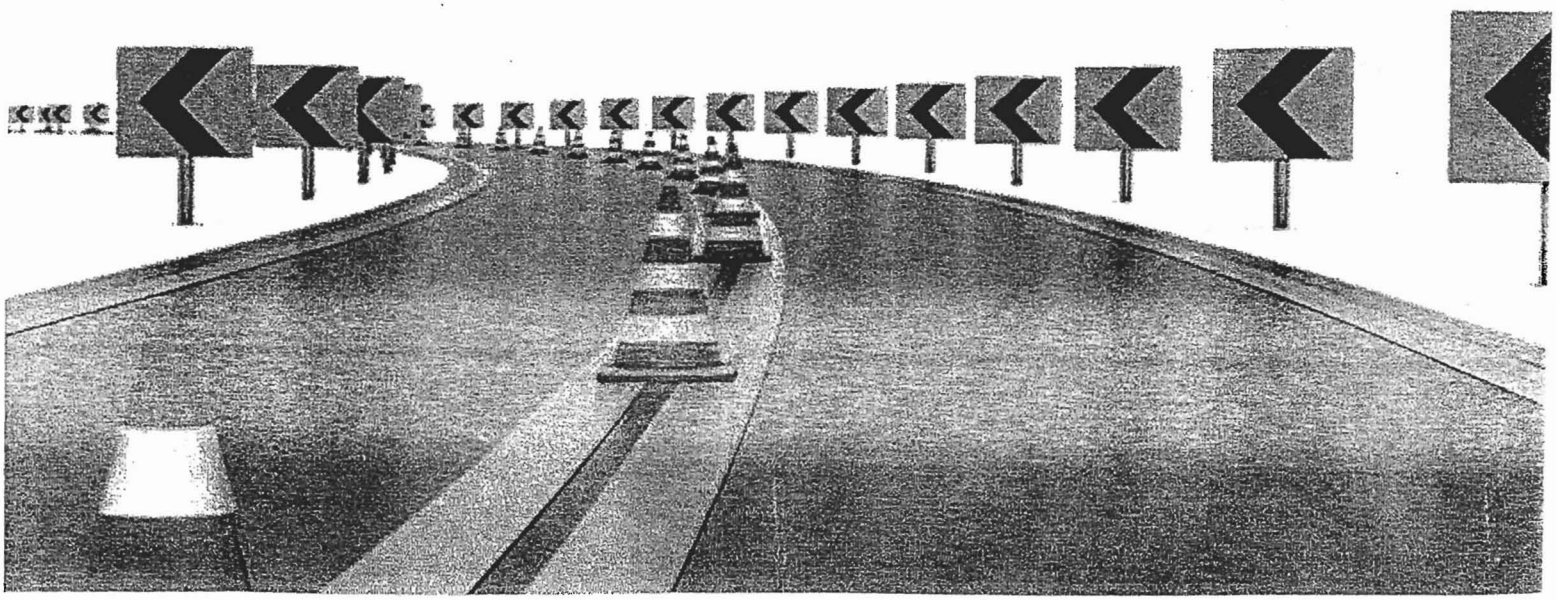
2012

Highway Engineering

4th year Civil

HORIZONTAL ALIGNMENT(3)

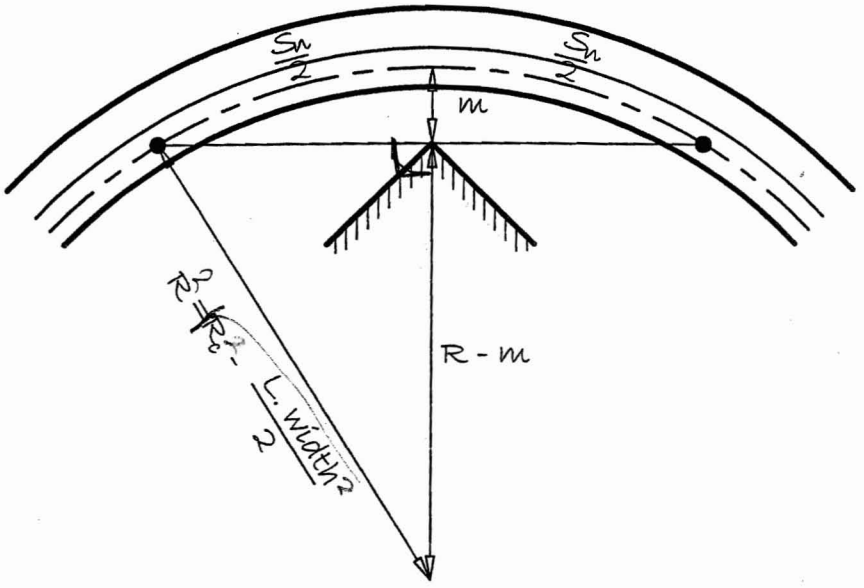


#14 , GEOMETRIC #9

Sight diastance on HL curves

غير مسموح بالتخطي على المنحنيات الأفقية
لذلك فإن المسافة المطلوب تواجدها هي S_n

إيجاد بعد أقرب عائق في حالة أن مسافة الرؤية للتوقف أقل من طول المنحني $S_n \leq L$



$$\left(\frac{S_n}{2}\right)^2 = m^2 + \left[R^2 - (R-m)^2\right]$$

$$= m^2 + R^2 - (R^2 - 2Rm + m^2)$$

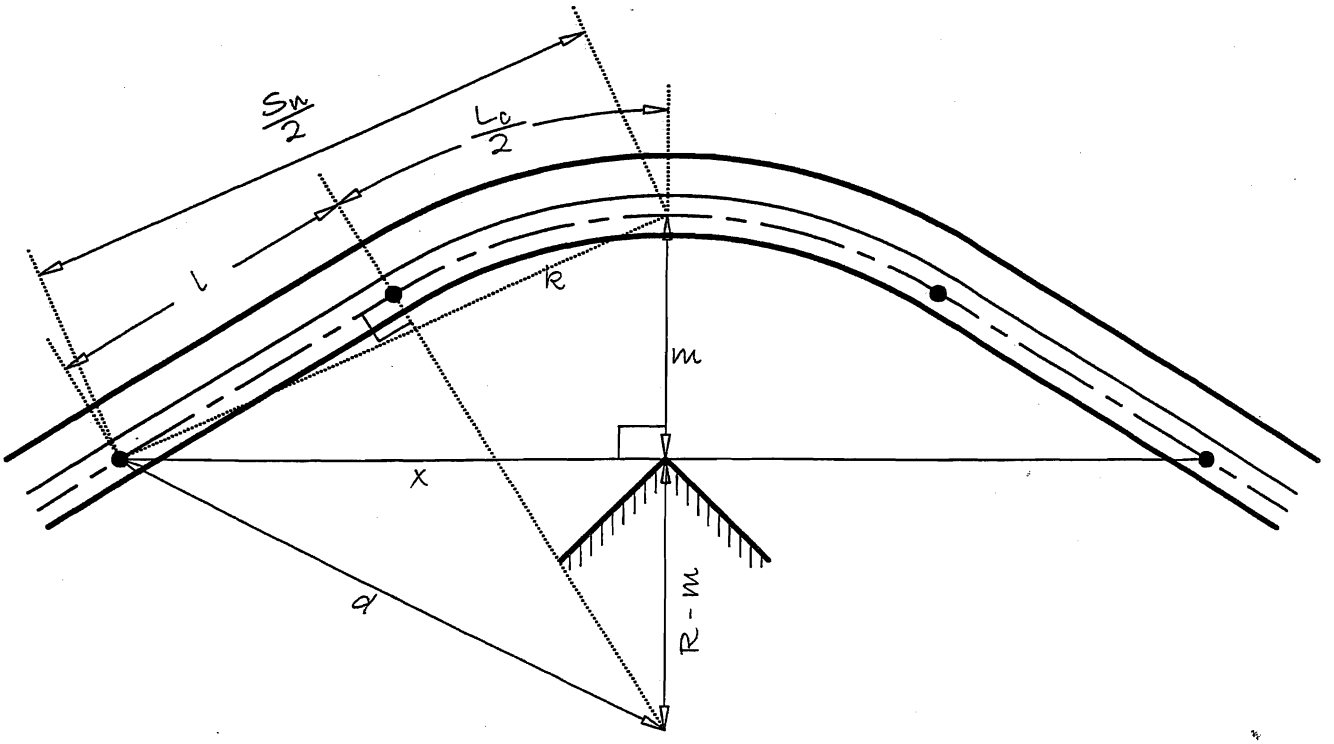
$$\therefore \quad S_n^2 = 8Rm$$

$$m = \frac{S_n^2}{8R}$$

ملحوظة هامة

تقاس m, R من الـ $\mathcal{C}_L$ لأقرب حارة من العائق

إيجاد بعد أقرب عائق في حالة أن مسافة الرؤية للتوقف أكبر من طول المنحني $S_n > L$



$$\because \frac{S_n}{2} \cong l + \frac{L_c}{2} \longrightarrow \therefore l = \frac{S_n - L_c}{2}$$

$$\because d^2 = l^2 + R^2$$

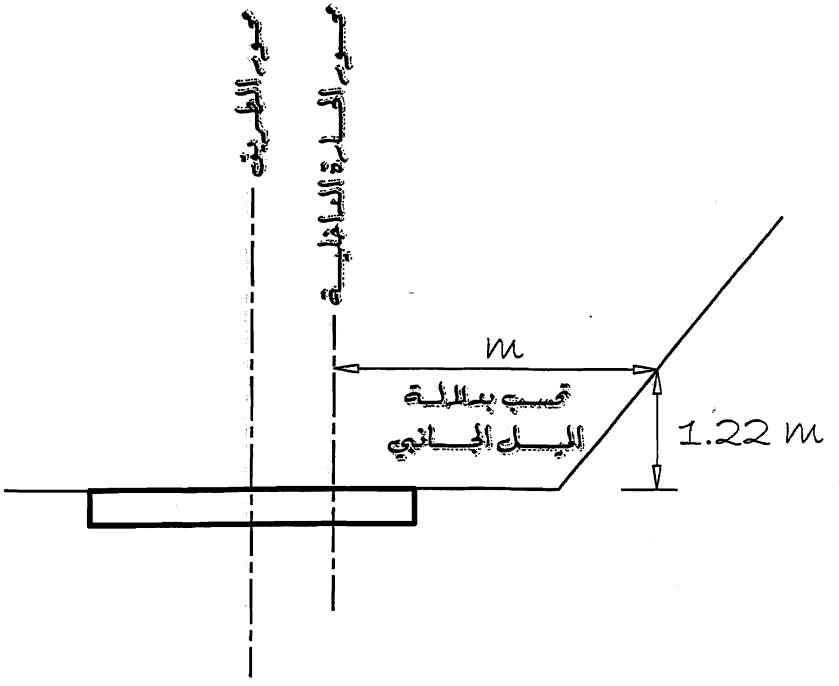
$$\therefore d^2 = \left(\frac{S_n - L_c}{2}\right)^2 + R^2$$

$$\because x^2 = d^2 - (R-m)^2$$

$$\therefore = \left(\frac{S_n - L_c}{2}\right)^2 + R^2 - (R-m)^2$$

ملحوظات هامة

في حالة وجود عائق جانبي :



إذا ذكر نصف قطر المنحني ولم يذكر الزاوية المركزية ← External Angle

أو طول المنحني فإننا نعتبر أن $S_h < L$

A corner of an existing obstruction is 6.0 m from centerline on 12 degree curved portion of 2-lane roadway having a lane width of 3.0 m.

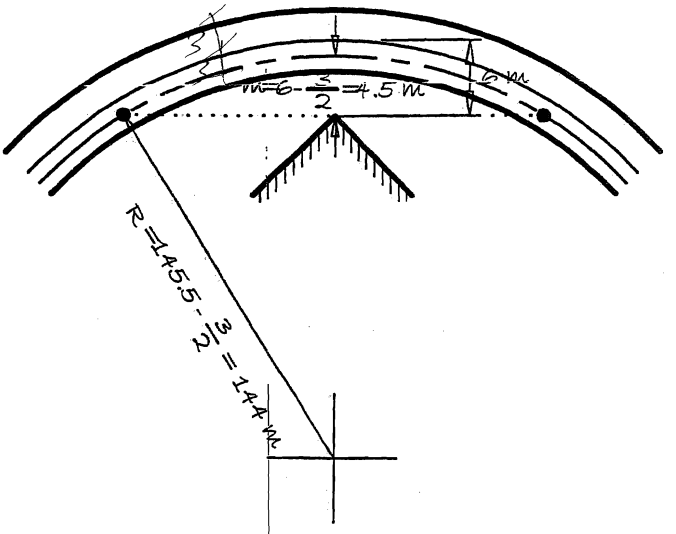
- Considering horizontal sight distance along the centerline of the inside lane. What is the safe operating speed ?
- If the desired operating speed is 100 km/hr. how far the obstruction should be set back to satisfy the stopping sight distance.
- Calculate the distance which the obstruction should be set back it to satisfy a design speed of 100 km/hr if the curve was excuted as a simple curve with external angle of 50 degrees.

Solution

$$R = \frac{1746}{D^{\circ}} = \frac{1746}{12^{\circ}} = 145.5\ m$$

Request#1

$V_{max.} = ??$



$$\because \quad m = \frac{S_n^2}{8R}$$

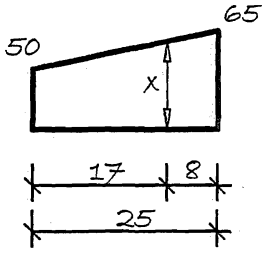
$$\therefore \quad S_n = \sqrt{8Rm}$$

$$S_n = \sqrt{8 * 144 * 4.5} = 72 \text{ m}$$

from table#4 ⟶ Data sheet

$$V_{max.} = \frac{50 * 8 + 65 * 17}{25} = 60.2 \text{ km/hr.}$$

بالاستكمال



Request#2

@ $V = 100$ km/hr. ⟶ $m = ??$

from table#4 @ $V = 100$ km/hr. ⟶ $S_n = \frac{150+165}{2} = 157.5$ m

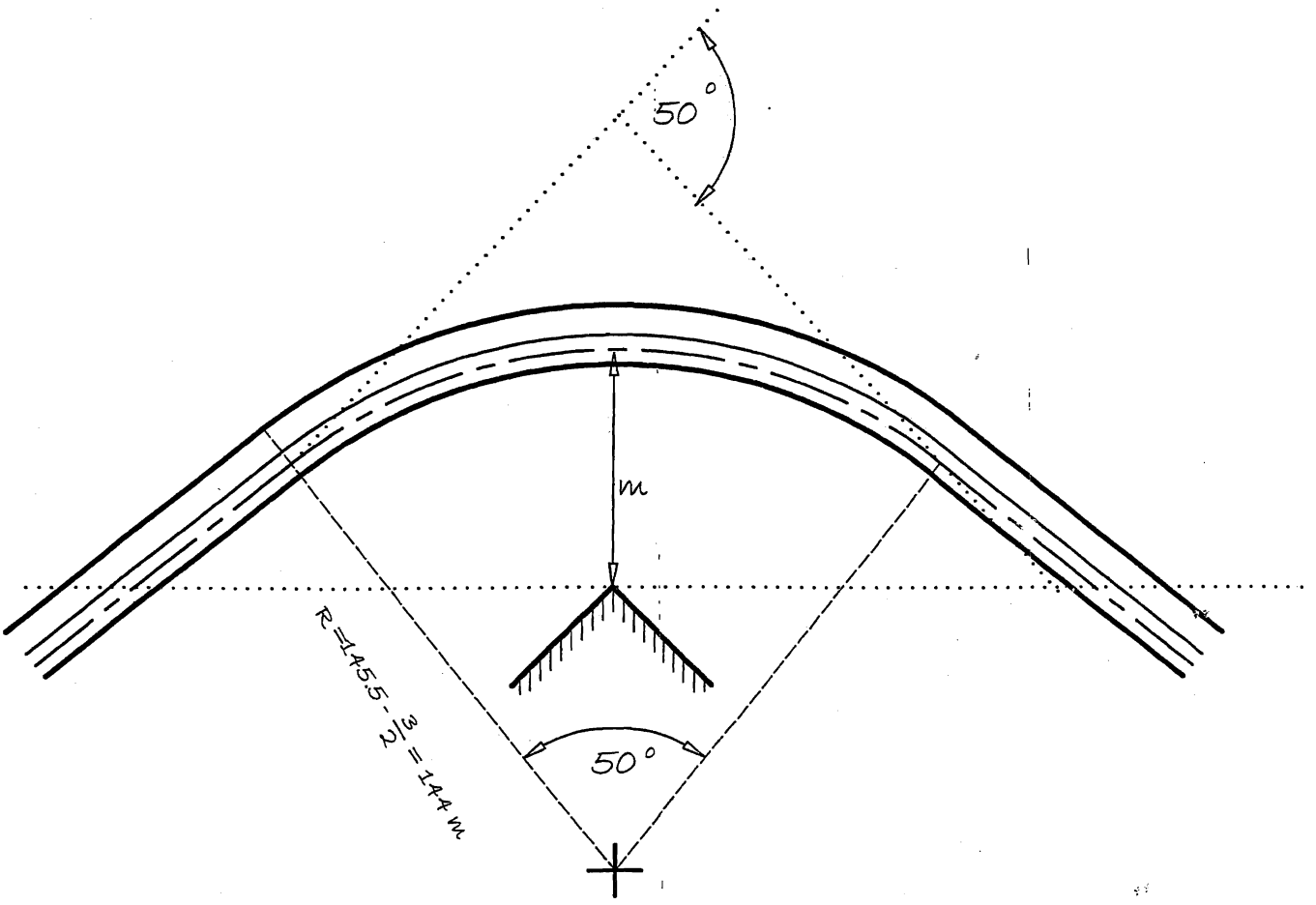
$$m = \frac{157.5^2}{8 * 144} = 21.53 \text{ m}$$

Obstruction distance = 21.53 + 1.5 = 23.03 m

$\frac{1}{2}$ عرض الحارة

Request#3

@ $V = 100$ km/hr. $\longrightarrow$ $S_n = 157.5$ m



$$L_c \cong 144 * 50^\circ * \frac{\pi}{180} = 125.66 \quad < \quad S_n = 157.5 \text{ m}$$

$$\therefore \quad m = \frac{L_c * (2S_n - L_c)}{8R}$$

$$\therefore \quad = \frac{125.66 * (2*157.5 - 125.66)}{8 * 144} = 20.66 \text{ m}$$

Obstruction distance $= 20.66 + 1.5 = 22.16$ m