

**Assignment 7: Air Traffic and Runway Operations**

Date Due: October 30, 2020 (All students work 3 problems)

Instructor: Trani

**Problem 1**

Answer briefly the following ATC-related questions.

- a) An Airbus A321 is scheduled to fly from Denver (DEN) to Chicago O'Hare airport (ORD). Name two possible flight levels below FL410 that this flight could take while following ATC hemispherical rules for vertical separation.
- b) An Airbus A320 cruises at Mach 0.78 at FL 350 over Nevada. Name the ATC service used by the aircraft if the pilot requests a 10 mile deviation to the right to avoid weather.
- c) An Airbus A319 is 20 nm from Atlanta (ATL) airport. The aircraft is descending at 250 knots at 7,500 feet. Name the ATC service that handles this flight.
- d) Find the minimum separation between two runways able to operate simultaneous instrument landing procedure arrivals with a fast-scan radar.
- e) Use Google Earth or Google maps and inspect the runway configuration of Chicago ORD airport. Can aircraft arrivals use runways 10R and 10C independently in IMC conditions? ORD has a fast scan radar. Comment what runway separation rule applies.
- f) Use Google Earth or Google maps and inspect the runway configuration of RDU (Raleigh-Durham) airport. Can aircraft departures use the two parallel runways independently in IMC conditions? Comment on the runway separation rule used.

**Problem 2**

Answer briefly the following ATC-related questions. Consult the aircraft classifications handout as needed.

- a) An Airbus A321 follows in-trail a Boeing 777-300ER before landing on runway 28C at Chicago O'Hare Airport (ORD). Find the minimum in-trail separation possible if the runway has several high-speed runway exits and the average runway occupancy time is 49 seconds. ORD operates under RECAT Phase 1 rules.
- b) A Falcon 7X corporate jet follows in-trail a Boeing 737-900ER aircraft before landing on runway 8L at Atlanta International Airport (ATL). Find the minimum in-trail separation possible if the runway has several high-speed runway exits and the average runway occupancy time is below 50 seconds. ATL operates under RECAT Phase 1 rules.
- c) The typical runway departure capacity of a single runway at Chicago O'Hare Airport (ORD) is 51 operations per hour. Estimate the loss in departure capacity after the FAA implemented Converging Runway Operations (CRO) at the airport. Briefly explain the concept of CRO operations at ORD. Which runways are involved.
- d) Using the Virginia Tech/FAA Landing Database estimate the median approach speed of Boeing 737-800 landing in Atlanta on runway 8L.

- e) During a period of time in the morning the airport receives RECAT Class D aircraft (similar to the Boeing 737-800) on runway 8L. If the ATC applies an 19 second buffer above the minimum radar separations, estimate the maximum hourly capacity of runway 8L at Atlanta International Airport.

### Problem 3

Figure 1 shows the interface of the Webtrak system for Chicago Department of Aviation (CDA). The system is available on the internet at: <https://webtrak.emsbk.com/cda>. Figure 2 shows the configuration of the airport. Use the replay feature of the Web Tracker to study the operations at ORD on October 13, 2020. Consult the airport map provided in Figure 2.

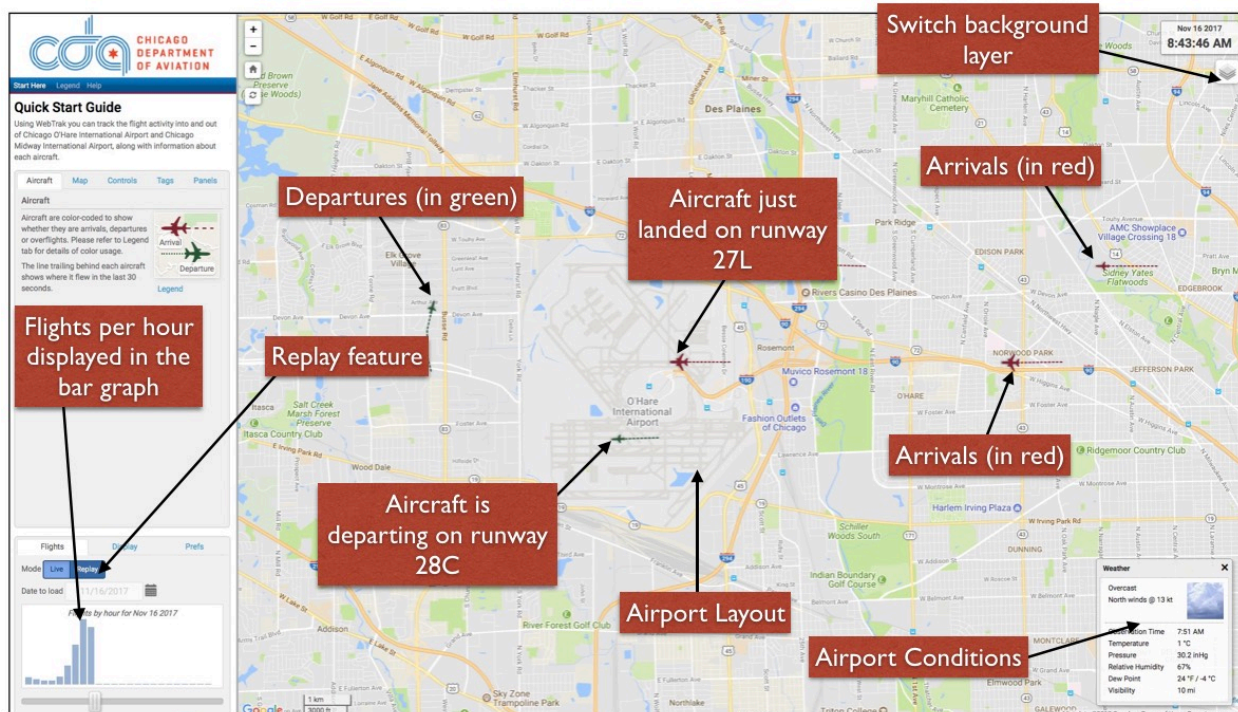


Figure 1. Webtrak system for Chicago Department of Aviation (CDA).

- Use the replay feature in Webtrak5 to estimate the total number of hourly landing operations (i.e., throughput) at O'Hare runway 28C airport between 6-7 PM (hour 18 in Webtrak).
- Use the replay feature in Webtrak5 to estimate the total number of hourly departure operations at O'Hare runway 28R airport between 6-7 PM (hour 18 in Webtrak).
- Observe traffic departing on runway 22L and the arrivals on runway 28C during the period 6-7 PM. Explain what type of coordination is needed to operate these two runways during the 6-7 PM period.
- Using the traffic during the period 6-7 PM, provide a first-order estimate of the closest distance between an arrival on runway 28C and a departure on runway 22. Use Google Earth to estimate distances shown in the WebTrack system. For example, the Web Track system shows highway I-171, Route 43, etc. in the map. These distances can be used as reference in your estimate.

- e) Explain the airspace organization to feed and meter arrival traffic to runways 27R, 27L and 28C. Are the arrivals independent of each other? Explain the FAA rule to operate triple independent arrivals.
- f) If the hourly arrivals and departures estimated in parts (a) and (b) represent maximum runway throughput or capacities, estimate the runway capacity of the airport in West flow configuration with arrivals on runways 27R, 27L, 28C and departures on runways 28C and 22L.

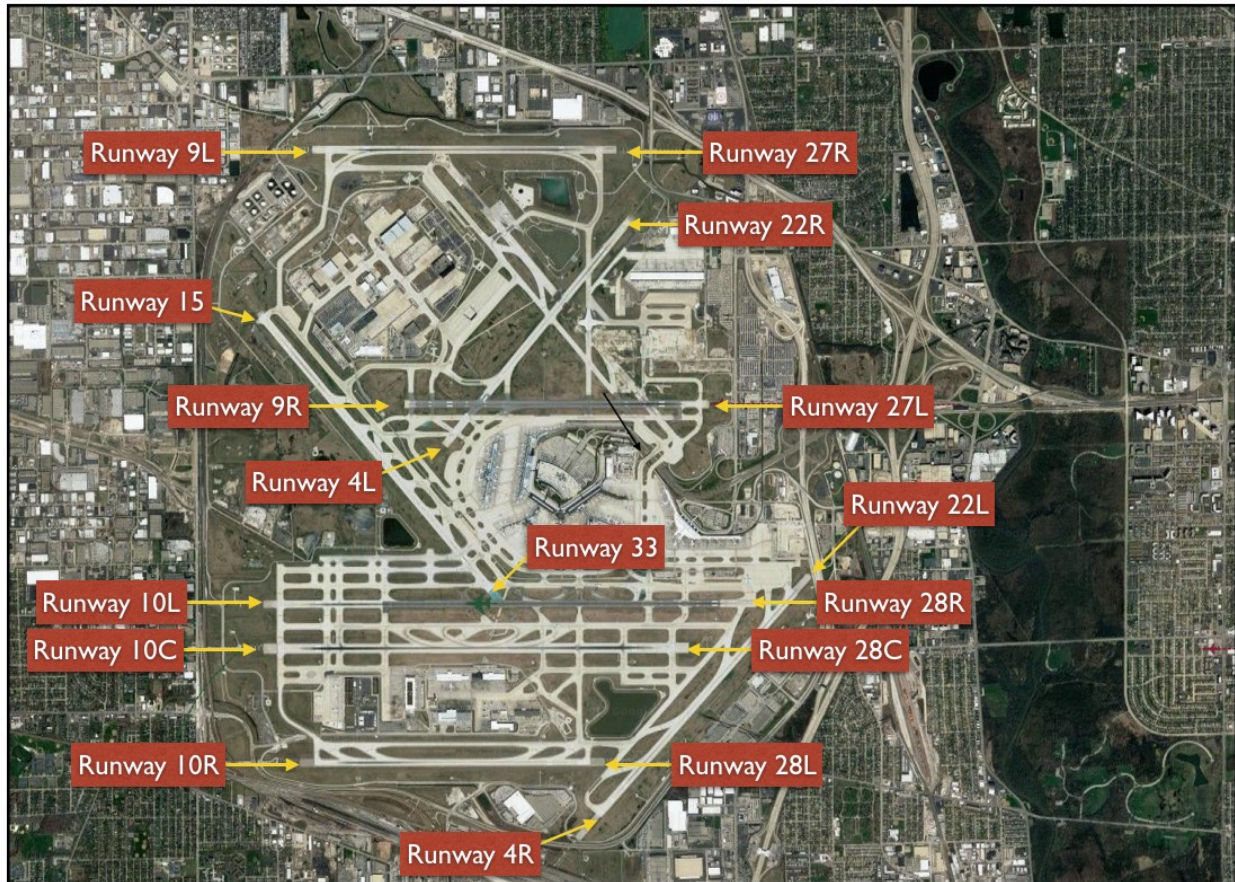


Figure 2. Chicago ORD Runway Configuration. Runway 15-33 was Decommissioned on March 29 2019.