

### TRANSPORTATION BASICS

“FTE” = Fundamentals of Transportation Engineering, the textbook for CE361.

For every problem, identify the problem by its number and **name**, be clear, be concise, cite your sources, attach documentation (if appropriate), and let your methodology be known.

**1. (25 points) Determining the value of time.** Problem 1.4 in FTE.

If 75 cents gains you 10 minutes, then the value of time in this instance is at least  $VoT = \$0.75/(10/60 \text{ hr}) = \$4.50$  per hour. The experiment is probably providing only a lower bound on your VoT. How much more than 75 cents would you have been willing to pay? Other factors, such as health, weather, and/or safety, may dictate walking or riding the bus. Your VoT may also depend on the importance of being punctual for a particular trip.

**2. (25 points) Per capita freight movement.** Problem 1.6 in FTE.

Table 1a “Shipment Characteristics by Mode ...” at [www.bts.gov](http://www.bts.gov) gives  $3,204,410 * 10^6$  ton-miles shipped in 2002. According to <http://www.census.gov/popest/national/popbriefing.html>, there were 290,809,777 residents in the US on July 1, 2003. Then 11,019 ton-miles per person were shipped. [Ton-miles and Tons per person are an indication of just how important the movement of freight is to each individual. All that we buy and use was moved as freight at some point on its way to our use. It might be good to trace the steps in getting an appliance from its raw materials to final assembled product. See Figure 12.2 (page 644) for an illustration.]

**3. (25 points) The "transportation disadvantaged".** Problem 1.9 in FTE.

The elderly, the poor, and the disabled are all among the transportation disadvantaged.

- A. A specific example would be the 90-year-old father of a friend. It is difficult for him to enter and exit a standard passenger car. Although in reasonable health for his age, he is clearly not able to operate a motor vehicle.
- B. Although travel is possible by accessible vans, most of his travel is short distances via wheelchair.
- C. The transportation engineer can help provide transportation alternatives that are accessible and affordable. Examples are public transportation vehicles that are easy to board, paratransit services that provide curb-to-curb service, and intersections designed with disabled individuals in mind. Sidewalks that can be negotiated by wheelchairs are also important.

**4. (25 points) Safety performance measures.** Problem 1.10 in FTE.

Fatalities per crash	Injuries per crash
Fatalities per passenger carried	Injuries per passenger carried
Fatalities per mile of revenue service	Injuries per mile of revenue service
Fatalities per passenger mile	Injuries per passenger mile
Fatalities per vehicle mile	Injuries per vehicle mile

Injuries per passenger mile is perhaps the most fair, because it includes the concept of exposure. The more miles, the more likely that some injurious incident will occur.