Assignment 7: Airport Geometric Design Standards

Date Due: October 30, 2023
Instructor: Trani

Problem 1

A new airport is designed with two satellite terminal buildings as shown in Figure 1. The buildings are designed to accommodate aircraft up to the size of a **Boeing 787-10** and the Airbus **A350-1000**.

a) Find the dimensions A through R in Figure 1. Make sure that your design allows pilots entering the gate position to maneuver with steering angles no more than 50 degrees. Assume the service roads have 12-foot wide lanes.
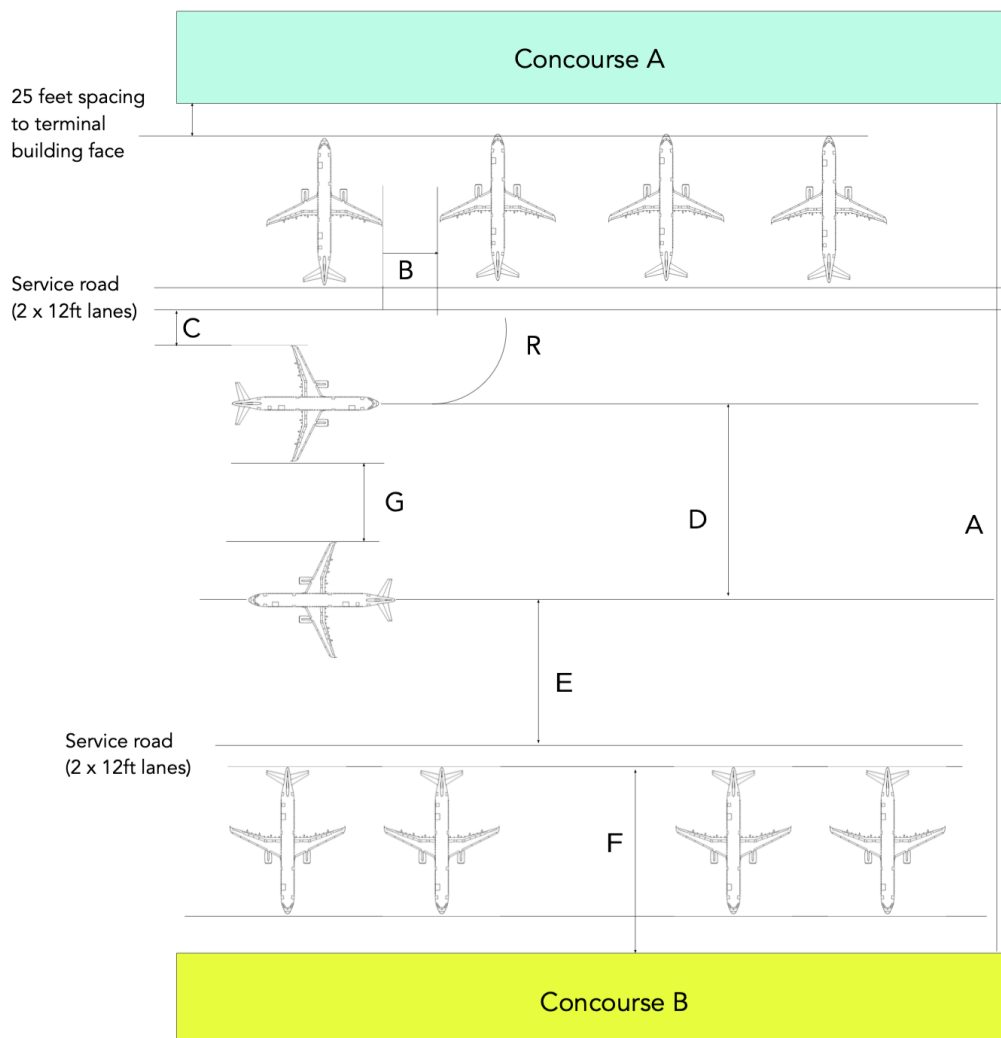

Figure 1. Airport Dual-Taxilane Configuration for Problem 1.

b) Estimate the steering angle and wingtip radius of the Boeing 787-10 for the centerline radius R selected in part (a) of the problem. Consult Section 4 of the corresponding Boeing airport design document.

c) Compare the dimensions of your design at the gate with the typical gate layout dimensions recommended by Airbus for the A350-1000 (Section 5 in the Airbus A350 airport design document - see the Typical Ramp Layout (Gate) figure). Comment on any differences.

Problem 2

a) Use the FAA Taxiway Fillet Design Tool demonstrated in class to design a 150-degree taxiway-taxiway connector for the Airbus A350-1000 (see Figure 2). Your design should include all dimensions needed to construct the taxiway fillets (three segment lengths L-1, L-2, L-3; three taxiway widths W-1, W-2, W-3; and two radii dimensions R-Fillet and R-Outer. For your design use a 170 foot centerline radius.

b) For the Airbus A350-1000 what is the minimum centerline radius required by FAA?

c) Find the steering angle required for the design implemented in part (a).

d) Use the FAA FAA Taxiway Fillet Design Tool to produce a simple CAD drawing of the taxiway-taxiway connector design in part (a). Show the detailed geometry in the CAD software of your choice (no hand sketches accepted).

Note: If the FAA Taxiway Design Tool does not work on your computer, use the tables in Appendix J of the FAA Advisory Circular 150/5300-13B to implement your design. You are still required to draw the solution in part (a) using CAD.

Figure 2. Airbus A350-1000 Landing at San Diego Airport (A. Trani).

Problem 3

An airport is expected to have two parallel taxiways to serve Airbus A350-1000 aircraft taxiing in opposite directions. Specify the following dimensions:

   a) Distance between parallel taxiway centerlines.

   b) Find the minimum distance between the taxiway centerline and the tail of another aircraft parked perpendicular to the taxiway.

   c) Find the dimension of the taxiway shoulder used in the design.

   d) Find the taxiway edge safety margin used in the design.

   e) State the dimensions of the Taxiway OFA and Taxiway Safety Areas (TSA).

Problem 4

A new 12,000-foot precision runway is to be constructed at CLT airport. The runway will have a Category II Instrument Landing System. The critical aircraft is the Boeing 747-8i. Answer the following questions.

   a) Find the recommended runway width for the new runway.
   b) Find the dimensions (width and length) of the runway blast pad area at both runway ends.
   c) Find the recommended distance between the runway centerline and a parallel taxiway. Consider the Category II ILS landing system.

Problem 5

Specify the dimensions of a crossover taxiway designed for the Boeing 737-9Max. Your design should be based on the TDG group design criteria.

   a) Find the recommended taxiway centerline to taxiway centerline distance.
   b) Find the three fillet lengths L-1, L-2, and L-3 for the crossover taxiway.
   c) Find the four widths associated with the taxiway fillet design (W-0, W-1, W-2, and W-3).
   d) Find the recommended centerline and fillet radii.