B. offsets from the tangent

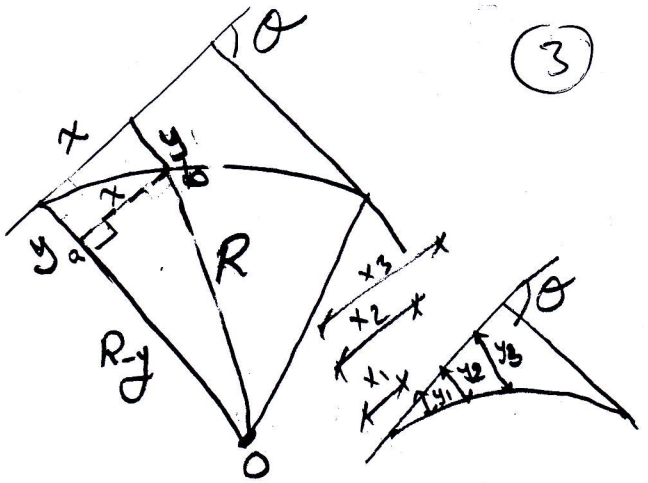
from triangle abO

$$R^2 = x^2 + (R-y)^2$$

$$\sqrt{R^2-x^2} = \sqrt{(R-y)^2}$$

$$R-y = \sqrt{R^2-x^2}$$

$$y = R-\sqrt{R^2-x^2}$$



The curve is setout in two parts, starting from each tangent.

Example) If the deflection angle of curve is 50° and radius 60 m. Compute the offset from the tangent at 5 m intervals.

Sol.

$$T = R\tan\frac{\theta}{2} = 60\tan\frac{50}{2} = 27.98\ m$$

$$y = R-\sqrt{R^2-x^2}$$

$$y_1 = 60-\sqrt{60^2-5^2} = 0.208\ m$$

$$y_2 = 60-\sqrt{60^2-10^2} = 0.839\ m$$

$$y_3 = 60-\sqrt{60^2-15^2} = 1.905\ m$$

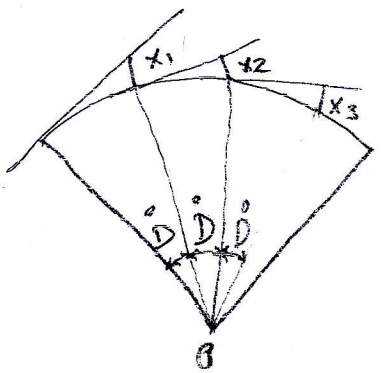
$$y_4 = 60-\sqrt{60^2-20^2} = 3.431\ m$$

$$y_5 = 60-\sqrt{60^2-25^2} = 5.456\ m$$

$$y_6 = 60-\sqrt{60^2-27.98^2} = 6.923\ m$$

C- Offsets from Chord produced (by deflection distance)

deflection distance : is the distance between tangent and the end points of standard chord for curve.



$x_1 = \frac{1}{2} D' \cdot C$

$D = \frac{C}{R} \Rightarrow x_1 = \frac{C^2}{2R}$ (First defl. distance)

$x_2 = D \cdot C$

$x_2 = \frac{C^2}{R}$ (Second defl. distance)

$x_3 = \frac{C^2}{2R}$ (Last defl. distance)

Example) To set out a circular curve of radius 300 m by offsets the distance of (P.C) & (P.T) is 327.5 m, and 425.3 m. Compute the offsets distance to set out the Chord. If the interval distance 20 m.

note) the interval is 20 m.

0, 20, 40, 60, 80, ..., 320, 340, 360, ...etc

P.C (327.5) located between 320 and 340, we must taken 340 is upper value.

$L = P.T - P.C$

$= 425.3 - 327.5 = 97.8\ m$

$340 - 327.5 = 12.5$ First chord

80 for four chords

5.3 Last chord

$\Sigma = 97.8$ (check)

No. of chord	Length of chord (m)	distance of chord (m)	offset (m)
1	First Chord → 12.5	340	$\frac{(12.5)^2}{600} = 0.26$
2	4 chords → 20	360	$\frac{20(20+12.5)}{600} = 1.083$
3	20	380	$\frac{20^2}{300} = 1.333$
4	20	400	$\frac{20^2}{300} = 1.333$
5	20	420	$\frac{20^2}{300} = 1.333$
6	Last chord → 5.3	425.3 (P.T)	$\frac{5.3(5.3+20)}{600} = 0.233$

Example) Two lines the deflection angle between them is $18^\circ 24'$ to connect with circle curve with radius 600m. Calculate the offset distance to set out the chord by even distance 20m. If the intersection point for the line is 2140.00 m.

Sol.

$$T = R \tan\frac{\theta}{2} = 600 \tan\frac{18^\circ 24'}{2} = 97.2\ m$$

$$P.C = P.I - T = 2140 - 97.2 = 2042.8\ m$$

$$L = R\theta * \frac{\pi}{180} = 600 * 18^\circ 24' * \frac{\pi}{180} = 192.68^m$$

$$P.T = P.C + L = 2042.8 + 192.68 = 2235.48^m$$

$2060 - 2042.8 = 17.2$

No. of chord	length of chord (m)	distance of chord (m)	offset (m
1	17.2	2060	* 0.25
2	20	2080	** 0.62
3	20	2100	0.67
4	20	2120	0.67
5	20	2140	0.67
6	20	2160 ***	0.67
7	20	2180	0.67
8	20	2200	0.67
9	20	2220	0.67
10	15.48	2235	**** 0.46

* $\frac{(17.2)^2}{2(600)} = 0.25$

** $\frac{20(20+17.2)}{2(600)} = 0.62$

*** $\frac{20^2}{600} = 0.67$

**** $\frac{15.48(15.48+20)}{2(600)} = 0.46$

D. offset from radius

$(R+y)^2 = x^2 + R^2$

$y = \sqrt{R^2+x^2} - R$