

Name \_\_\_\_\_

## CE 3201 -- Recitation #2

### Braking Distance and Signal Timing

Later in the semester we will work on a project involving the timing of an intersection's traffic signal. Today what we want to look at is how braking distance models are used to determine the yellow (clearance) intervals in a signal timing plan.

A vehicle is travelling at 40 mph and approaching a signalized intersection when the traffic light changes to yellow. The duration of the yellow interval is 3.0 seconds, the driver has a perception/reaction time equal to 1.0 seconds and, when braking, decelerates at a constant rate of  $10.0 \text{ feet/sec}^2$ .

- (1) What is the shortest distance the vehicle can be from the intersection and still stop without encroaching on the cross-street? Call this distance  $d_s$ .

$d_s =$  \_\_\_\_\_

- (2) Now suppose the vehicle is 15 feet long, and the width of the cross-street is 25 feet. What is the farthest distance the vehicle can be from the intersection when the light changes to yellow and still completely clear the intersection before the light changes to red, without accelerating? Call this distance  $d_c$ .

$d_c =$  \_\_\_\_\_

- (3) When  $d_c < d_s$ , traffic engineers call the area between  $d_c$  and  $d_s$  the *dilemma zone*. Suppose the vehicle's front end is exactly in the middle of the dilemma zone when the light changes to yellow. What is the minimum acceleration needed to clear the intersection before the light changes to red? (Assume that the driver's acceleration reaction time is 0.5 seconds)

Minimum clearing acceleration = \_\_\_\_\_

- (4) What yellow interval would eliminate the dilemma zone by making  $d_c = d_s$ ?

Yellow interval = \_\_\_\_\_.

