

**CE 466 / 566 Highway Geometric Design
Homework 5 Solutions**

Problem 1

- (a) The minimum allowable radius at the full superelevation of 4% is 926 ft. This is from Exhibit 3-25, p. 167, in the Green Book, with a design speed of 50 mph and a superelevation rate of 4%.
- (b) A reverse crown (i.e., at 2% superelevation) has a radius of 4940 ft, from Exhibit 3-25 also at the 50 mph design speed.
- (c) Depending on your interpretation of the paragraph on p. 166, this is 7220 ft, the maximum value in Exhibit 3-25 under the 50 mph design speed.

(d) and (e)

From Exhibit 3-32, on p. 181 in the Green Book, the superelevation runoff and tangent runout are equal to 144 ft and 72 ft for the runoff and runout (respectively) at full superelevation (4%). For the reverse crown of 2%, the numbers are 72 ft and 72 ft, respectively.

These values are taken from the 50 mph design speed column, with 2 lanes rotated. Also, the tangent runout length is found by multiplying the superelevation runoff length times the ratio of the normal crown (2%) to the superelevation (4% or 2% in this case). That is, the runout is one-half of the runoff length at 4% superelevation, and equal to the runoff at 2% superelevation.

- (f) This was a bit of a trick question. For a crest curve at 50 mph, the minimum K value is 84 (ft per % change in grade), from Exhibit 3-72 on p. 272 in the Green Book.
- (g) For a sag curve at 50 mph, the minimum K value is 96 (ft per % change in grade), from Exhibit 3-75 on p. 277 in the Green Book. This is fine for both drainage (at 0.3% within 50 ft of the low point), for comfort, and for sight distance.