

**Purdue University**  
**School of Civil Engineering**  
**CE 361 Introduction to Transportation Engineering**

**Homework 10**

**AIRPORT FORECASTS, FINANCING, CAPACITY, AND  
DELAY**

**Posted: Mon. 18 November 2002**  
**Due: Wed. 4 December 2002**

Dear Consultant(s):

Georgetown Airport (GTN) is becoming a popular destination for business and leisure air travel. Please demonstrate your facility with basic airport analysis methods by completing and submitting the exercises below.

Note: You may submit this HW as a member of a group formed by the mutual consent of no more than four CE361 students. If this HW is submitted by a group, the top sheet of the material submitted must be signed by each group member.

1. (25 points) **Forecasting Air Travel using the FAA "Share Model"**. Forecast the *total operations and total passenger traffic* at Georgetown Airport for the years 2005, 2010, 2015, 2020, and 2025 shown in the bottom half of Table 11.6 on CNotes page 11.19. Construct a spreadsheet with *exactly* the *format* of CNotes Table 11.6. For Georgetown data, see Table 10.1 below. Notes: (1) When revising the table for Georgetown, use the first three forecast lines in Table 11.6 (Year 2000) as the last three historical lines in the table, treating the Year 2000-2002 values as estimates (not forecasts) for that year. (2) Because Georgetown is a smaller airport, you may have to increase the number of digits after the decimal point for some values in the table. (3) Your choice of *Planning Factors* may differ from other analysts', so you must provide a brief explanation for the values you chose and show the values clearly.
2. **Financing Airport Improvements**. Based on the 2025 projections, the Georgetown Airport authorities are planning a \$4.7 million expansion. It has been agreed that general obligation (GO) bonds and revenue bonds will each finance half of the project. The GO bonds will pay 8.1 percent over 10 years and the revenue bonds will have a 20-year life at 6.3 percent. The airport authority's taxing jurisdiction encompasses property with an assessed valuation of \$972.2 million. The lending institution will pay 4.7 percent on funds deposited by the airport authority into a sinking fund established to pay off the principal on the bonds. There is

currently no passenger facility charge (PFC) at MYH, but one is being proposed to pay off the revenue bond. Both the project and the bond issues to pay for it are planned to begin in year 2005.

- A. (10 points) By how much will the property tax rate (in cents per \$100 assessed valuation) have to be increased to pay for the GO bond?
  - B. (15 points) How much will the new PFC (in cents per enplaning passenger) have to be in order to pay for the revenue bond? Note: You will have to estimate the number of passengers who will be paying the PFC over the life of the revenue bond. Show how you determine this value.
3. **Airport Capacity and Delay.** During the peak period for arrivals at Georgetown Airport, heavy (150 knots), medium (120 knots), and light (100 knots) aircraft arrive in random sequence. The proportions of aircraft landing are 0.08 heavy, 0.40 medium, and 0.52 light. The average peak period arrival rate is 18 aircraft per hour. The standard deviation involved in handling these arrivals is 0.42 minutes. Georgetown's entry gate is 5.3 nautical miles from the threshold.
- A. (15 points) What is the capacity of the airport under IFR conditions for the random pattern of aircraft arrivals? Use the format of Table 11.16 on page 11.35 of the Course Notes. (Suggestion: Build a spreadsheet to duplicate the contents of Table 11.16, then modify it to fit the data in this problem.)
  - B. (10 points) What is the average delay experienced by aircraft landing at Georgetown Airport during the peak period? Use CNotes Equation 11.6.
  - C. (10 points) What is the maximum number of arriving aircraft that Georgetown Airport can receive in an hour, and expect to maintain a mean delay of no more than 7.8 minutes?

**Table 10.1 Historical Data for Georgetown Airport**

Year	Commercial Enplanements	Interline Pax	Commercial Departures	Seats per Dep. Aircraft	GA Opns
1993	26719	5318	1684	41.4	14620
1994	27692	5441	1736	42.1	14632
1995	28078	5732	1786	42.5	15056
1996	28654	5887	1879	43.5	15108
1997	28977	6087	1992	44.0	16659
1998	29395	6182	2032	48.7	16722
1999	29855	6279	2094	56.0	19832
2000	29861	6499	2135	60.5	20136
2001	32879	6634	2349	62.5	20899
2002	36889	6652	2365	63.8	21498