

## **BOTEC = Back of the envelop calculation 1**

Estimating cars on IH10 at DeZavala during a typical lunch hour (noon to 1 pm).

Last time class estimates ranged from 19 to 9000 vehicles:

### **Assumptions:**

Car length: 15 feet on average

feet/mile: 5280

Average speed of a car: 60 miles/hour

Lanes at IH10: 6 lanes (3 in each direction).

### **Feet of highway to work with:**

60 miles/hour × 1 hour × 5000 feet/mile × 6 lanes/highway =  $1.8 \times 10^6$  feet/highway

**Upper bound** [short cars --- bumper to bumper --- 10 feet/car]:

$$\frac{1.8 \times 10^6 \text{ feet/highway}}{10 \text{ feet/car}} = 1.8 \times 10^5 = 180,000 \text{ cars/highway}$$

**Lower bound:** [cars --- spaced far apart -- 1000 feet/car]:

$$\frac{1.8 \times 10^6 \text{ feet/highway}}{1000 \text{ feet/car}} = 1.8 \times 10^3 = 1800 \text{ cars/highway}$$