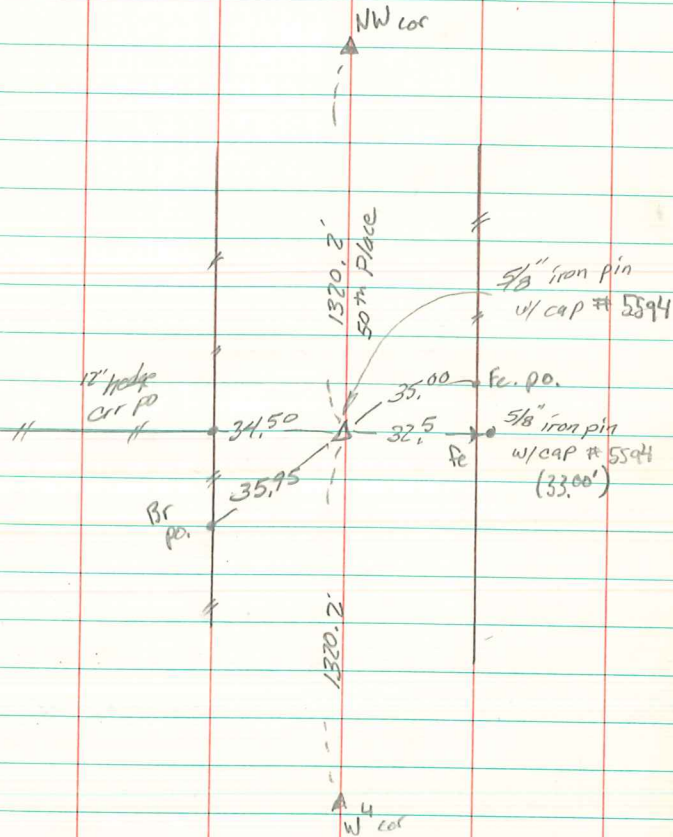


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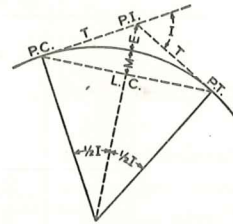


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3/23/05

## CURVE AND REDUCTION TABLES

Published by Eugene Dietzgen Co.



### CURVE FORMULAS

1. Radius :  $R = \frac{50}{\sin D/2}$
2. Degree of Curve:  $D = 100 \frac{I}{L}$ . Also,  $\sin D/2 = \frac{50}{R}$
3. Tangent :  $T = R \tan \frac{1}{2} I$ . Also,  $T = \frac{T \text{ for } 1^\circ \text{ curve}}{D} + C$ .
4. Length of Curve:  $L = 100 \frac{I}{D}$
5. Long Chord :  $L. C. = 2R \sin \frac{1}{2} I$ .
6. Middle Ordinate:  $M = R (1 - \cos \frac{1}{2} I)$
7. External :  $E = \frac{R}{\cos \frac{1}{2} I} - R$ . Also,  $E = T \tan \frac{1}{4} I$ .

### EXPLANATION AND USE OF TABLES

Given P.I. Sta. 83+40.7,  $I = 45^\circ 20'$  and  $D = 6^\circ 30'$  find:

Stations - P.C. = P.I. - T.  $T = \frac{T \text{ for } 1^\circ \text{ Curve}}{D} + C$ . From Tables V and VI

$$T = \frac{2392.8}{6.5} + 1.97 = 368.32 = 3 + 68.32. \text{ Sta. P. C.} = 83 + 40.7 - (3 + 68.32) = 79 + 72.38.$$

$$P. T. = P. C. + L, \text{ and } L = 100 \frac{I}{D} = 100 \frac{45.33}{6.5} = 697.38 \text{ Therefore, P. T.} = (79 + 72.38) + (6 + 97.38) = 86 + 69.76.$$

**Offsets**—Tangent offsets vary (approximately) directly with  $D$  and with the square of the distance. From Table III Tangent Offset for 100 feet = 5.669 feet. Distance = 80 - Sta. P. C. = 27.62. Hence offset =  $5.66 \times \left(\frac{27.62}{100}\right)^2 = .432$  ft. Also, square of any distance, divided by twice the radius equals (approximately) the distance from tangent to curve. Thus  $(27.62)^2 + (2 \times 881.95) = .432$  ft.

**Deflections**—Deflection angle =  $\frac{1}{2} D$  for 100 ft.,  $\frac{1}{4} D$  for 50 ft., etc. For "X" ft., Deflection Angle (in minutes) =  $.3 \times X \times D$ . For Sta. 80 of above curve Deflection Angle =  $.3 \times 27.62 \times 6.5 = 53.86'$ . Also Deflection Angle = dif. for 1 ft. from Table III  $\times X = 1.95 \times 27.62 = 53.86'$ . For Sta. 181 Deflection Angle =  $53.86' + \frac{6^\circ 30'}{2} = 4^\circ 8.86'$ .

**Externals**—From Table V for  $1^\circ$  curve, with central angle of  $45^\circ 20'$ ,  $E = 479.6$ . Therefore, for  $6^\circ 30'$  curve,  $E = \frac{479.6}{6.5} + \text{Correction from Table VI} = 7.378 + .039 = 7.417$ .