**CE 34500: Transportation Engineering**

**Spring 2020**

**Homework 1**

1. The design speed of a multilane highway is 60mph. Determine a) the minimum stopping sight distance that should be provided for a level roadway, and b) the minimum stopping sight distance that should be provided for a roadway with a maximum grade of 5%. Note: the term in the appropriate equation is typically rounded to 0.35 in calculations. Assume perception reaction time = 3.0 sec.

**Solution:**

a. Road is level,

b. G=5%=0.05,

1. The acceleration of a vehicle can be expressed as:

If the vehicle speed, u, is 30 ft/sec at time , determine:

* 1. Distance traveled when the vehicle has accelerated to 45 ft/sec.
  2. Time for vehicle to attain the speed of 45 ft/sec.

**Solution:**

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693-500+250= **443 ft.**

1. Determine the horsepower developed by a passenger car travelling at a speed of 50 mph on an upgrade of 4% with a smooth pavement. The weight of the car is 4000Ib and the cross-section area of the car is 40 .

**Solution:**

+

=10.23+61.97+160

=233 Ib

1. Determine the minimum radius of a horizontal curve required for a highway if the design speed is 70 mph and the super-elevation rate is 0.08.

**Solution:**

1. A curve of radius 250 ft. and is located at a section of an existing rural highway, which restricts the safe speed at this section of the highway to 50% of the design speed. This drastic reduction of safe speed resulted in a high crash rate at this section. To reduce the crash rate, a new alignment is to be designed with a horizontal curve. Determine the minimum radius of this curve if the safe speed should be increased to the design speed of the highway. Assume for the existing curve and the new curve is to be designed with .

**Solution:**

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