Short Answers

Which US President was most responsible for the development of the US Interstate System?

What metric is used to calculate intersection Level of Service?

Why is automobile traffic typically ignored when calculating pavement structural design?

A vehicle slows from 60 mph down to 30 mph on a flat grade. Using the standard AASHTO recommended deceleration rate, what is the braking distance over which this occurs?

AASHTO recommended deceleration rate = 11.2 ft/sec^2 (2 points)

Problems

A 2-lane (12 ft wide lanes) combined horizontal and crest vertical curve is reportedly designed for 35 mph. Both curves begin at point A and end at point B.

Given the data below, is this section of roadway adequately designed for 35 mph? Show appropriate calculations to support your conclusion.



CEE 320 Midterm 2 Sample Questions

A new pavement must be built for the I-5 off-ramp to the Metro bus facility just south of N 175 St. in Shoreline. Assume all buses at the facility are 60 ft Flyer hybrid dieselelectric buses. They are always empty (one driver only) when they drive across the offramp and enter the facility. Metro logs show an average of 400 buses per day use the offramp with no expected growth rate. The off-ramp pavement is to be doweled rigid (portland cement concrete – PCC) pavement using a hot mix asphalt (HMA) base and 85% reliability.

Report the following:

- The number of ESALs for a single bus
- Total number of ESALs over 50 years (assuming no growth)

Condition	Weight when bus is empty	
Front axle	13,300 lb	
Middle axle	18,200 lb	
Rear axle	12,200 lb	

photo by Ned Ahrens (from Metro website)

The road up Mt. Baker is being redesigned to accommodate a 35 mph design speed. Part of this road has an existing curve with a 280 ft radius and zero superelevation. Answer the following 2 questions about the redesign of this curve:

- 1. If the existing curve radius is kept unchanged, what superelevation is required for the curve to accommodate a 35 mph design speed (use $f_s = 0.23$).
- 2. How far back from the edge of the road must the rock outcropping be to allow adequate sight distance for a 35 mph design speed?



Refer to the intersection diagram below and determine the Level of Service for the westbound approach of this pre-timed signal. You will need to determine the signal timing, including the cycle time and effective green time for the approach.



Assume the following:

- Saturation flow rate per lane = 1800 veh/h
- Start-up lost time/phase: 2 sec
- Clearance lost time/phase = 2 sec