

← تنبيه هام :-

- علغ من تغذر عليه حضر ال Quiz الأول أو الثاني أو امتحان
ال Midterm في مادة ال Steel Structures الذهاب إلغ مكتب الدكتور

سعد الدين محطفاً « علغ السلم الدور الثاني بلوك 4 »

وذلك يوم لأحد الموافق 2016/5/15 من الساعة 10 صباحاً حتى
11 صباحاً ...

← ويعتبر هذا آخر موعد متاح لهم لاعادة الامتحان ... وذلك ليتمكنوا
من الحصول علغ درجات أعمال السنة ...

And ThanX :D

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Traffic
Transportation

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Part 3

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اول شارع الجيزة / امام مطعم ليل القاهر / امام مطعم مصر عود / الطود الرابع

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S > 1/2

Horizontal curve

نقطة التقاطع

Tangent length

external distance

middle distance

long chord

PC - Point of Curve

PI - Point of Intersection

PT - Point of Tangency

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deflection angle

Degree of curvature

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

Radius R

$$T = R \tan \frac{A}{2}$$

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

$$E = R \left(\sec \frac{A}{2} - 1 \right)$$

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

$$Long\ chord = 2 R \sin \frac{A}{2}$$

$$station\ of\ PT = station\ of\ PC + L_{curve}$$

$$station\ of\ PT = station\ of\ PC + L_{curve}$$

$$\sec = \frac{1}{\cos}$$

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

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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.

$$\Delta = 33^\circ$$

$$D = 4^\circ$$

$$\text{Station of PI} = 100+00$$

$$R = \frac{5730}{4} \Rightarrow R = 1432.5 \text{ Ft}$$

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

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

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

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

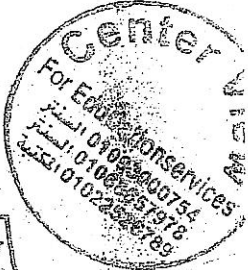
$$E = R(\sec \frac{\Delta}{2} - 1) \Rightarrow E = 1432.5(\sec \frac{33}{2} - 1) \Rightarrow E = 61.52 \text{ Ft}$$

$$\text{Station of PC} = 100+00 - 424.33 = 9575.67$$

$$= (95+75.67)$$

$$\text{Station of PT} = 9575.67 + 825.06 = 10400.73$$

$$= (104+00.73)$$



سأص

Recommended value of $(e) = 0.15$

" " " $e = 4-6\%$ urban
 $6-12\%$ Rural

0.07

➔ 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.

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

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

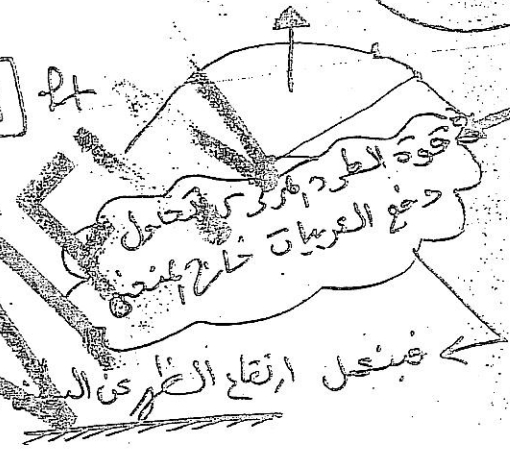
$$e = 0.08$$

Radius of Curve (m)
 السرعة Km/hr
 Super elevation
 Side Friction

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

Comment
 ????



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

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

$$\text{Psychological widening} = \frac{v}{9.5 \sqrt{R}} = \frac{60}{9.5 \sqrt{200}} = 0.447 \text{ m}$$

$$\text{extra widening} = 0.692 \text{ m}$$

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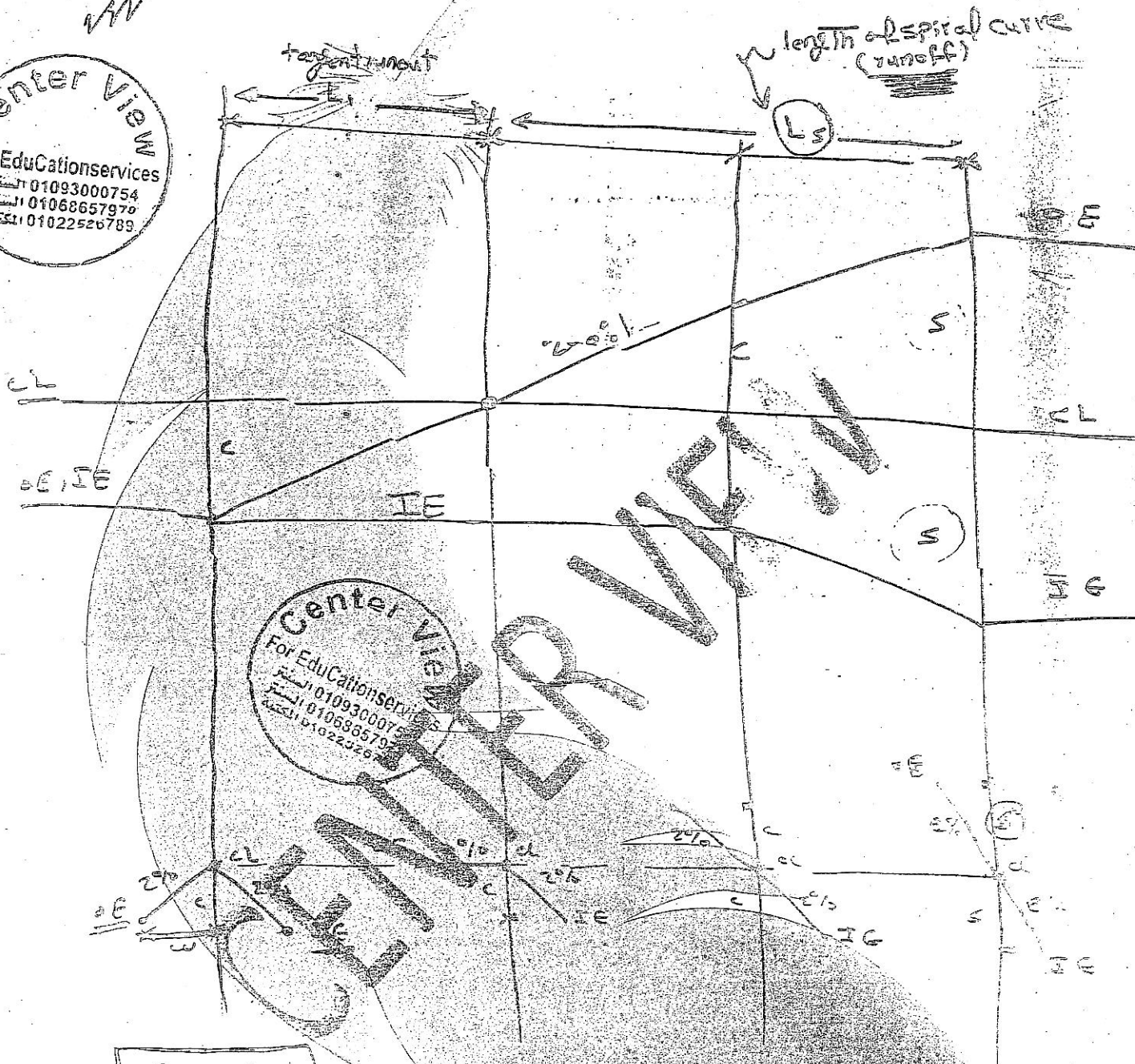
methods of attaining super elevation

توزيع ارتفاع الطريق

□ rotate about CL

W

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$$\frac{S}{100} = \frac{2}{100} \Rightarrow S = 2\%$$

$$\frac{R}{100} = \frac{3}{100} \Rightarrow S = 3\%$$

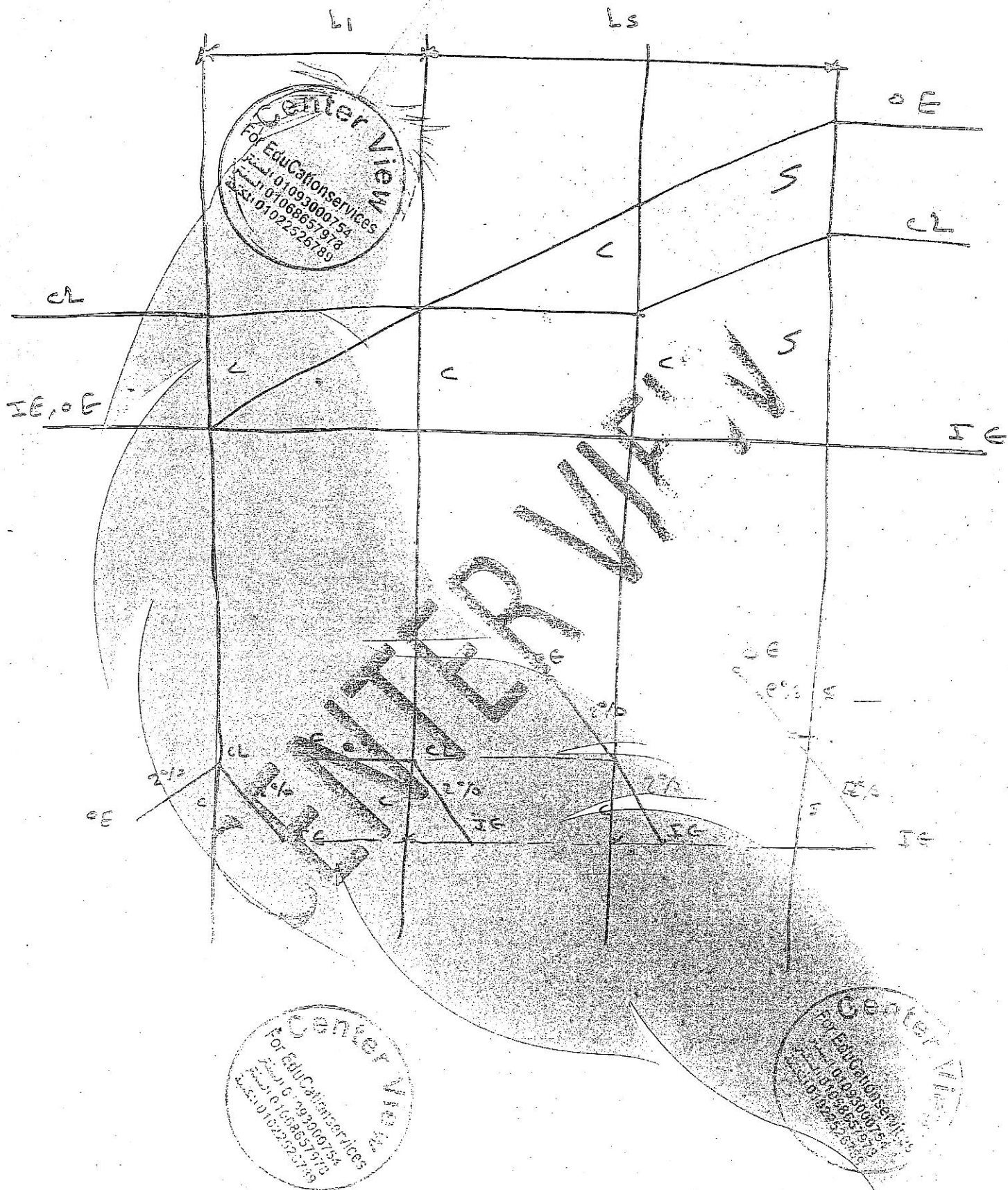
L1: 2004

$$L_s = \frac{V^3}{3.15 R \cdot S} = \frac{1.643^3}{3.15 \cdot 100 \cdot 0.03} = 1.643 \text{ m/s}$$

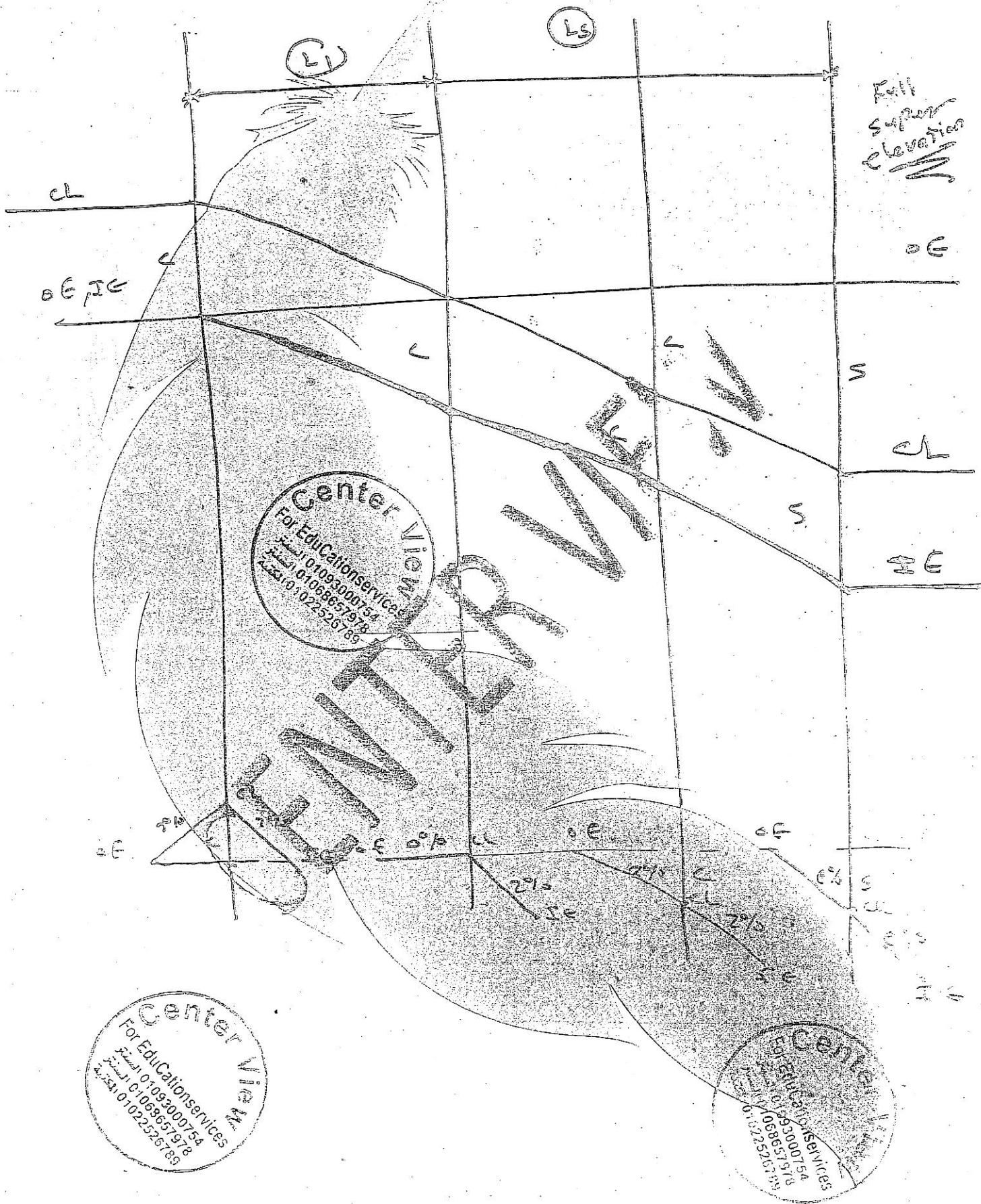
S = slope %

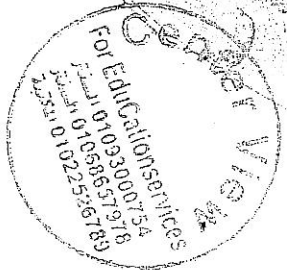
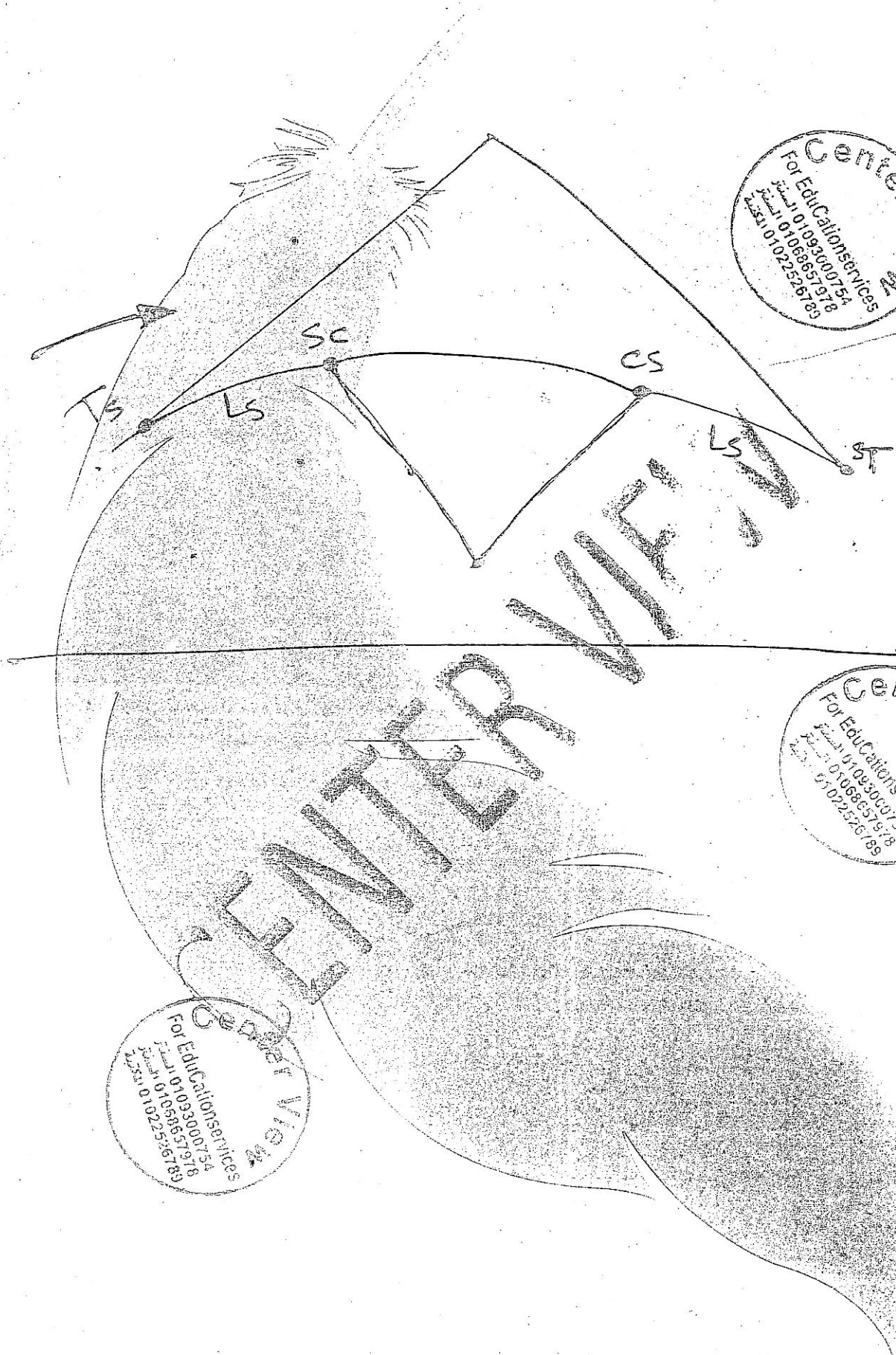
L1 axis slope %

← slope road



3) rotate about e





* Draw a super elevation diagram 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 = 3.6 m

$$\frac{1}{4} \frac{\text{inch}}{\text{ft}} = \frac{1}{48} = \boxed{2.083\%}$$

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

$$e = 0.0616$$

$$L_s = \frac{1.6 v^3}{R} = \frac{1.6 \times (80)^3}{250} = 239.32 \text{ ft}$$

$$= \frac{250}{0.3048} = \boxed{72.94 \text{ m}}$$

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

$$S = 0.0616 \times 3.6 = 0.2218$$

$$L_s = 200\% S = \boxed{44.35 \text{ m}}$$

$$\text{Total } L_s = 72.94 \text{ m}$$

$$L_s = \frac{\text{slope} \times S}{\text{actual}} = \frac{72.94}{0.2218}$$

$$\text{slope} = \text{actual} = \text{X}$$

