SURV 53 ROUTE SURVEYING & DESIGN
Vertical Curve Equations

EQUAL TANGENT VERTICAL CURVES:

Known: BVC Sta. & Elev., g_1 (in decimal form), g_2 (in decimal form), Length of Curve

Solve for Elev of Pt.

$$\mathbf{Elev_x = Elev_{BVC} + g_1(x) + (R)x^2}$$

$$\mathbf{R = \frac{(g_2 - g_1)}{2L}}$$

x = Horiz Dist from BVC to Pt.

Solve for High/Low Point along vertical curve.

$$\mathbf{x_o = \frac{g_1(L)}{(g_1 - g_2)}}$$

x_o = Horiz Dist from BVC to High/Low Pt.

Insert **"x_o"** into above equation to compute elevation of the High/Low point.

VERTICAL CURVE THROUGH A FIXED POINT:

Known: BVC Sta. & Elev., Pt. Sta. & Elev., g_1 , g_2

Solve for Length of Curve "L":

$$\mathbf{L = \frac{(g_2 - g_1)\, x^2}{2[\,\Delta EL - g_1(x)\,]}}$$

Δ EL = Diff. in Elev. (Pt. Elev. - BVC Elev.)

x = Horiz Dist. from BVC to Pt.

Known: PVI Sta. & Elev., g_1, g_2

Solve for Constant "C" and Length of Curve "L":

$$\mathbf{C = \sqrt{\frac{V - g_1(h)}{V - g_2(h)}}} \qquad \text{4 dec places} \qquad \mathbf{L = \frac{2\,(h)\,(C + 1)}{(C - 1)}}$$

V = Diff. in Elev. (Pt. Elev. - PVI Elev.)

h = Dist. between Pt. and PVI (Pos. when Pt. **exceeds** PVI, Neg. when Pt. **preceeds** PVI)

$Pt_{Sta} - PVI_{Sta}$