⇐ تنبيه هام :-

- على من تعذر عليه حضور الـ Quiz الأول أو الثاني أو امتحان الـ Midterm في مادة الـ Steel Structures الذهاب إلى مكتب الدكتور سعد الدين مصطفى « على السلم الدور الثاني بلوك 4 » ⇒
وذلك يوم الأحد الموافق 2016/5/15 من الساعة 10 صباحا حتى 11 صباحا ....

⇐ ويعتبر هذا آخر موعد متاح لهم لإعادة الامتحان ,,, وذلك ليتمكنوا من الحصول على درجات أعمال السنة .....

And ThanX :D

Level 3 ,Madny
Mansoura

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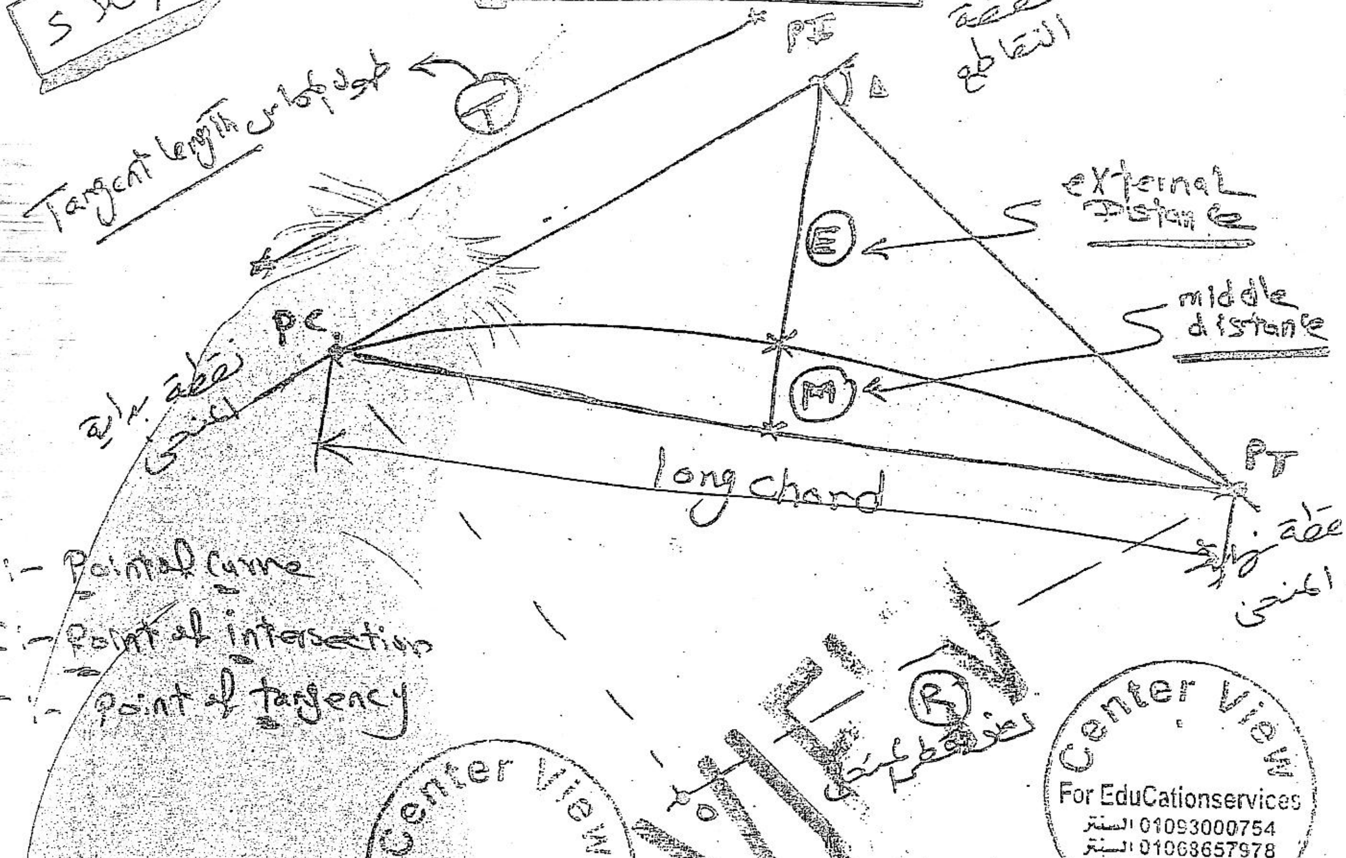
2016

Traffic
Transportation

Part 3

Horizontal Curve



PC :- Point of curve

PI :- Point of intersection

PT :- point of tangency

Degree of curvature

Δ → deflection angle

$$D = \frac{5730}{R}$$

⇛ $T = R \tan \frac{\Delta}{2}$

⇛ $L_{curve} = R \Delta \frac{\pi}{180}$

⇛ The steepness of the curvature is defined by the radius (R) or the degree of curvature

⇛ $E = R\left(\sec \frac{\Delta}{2} - 1\right)$ $\quad \sec = \frac{1}{\cos}$

⇛ $M = R\left(1 - \cos \frac{\Delta}{2}\right)$

⇛ $\text{Long Chord} = 2R \sin \frac{\Delta}{2}$

⇛ station of PC = station of PT − T

⇛ station of PT = station of PC + L_{curve}

A horizontal curve with a deflection angle of 33°. Degree of curvature equals 4° and the point of intersection station is 100+00, determine the curve data and the stations of the beginning and the end of the curve.

$\Delta = 33^\circ$ $\quad D = 4^\circ$ $\quad$ station of PI = 100+00

$R = \frac{5730}{D} \Rightarrow R = 1432.5$ Ft

$T = R \tan\frac{\Delta}{2} \Rightarrow T = 1432.5 \tan\frac{33}{2} \Rightarrow T = 424.33$ Ft

$L_{curve} = R\Delta * \frac{\pi}{180} \Rightarrow L = 1432.5 * 33 * \frac{\pi}{180} \Rightarrow L_{curve} = 825.06$ Ft

$L_{chord} = 2R\sin\frac{\Delta}{2} \Rightarrow L = 2 * 1432.5 * \sin\frac{33}{2} \Rightarrow L_{chord} = 813.7$ Ft

$M = R(1-\cos\frac{\Delta}{2}) \Rightarrow M = 1432.5(1-\cos\frac{33}{2}) \Rightarrow M = 58.99$ Ft

$E = R(\sec\frac{\Delta}{2}-1) \Rightarrow E = 1432.5(\sec\frac{33}{2}-1) \Rightarrow E = 61.52$ Ft

Station of PC = 100+00 − 424.33 = 9575.67

= (95+75.67)

Station of PT = 95+75.67 + 825.06 = 10400.73

= (104+00.73)

Recommended value of (e) = 0.15

" " " (e) = 4-6 % urban, 8-12% Rural

A roadway with a design speed of 100 km/hr and a degree of curvature of 4.25°, what's the superelevation rate if side friction equals 0.11.

$$e + f = \frac{V^2}{127 R}$$

V = السرعة Km/hr

R = Radius of Curve (m)

e = Super elevation

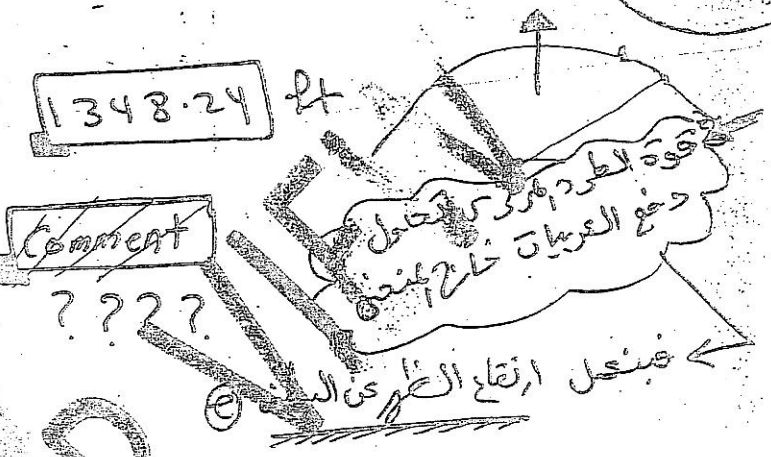
f = Side friction

$$e + 0.11 = \frac{(100)^2}{127 * 411} \Rightarrow e = 0.08$$

$$R = \frac{5730}{4.25} = 1348.24 \text{ ft}$$

Comment

???



Calculate the extra widening required for a horizontal curve (R= 200m) with a pavement of 7.2 m width if the longest wheel base of vehicle expected is 7.0 m and design speed is 60 km/hr

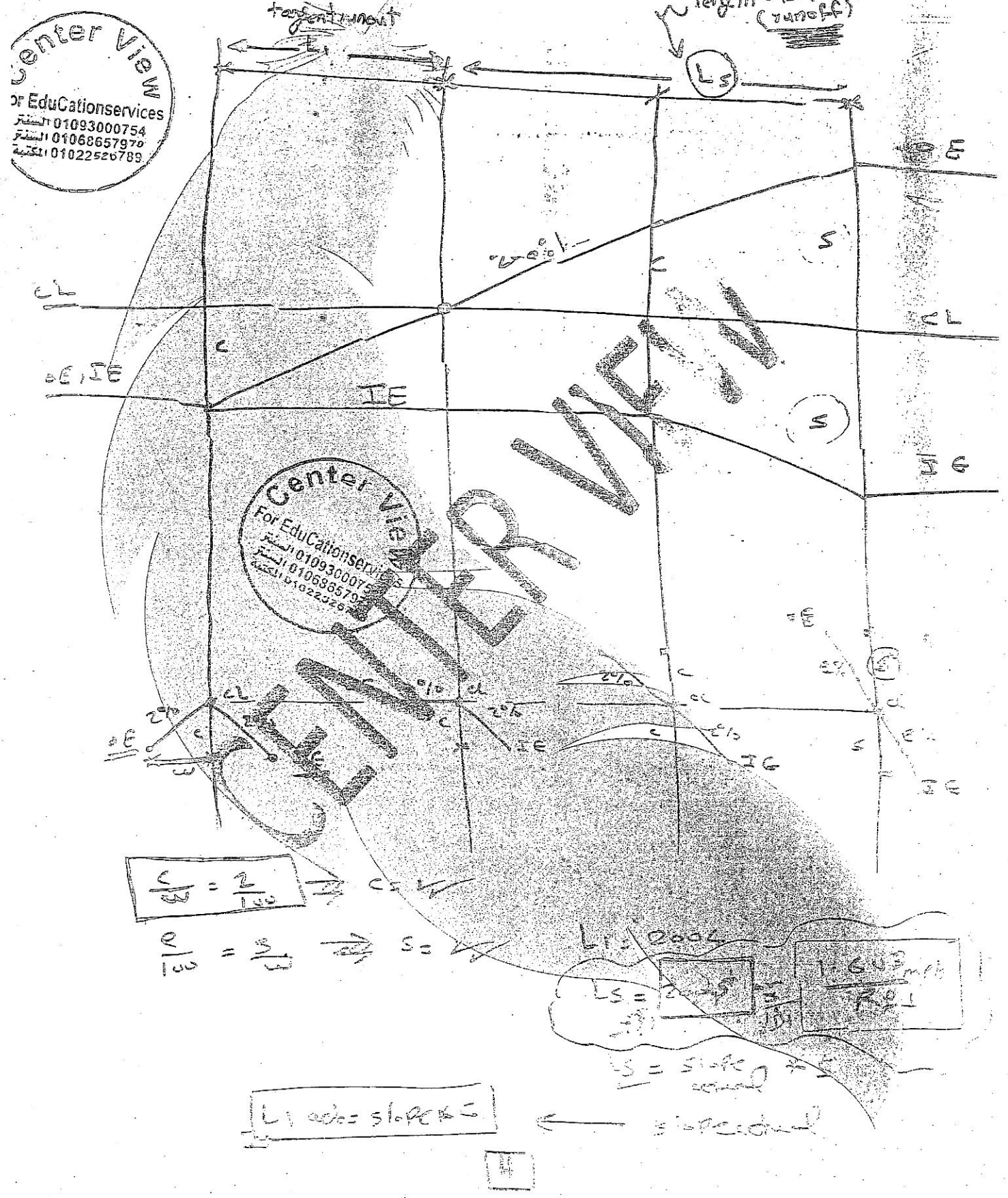
$$\text{mechanical widening} = \frac{nL^2}{2R} = \frac{2 * (7)^2}{2 * 200} = 0.245 \text{ m}$$

$$\text{Psychological widening} = \frac{V}{9.5\sqrt{R}} = \frac{60}{9.5\sqrt{225}} = 0.447 \text{ m}$$

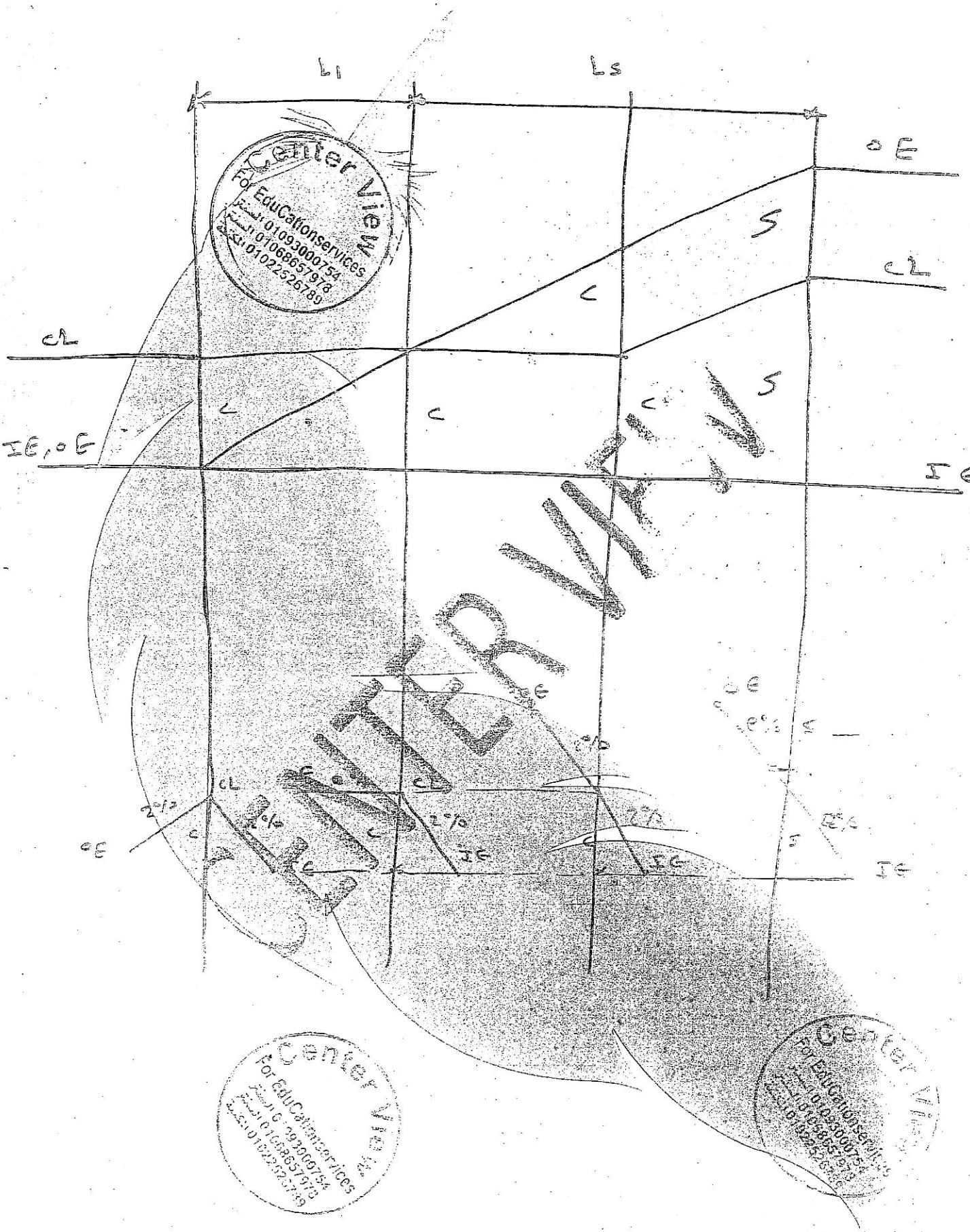
extra widening = 0.692 m.

methods of attaining super elevation

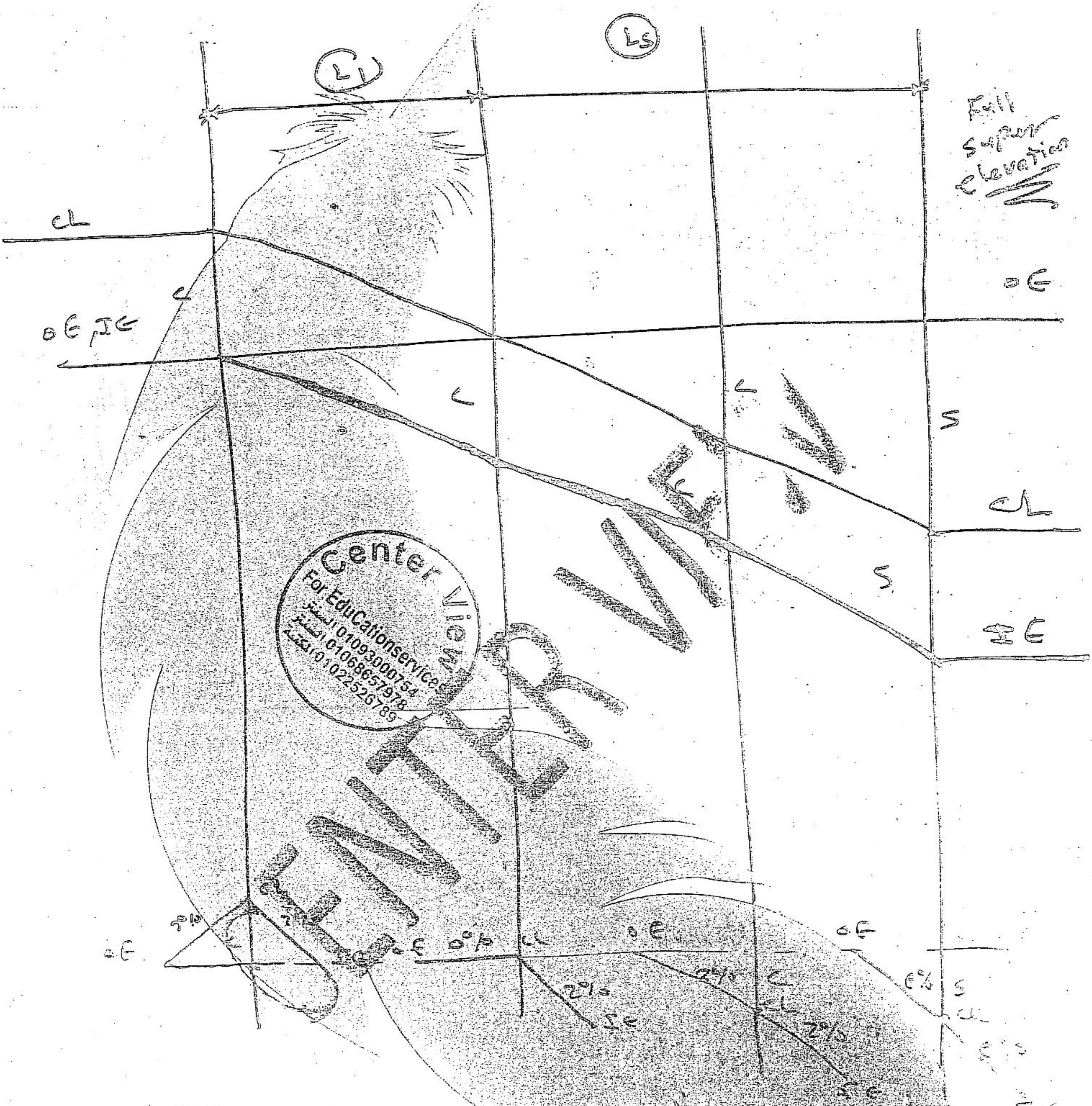
1 rotate about CL

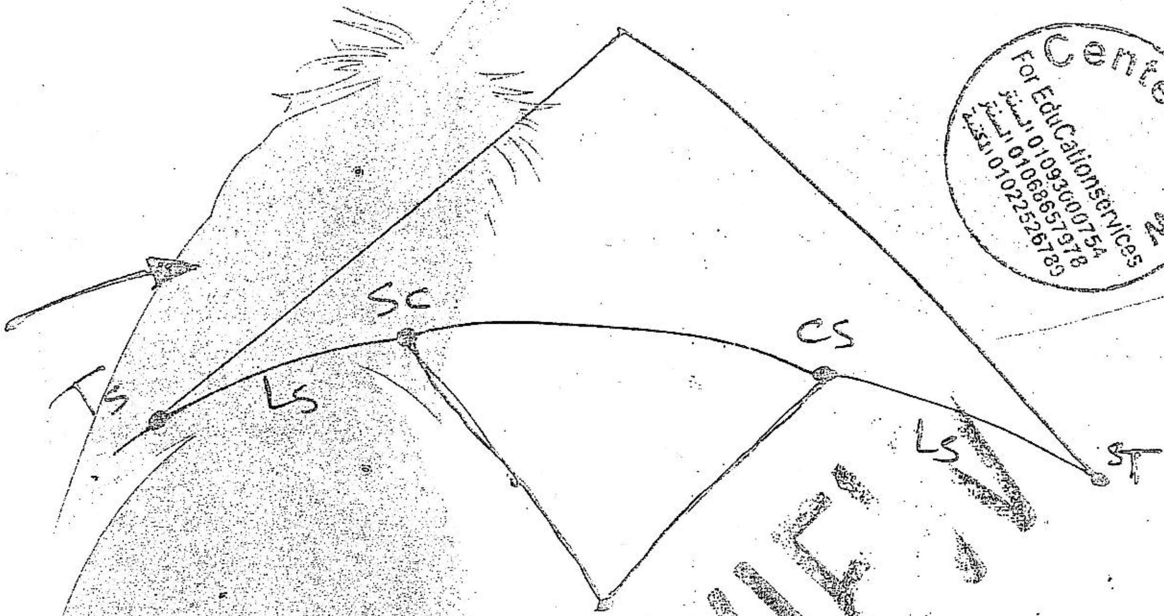


[2] rotate about Inside edge



3] rotate about o E




SC
CS
Ts
Ls
Ls
ST

* Draw a superelevation digram for a 2-lane highway in a horizontal curve with 80 km/hr design speed, a 250 m radius and the lanes have a crown of 1/4 inch/ft. Assume that the side friction coefficient = 0.14 and lane width = 3.6m

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$\frac{1}{4} \frac{inch}{ft} = 1/48 = 2.083\%$ + الرسم

$R = \frac{v^2}{127(e+f)} \Rightarrow 250 = \frac{(80)^2}{127(e+0.14)}$

$e = 0.0616$

$L_s = \frac{1.6 v^3}{R} = \frac{1.6 \times (\frac{80}{1.61})^3}{(\frac{250}{0.3048})} = 239.32 ft = 72.94 m$

$S = \frac{2.083}{100} \times 3.6 = 0.0749$

$S = 0.0616 \times 3.6 = 0.2218$

$L_s = 200 \times S = 44.35 m$

الأكبر $L_s = 72.94 m$

$L_s = slope_{actual} \times S$

72.94 0.2218

$slope_{actual} = \frac{1}{329}$