

## Assignment 7: Imaginary Surfaces and Airport Geometric Design Standards

Date Due: October 31, 2025

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### Problem 1

This problem analyzes possible FAR Part 77 imaginary surface violations. The single runway airport has a 8,750-foot precision runway (see Figure 1). Three objects identified near the runway are proposed by two developers and a telecommunications company.

- Use the CAD program of your choice to construct the top view of the five imaginary surfaces. Provide the dimensions of each surface.
- Study three objects shown in Figure 1 to see if the objects violate any imaginary surface. State the FAR Part 77 imaginary surface applicable to each object. Also, state if the objects are obstacles to navigation.

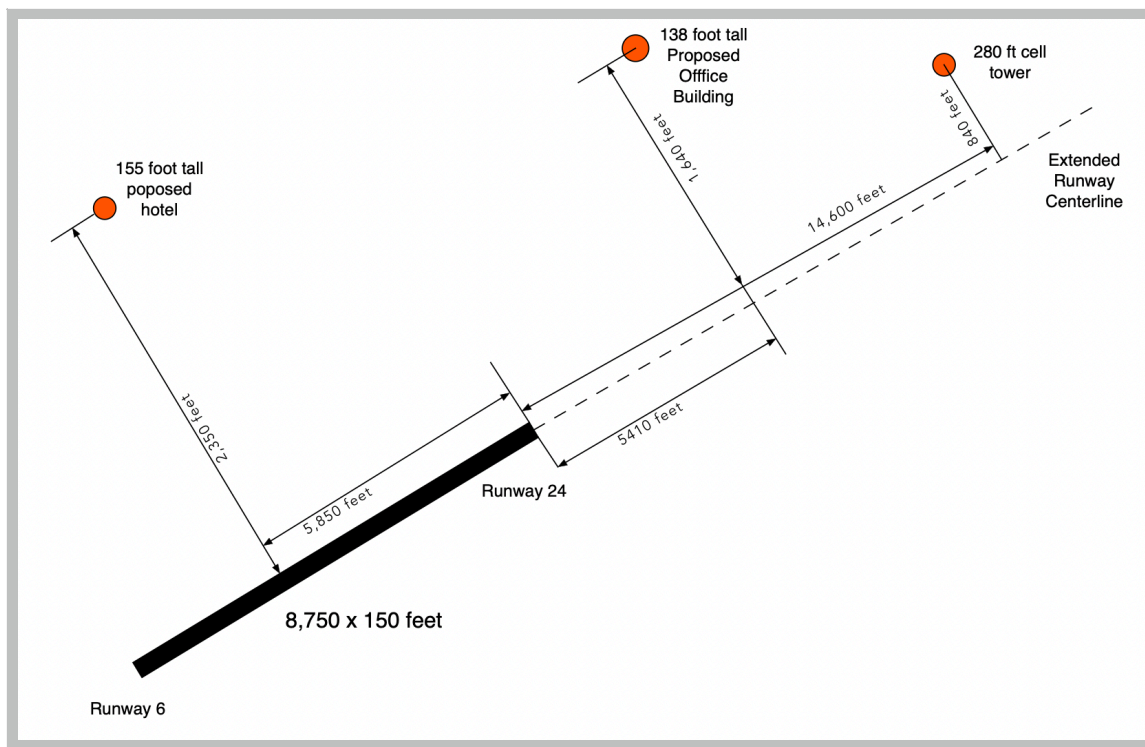


Figure 1. Objects Identified Near the Existing Runway. Drawing not to Scale.

## Problem 2

A new finger-pier terminal building is required at an international airport (see Figure 2). The idea is to provide eight gates that can accommodate aircraft up to the size of a Boeing 787-10 (see Figure 3).

a) Find the dimensions A through R1 in Figure 2. 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. Use the new design criteria to satisfy the taxiway object-free areas on the dual taxi lane. Assume the width of the finger pier terminal is 65 feet.

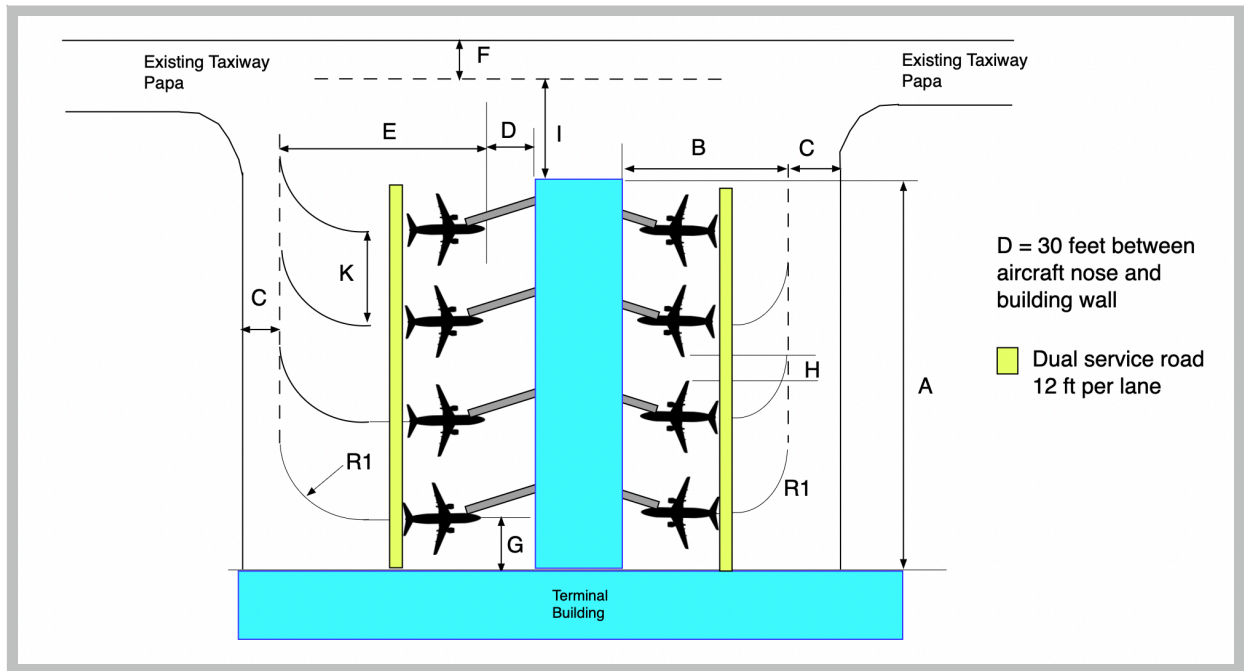


Figure 2. Airport Terminal Configuration for Problem 2.

b) Estimate the steering angle and wingtip radius of the Boeing 787-10 for the centerline radius R1 selected in part (a) of the problem. Consult Section 4 of the corresponding Boeing airport design and planning document.



Figure 3. Boeing 787-10 in Tow at Chicago O'Hare International Airport (A. Trani).

### Problem 3

- Use the **FAA Taxiway Fillet Design Tool** to design a 125-degree taxiway-taxiway connector for the Airbus A330-900neo (see Figure 3). 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-0, W-1, W-2, W-3; and two radii dimensions R-Fillet and R-Outer. For your design, use a 180-foot centerline radius.
- Tell me the steering angle produced in the design of part (a). Is it acceptable?
- For the A330-900neo what does FAA require the minimum centerline radius on the 125-deg. Taxiway junction?
- Find the steering angle required for the design implemented in part (a).
- Use the **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 with dimensions (no hand sketches accepted). You can export the DXF file produced by the FAA Taxiway Design Tool.

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 must still draw the solution in part (a) using CAD.



Figure 4. Airbus A330-900neo at Atlanta Hartsfield-Jackson International Airport (A. Trani).

### Problem 4

An airport is expected to have two parallel taxiways to serve ADG V aircraft taxiing in opposite directions. Specify the following dimensions:

- Distance between parallel taxiway centerlines.
- Find the minimum distance between the taxiway centerline and a fix or movable object.
- Find the dimension of the taxiway shoulder used in the design.
- Find the taxiway edge safety margin used in the design.
- State the dimensions of the Taxiway Object Free Area (OFA) and Taxiway Safety Areas (TSA).
- Find the dimensions (length and width) of the runway blast pad area.