

(7)

To find the highest or lowest elevation of point on curve, the first derivative of equation (B):

$$y' = rX + g_1$$

now $y' = 0$, and substituting x_0 instead of x

$$0 = r(x_0) + g_1 \Rightarrow \left\{ x_0 = \frac{-g_1}{r} \right\} \begin{array}{l} \text{the horizontal distance for} \\ \text{the highest or lowest} \\ \text{point in curve with} \\ \text{station} \dots (c) \end{array}$$

Substituting equation (c) in equation (A), we can easily find the highest or lowest elevation of point on the curve:

$$y_0 = \frac{r}{2} (x_0)^2 + g_1(x_0) + \text{Elevation BVC}$$

$$\text{Elevation of P.V.I} = \text{Elevation of BVC} + g_1 * \frac{L}{2}$$

$$\text{Elevation of EVC} = \text{Elevation of PVI} + g_2 * \frac{L}{2}$$

$$\text{station of PVI} = \text{station of BVC} + \frac{L}{2}$$

$$\text{station of EVC} = \text{station of PVI} + \frac{L}{2}$$

∴ Δy (is the difference elevation between tangent and curve @ distance x)

⇒ Δy = | Formulation of tangent - Formulation of vertical curve

∴ Formulation of tangent = g₁x + Elevation BVC

∴ " " vertical curve = $\frac{r}{2}x^2 + g_1x + \text{Elevation BVC}$

⇒ ... $\Delta y = \frac{r}{2} \cdot x^2$

We can calculate Δy with Δe through:

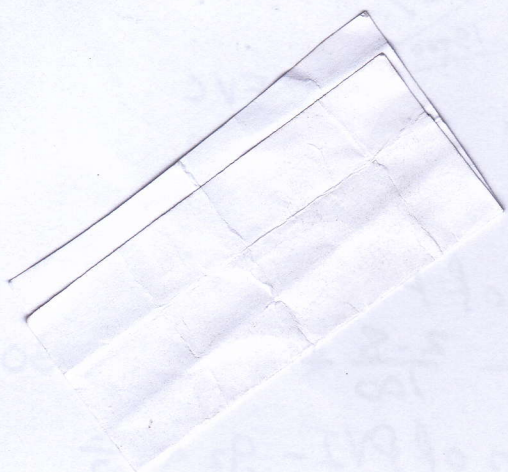
$\frac{\Delta e}{(L/2)^2} = \frac{\Delta y}{x^2} \Rightarrow \Delta y = \frac{\Delta e \cdot x^2}{(L/2)^2} \Rightarrow \Delta y = 4 \Delta e \cdot \left(\frac{x}{L}\right)^2$

Where $\Delta e = \frac{r}{2} \cdot x^2 \Rightarrow \Delta e = \frac{r}{2} \cdot \left(\frac{L}{2}\right)^2$

$= \frac{A}{2k} \cdot \frac{L^2}{4}$

⇒ $\Delta e = \frac{AL^2}{8}$

station



Example 1/ The vertical curve contains two grades, the first grade was upward 2.8% while the second one downward 4.6%. These grades meet at intersection point (PVI), which the Reduce level and station of (PVI) were (48.30m) and (13+70), respectively. The length of vertical curve was 500m. Find

- 1) The Reduce levels and stations of the tangent points.
- 2) The Reduce levels of the curve at 100m interval.
- 3) The station and Reduce level of highest point on the curve.

