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Q.1 Superelevation:

$e = \tan\theta$

$e = \tan(3)^\circ = 0.0524077$

Superelevation $(e) = \frac{(0.75V)^2}{127R} = \frac{(0.75 \times 50)^2}{1200 \times R}$

$= 0.082$

$6.655R = (37.5)^2$

$6.655R = 1406.25$

$\boxed{R = 211.30}$

Length of transition curve:

$L_S = \frac{V^2}{CR}$

$C = \frac{80}{75+V} = \frac{80}{75+50}$

$C = 0.64$

$L_S = \frac{502}{0.64 \times 211.30} =$

Length of curve $LS = 18.48674$

Allowable Speed / permissible speed

$$V = \sqrt{27.94 \times R} = \sqrt{27.94 \times 211.30}$$

$$= 76.83 \text{ km/hr}$$