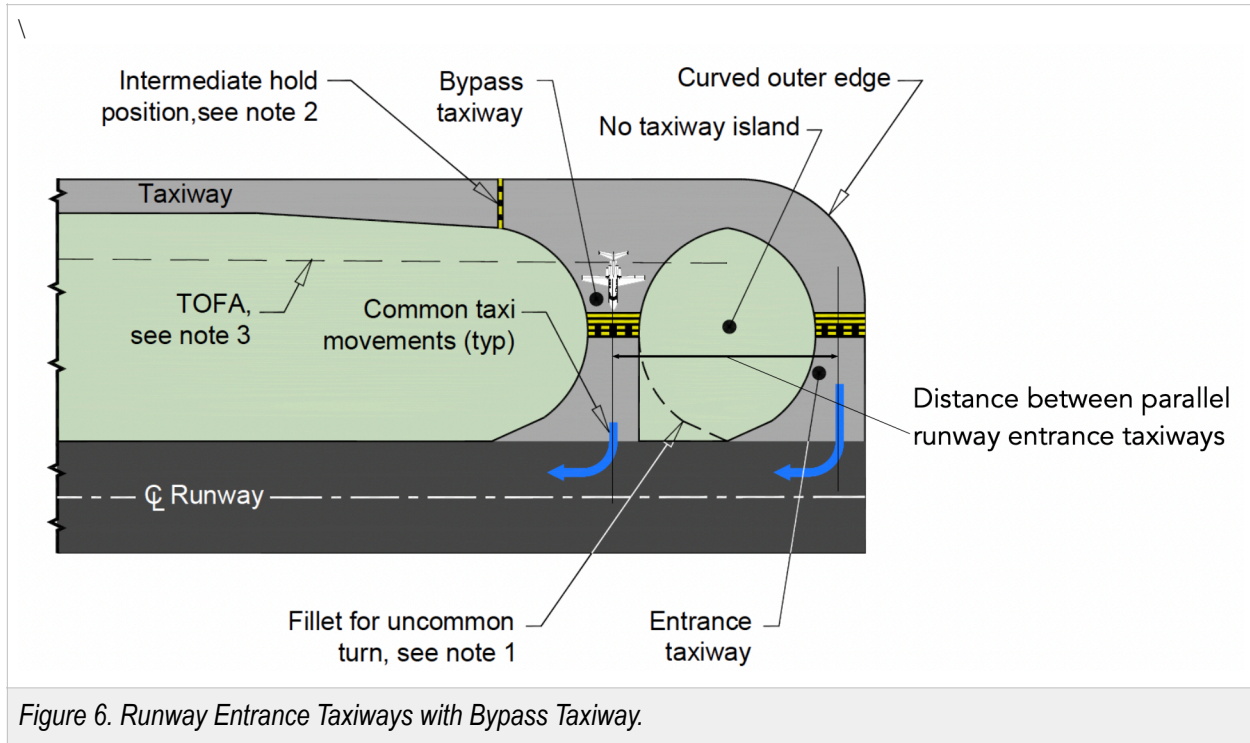


Figure 6. Runway Entrance Taxiways with Bypass Taxiway.

- Specify the dimensions of both runway entrance taxiways for runway end 24. Use either tables in the FAA Advisory Circular or the FAA Taxiway Design Tool. You **must specify all the fillet dimensions and taxiway widths of the fillet**. For the design use a **centerline radius of 120 feet** instead of the minimum required by the FAA.
- Determine the distance required between the two parallel runway entrance taxiways (see Figure 6) to provide safe separation for the critical aircraft.
- Draw to scale the solution using the CAD software of your choice. No sketches will be accepted.