

Assignment 5: Runway Separations and Air Traffic Control

Date Due: October 6, 2025 (midnight)

Instructor: Trani

Problem 1

Use Google Earth, Aimag, and Webtrak (<https://us.webtrak.aero/>) to study runway operations at Charlotte-Douglas International Airport and answer the following questions. Figure 1 illustrates the annotated Webtrak interface to review airport operations.

Use Webtrak and observe the historical flights for September 18, 2025 starting at 3 PM local time. Observe traffic between 3:00 and 3:20 PM to understand the operations at CLT. 3:00 PM local time is hour 15 in Webtrak. You can speed up the replay of runway operations as needed.

- a) Use Google Earth to measure the distance between the parallel runway centerlines at CLT.

Distance between runway 1L and 1C is 4,300 feet (old or legacy separation)

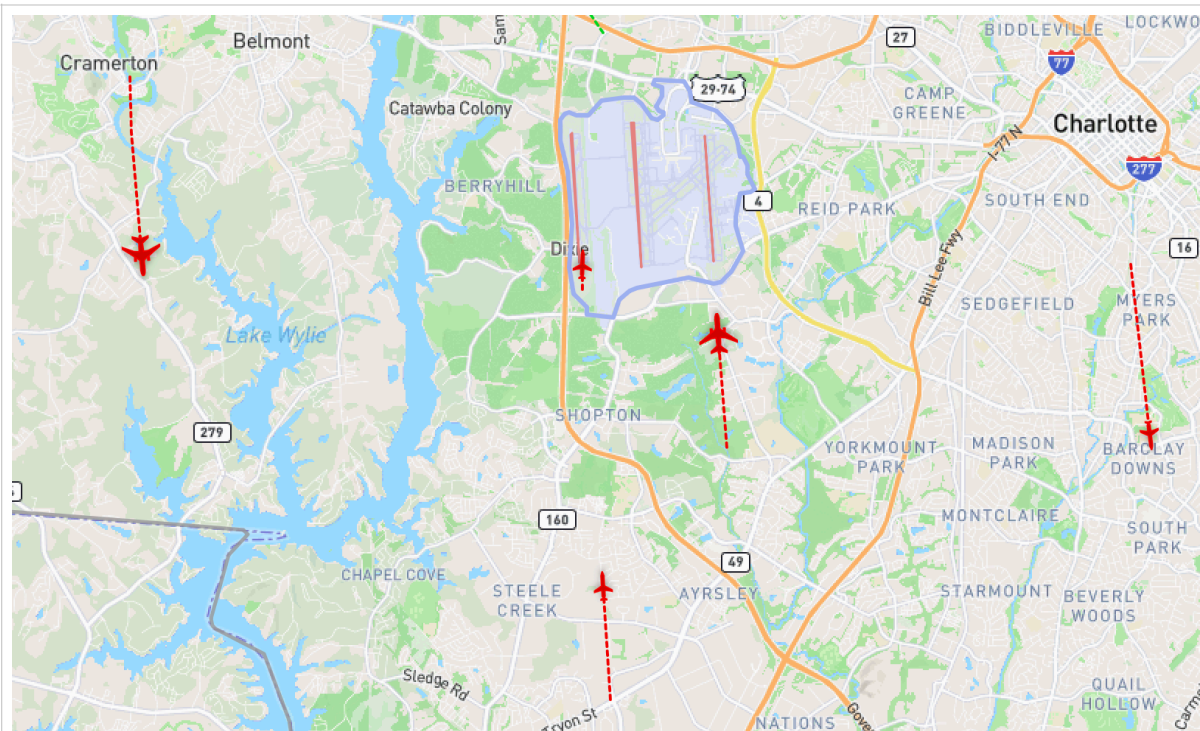
Distance between runway 1C and 1R is 5,000 feet

- b) Name the runways used for arrival operations in the period of interest.

Using Webtrak the following parallel runways are used in the period of interest.

Runways 1L and 1R are used for arrivals.

Runway 1C is used for departures.



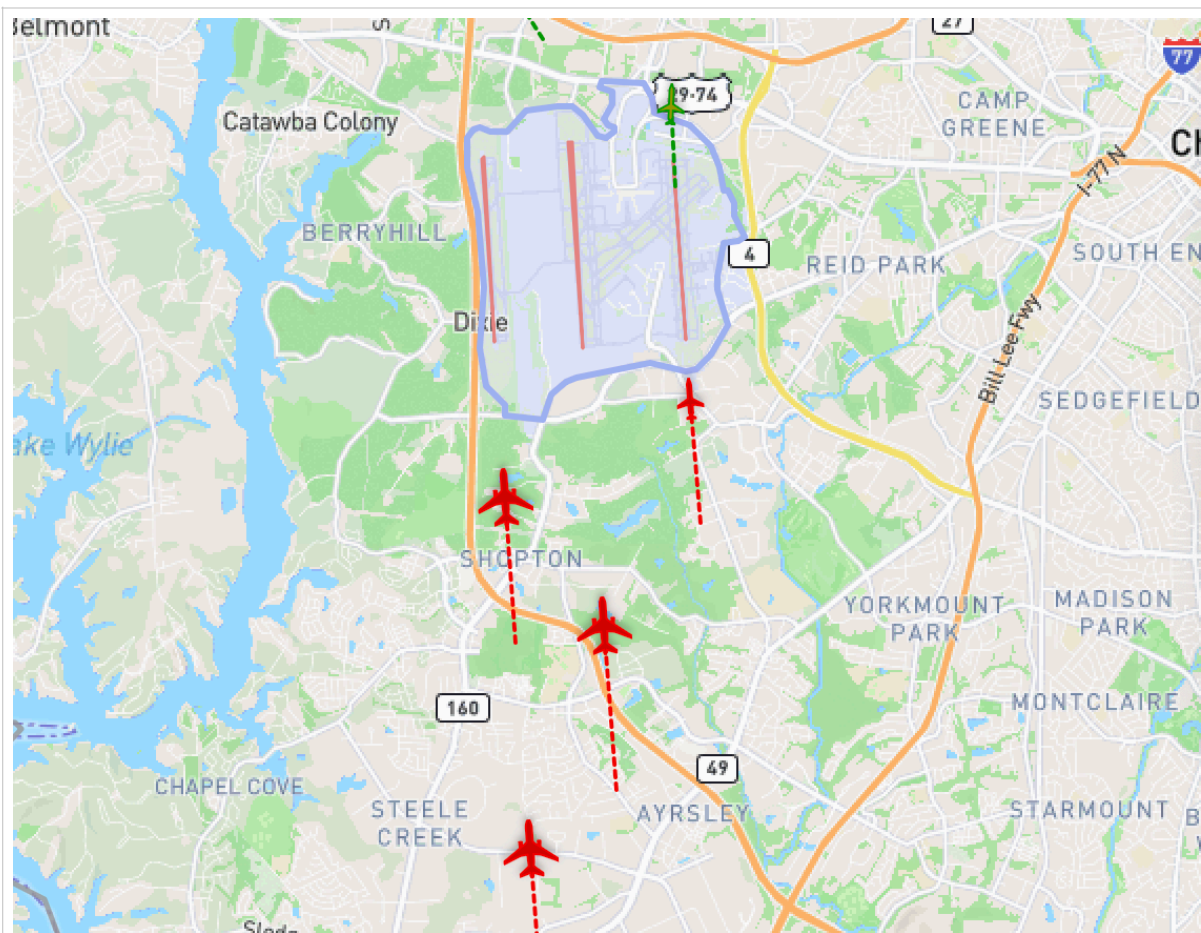
Webtrak Display for Charlotte, NC on September 18, 2025.

- c) Based on your observation, can CLT do dual simultaneous arrivals? Explain the runways.

Yes. Runways 1L and 1R are used for simultaneous arrivals.

d) Based on your observation, can CLT do triple simultaneous arrivals? Explain the runways.

Yes. Runways 1L, 1C and 1R are spaced 4,300 feet or more allowing triple independent instrument approaches. Look at the time 3:12 (hours:minutes) there are triple arrivals (see below).



Webtrak Display for Charlotte, NC on September 18, 2025. Time : 3:12 Hours: minutes. The graphic shows triple independent arrivals.

e) Briefly explain the FAA runway separation rule that applies and the distance between arrival runways in parts (c) and (d).

Dual independent arrivals today require 3,200 feet separation (CLT is below 2,000 feet Mean Sea Level conditions).

f) Can CLT do simultaneous departures operations from at least two runways? State the rule used and the runways used.

Triple independent arrivals today require 3,400 feet separation (CLT is below 2,000 feet Mean Sea Level conditions).

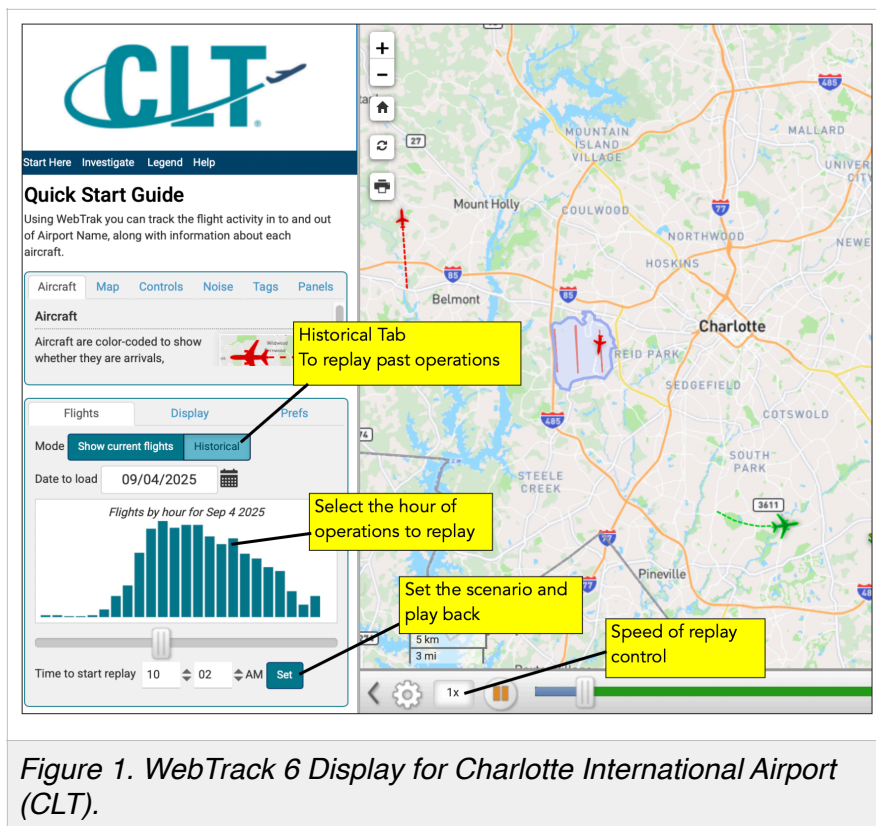


Figure 1. WebTrack 6 Display for Charlotte International Airport (CLT).

Problem 2

Use Google Earth, Airnav, and Webtrak (<https://us.webtrak.aero/>) to study runway operations at Philadelphia International Airport (PHL) and answer the following questions.

- a) Estimate the runway stagger between the thresholds for runways 27L and 27R.

5,300 feet of stagger between runways 27L and 27R.

- b) Estimate the distance between runways centerlines for runways 27L and 27R.

1,400 feet between centerlines.

- c) Could PHL operate simultaneous arrivals to runways 27L and 27R using the FAA stagger rule? Explain the required runway separation at PHL for arrivals using the stagger rule.

It is possible to do simultaneous arrivals only under VMC conditions. In bad weather (IMC conditions), it is not possible to execute simultaneous independent arrivals. The stagger rule applies to segregated operations (one runway for arrivals and one for departures). Considering the large stagger distance at PHL, the airport conducts arrivals and departures independently under most weather conditions (including IMC).

- d) Load the Webtrak data for Philadelphia International Airport (PHL) for September 18, 2025 starting at 4:00 PM local time (Hour 16 in Webtrak). Look at the traffic for 20 minutes (you can speed up the replay as needed).

Runway 27R is used for arrivals

Runway 27L is used for departures.

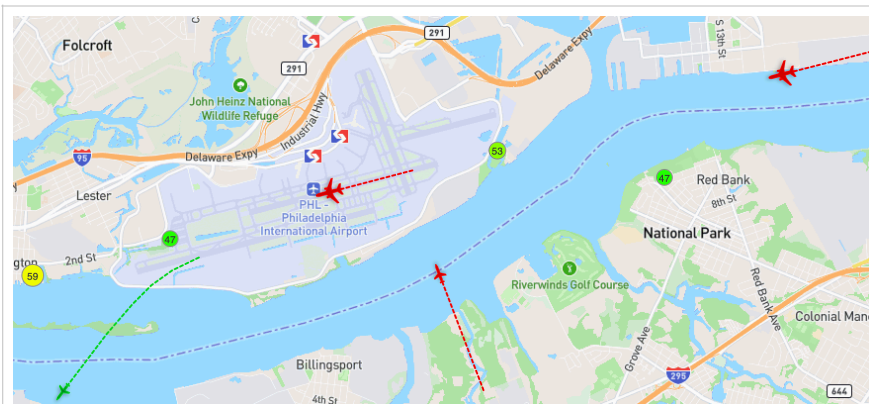
Runway 35 (crosswind runway) is used for arrivals.

- e) Explain the operations at the airport. Name the runway(s) used for arrivals and departures.

Runway 27R is used for arrivals

Runway 27L is used for departures.

Runway 35 (crosswind runway) is used for arrivals. Arrivals on runway 35 require a large gap between successive arrivals on runway 27L (see the figure below).



WebTrack 6 Display for Philadelphia International Airport (PHL).

- f) Using your knowledge of aircraft runway lengths requirements for landing and takeoff, is the operation at PHL consistent? Explain.

Use [airnav.com](https://www.airnav.com) to obtain the declared distances for each runway.

Runway 27R has TORA:9500 TODA:9500 ASDA:9500 LDA:8864 in feet

Runway 27L has TORA:12000 TODA:12000 ASDA:11825 LDA:9912 in feet

Longer runway lengths are needed for takeoff. The airport is using the two runways consistently.

Problem 3

Quick assessment and answers.

Cancun International Airport (CUN)

- a) Can the airport conduct simultaneous approaches to the parallel runways in Instrument meteorological conditions?

Yes. The separation between runways is estimated to be 4,700 feet. ICAO requires 3,395 feet for independent approaches.

- b) Name the ICAO rule used and the estimated distance between runway centerlines.

ICAO requires 3,395 feet for independent approaches.

London Heathrow Airport (LHR)

- c) Can the airport conduct simultaneous approaches to the parallel runways in Instrument meteorological conditions?

Yes. The separation between runways is estimated to be 4,700 feet (same as in Cancun). ICAO requires 3,395 feet for independent approaches.

- d) Name the ICAO rule used and the estimated distance between runway centerlines.

ICAO requires 3,395 feet for independent approaches.

- e) Comparing the configurations of Cancun and London, explain how the observed runway separations affect the location of the airport terminals to serve passengers.

It is clear that both separations exceed the current ICAO criteria. The runway separations at both airports are probably designed to provide ample space for terminals between the two runways.

Problem 4

Briefly answer the following questions with two sentences.

- a) Explain how ADS-B technology has affected the runway separation standards in the United States.

ADS-B provides aircraft position reports every second. The higher update rate (compared to radar technology) allows a reduction of runways separations with the same level of safety.

- b) Explain why runway separations at higher elevation airports increase.

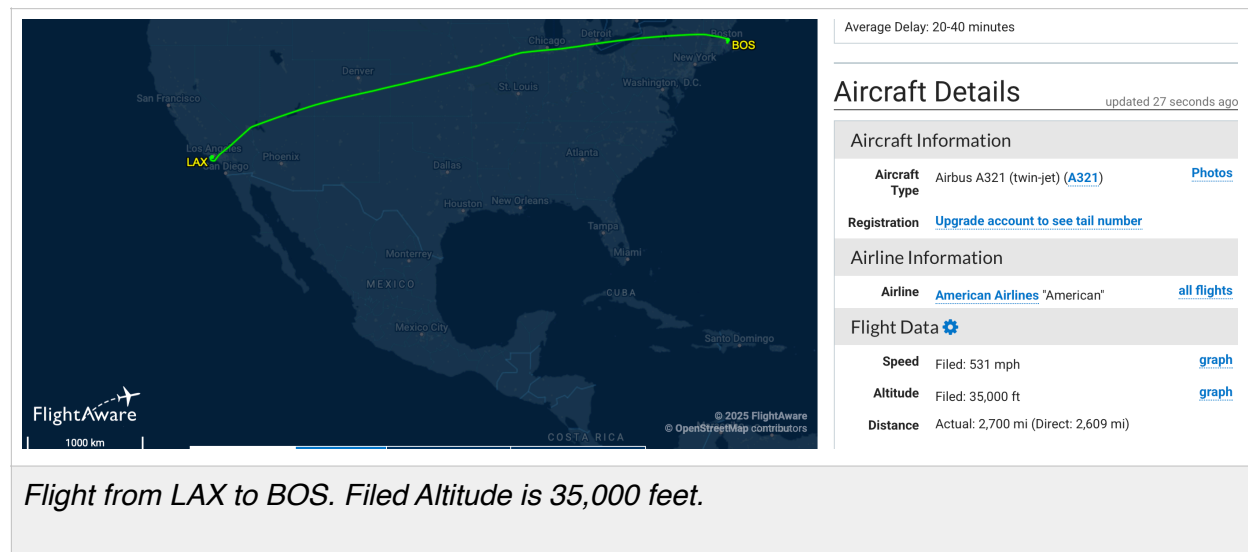
At higher elevations, aircraft travel at higher ground speeds because the air density is less, requiring faster speeds to produce the same amount of lift to keep the aircraft airborne.

- c) State the minimum parallel runway separation to conduct segregated runway operations in the US (assume instrument meteorological conditions and radar and ADS-B technology available).

2,500 feet (see notes).

- d) An Airbus A320 flies from Los Angeles airport to Boston. State a feasible cruise altitude for this flight. Explain the reason of your choice.

Flying from LAX to BOS, the aircraft flies a heading of 70-80 degrees (due East). According to the hemispherical rules assigned by Air Traffic Control, the aircraft can cruise at odd cruise flight levels. For example, 33,000 or 35,000 feet are typical altitudes flown. A sample flight below shows the aircraft cruising at 35,000 feet.



- e) Are landings on runway 26L and departures on runway 19R at Las Vegas International Airport (LAS) subject to converging runway operations (CRO)? Explain the rule used.

Yes they are subject to CRO rules because their thresholds are separated by less than one mile. Note that runways 26R and 26L were designated 25L and 25R until a few years ago. Runways are renamed when there is a change in the local magnetic variation.