

FORMULA SHEET

Horizontal Highway Curves

$$R = \frac{5729.58}{D_a}$$

$$T = R \tan\left(\frac{\Delta}{2}\right)$$

$$L = 100\left(\frac{\Delta}{D_a}\right) = \pi R \frac{\Delta}{180}$$

$$LC = 2R \sin\left(\frac{\Delta}{2}\right)$$

$$E = T \tan\left(\frac{\Delta}{4}\right)$$

$$M = E \cos\left(\frac{\Delta}{2}\right)$$

$$\text{deflection per foot of arc} = \frac{90}{\pi R}$$

Vertical Highway Curves

$$y = \frac{r}{2}x^2 + g_1x + (\text{PVC elevation})$$

$$r = \frac{g_2 - g_1}{L}$$

$$x' = \frac{g_1L}{g_1 - g_2}$$

3-Point Resection

$$A = \text{atan}\left(\frac{BC \sin X_1 \sin(A + C)}{AB \sin X_2 + BC \sin X_1 \cos(A + C)}\right)$$

$$C = \text{atan}\left(\frac{AB \sin X_2 \sin(A + C)}{BC \sin X_1 + AB \sin X_2 \cos(A + C)}\right)$$

Law of Sines

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

Law of Cosines

$$a^2 = b^2 + c^2 - 2bc(\cos A)$$

$$b^2 = a^2 + c^2 - 2ac(\cos B)$$

$$c^2 = a^2 + b^2 - 2ab(\cos C)$$

Tape Temperature Correction

$$C_t = (6.45 \times 10^{-6})(L)(T - 68)$$