

## CIVE-3520 Transportation 2 Highway Geometrics Homework

A horizontal curve with a PI Station at 596+87.00 with the associated deflection angle,  $\Delta = 20^\circ 30'$ , requires that the beginning of the curve (PC Station) must start at 592+99.32. Find the PT Station, the Radius and Dc required for the curve to layout in this manner.

A crest vertical curve on the same horizontal alignment has a PVI Station of 596+00 at elevation 598.75. For a 500' length of curve, find the elevation and station of the high point of the curve if  $G_1 = 2.5\%$  and  $G_2 = -2.0\%$ .

Does the curve have the proper K for a 55 mph design speed?

What is the high superelevated edge of pavement elevation at the high point of the curve for a 55 mph design speed in a rural locale? (2 LANE @ 12')

### HORIZONTAL CURVE

$$T = (596+87.00) - (592+99.32) = 387.68'$$

$$T = R \tan \frac{A}{2} \rightarrow R = \frac{T}{\tan \frac{A}{2}} = \frac{387.68'}{\tan 10.25} = \underline{2143.90'}$$

$$D_c = \frac{5729.58}{R} = \frac{5729.58}{2143.90} = 2.6725^\circ = \underline{2^\circ 40' 21''}$$

$$L = \frac{\pi R A}{180} = \frac{\pi (2143.90) 20.5}{180} = 767.07$$

$$PT \text{ Sta} = (592+99.32) + 767.07 = \underline{600+66.39}$$

### VERTICAL CURVE

$$C = PVI \text{ ELEV} = 598.75 - (2.5)(2.5) = 592.50$$

$$b = G_1 = 2.5\% \quad a = \frac{G_2 - G_1}{2L} = \frac{-2 - 2.5}{2.5} = -0.45$$

$$Hi \text{ Pt} - 0 = 2(-0.45)x + 2.5 \quad x = 2.7778 \text{ Sta} \rightarrow \underline{596+27.78}$$

$$Hi \text{ Pt ELEV} \quad y = -0.45(2.7778)^2 + 2.5(2.7778) + 592.50 = \underline{595.97}$$

$$K = \frac{L}{A} = \frac{500}{|-2 - 2.5|} = 111.11 \quad K = 114 \text{ Req'd (203-3)} \quad \underline{\text{NOT ADEQUATE}}$$

$$G_d = 0.055 \text{ (202-7)} \\ 0.053 - 0.060$$

$$Hi \text{ Pmnt Edge} = 595.97 \\ + 0.055(12) \\ \underline{\underline{596.63}}$$