

POINTS ON SPIRAL OFFSET CURVE

FORMULAS

$$C = Lsl - (0.00034 * a^2 * (Lsl / 100)^5); \quad Lsl = POS - TS$$

$$DEF = (a * Lsl^2) / 60000$$

$$Xa = C * \cos(DEF) \quad Cai = \sqrt{Xai^2 + (Yai - W)^2}$$

$$Ya = C * \sin(DEF) \quad Lsai = Cai * Lsl / C$$

$$Xai = Xa - (\sin(DEF * 3) * W) \quad DEFai = \arctan((Yai - W) / Xai)$$

$$Yai = Ya + (\cos(DEF * 3) * W) \quad Cao = \sqrt{Xao^2 + (Yao + W)^2}$$

$$Xao = Xa + (\sin(DEF * 3) * W) \quad Lsao = Cao * Lsl / C$$

$$Yao = Ya - (\cos(DEF * 3) * W) \quad DEFao = \arctan((Yao + W) / Xao)$$

EXAMPLE

Given: $a = 1$ TS = 2180+84.70 (From SC-1) POS = 2182+00.00 W = 100'

$$Lsl = 2182+00.00 - 2180+84.70 = 115.30'$$

$$C = 115.30 - (0.00034 * 1^2 * (115.30 / 100)^5) = 115.29931$$

$$DEF = (1 * 115.30^2) / 60000 = 0.22157^\circ \text{ or } 0^\circ 13' 18''$$

$$Xa = 115.29931 * \cos(0.22157) = 115.29845$$

$$Ya = 115.29931 * \sin(0.22157) = 0.44588$$

$$Xai = 115.29845 - (\sin(0.22157 * 3) * 100) = 114.13834$$

$$Yai = 0.44588 + (\cos(0.22157 * 3) * 100) = 100.43915$$

$$Cai = \sqrt{114.13834^2 + (100.43915 - 100)^2} = 114.13918$$

$$Lsai = 114.13918 * 115.30 / 115.29931 = 114.13986$$

$$DEFai = \arctan((100.43915 - 100) / 114.13834) = 0.22045^\circ \text{ or } 0^\circ 13' 14''$$

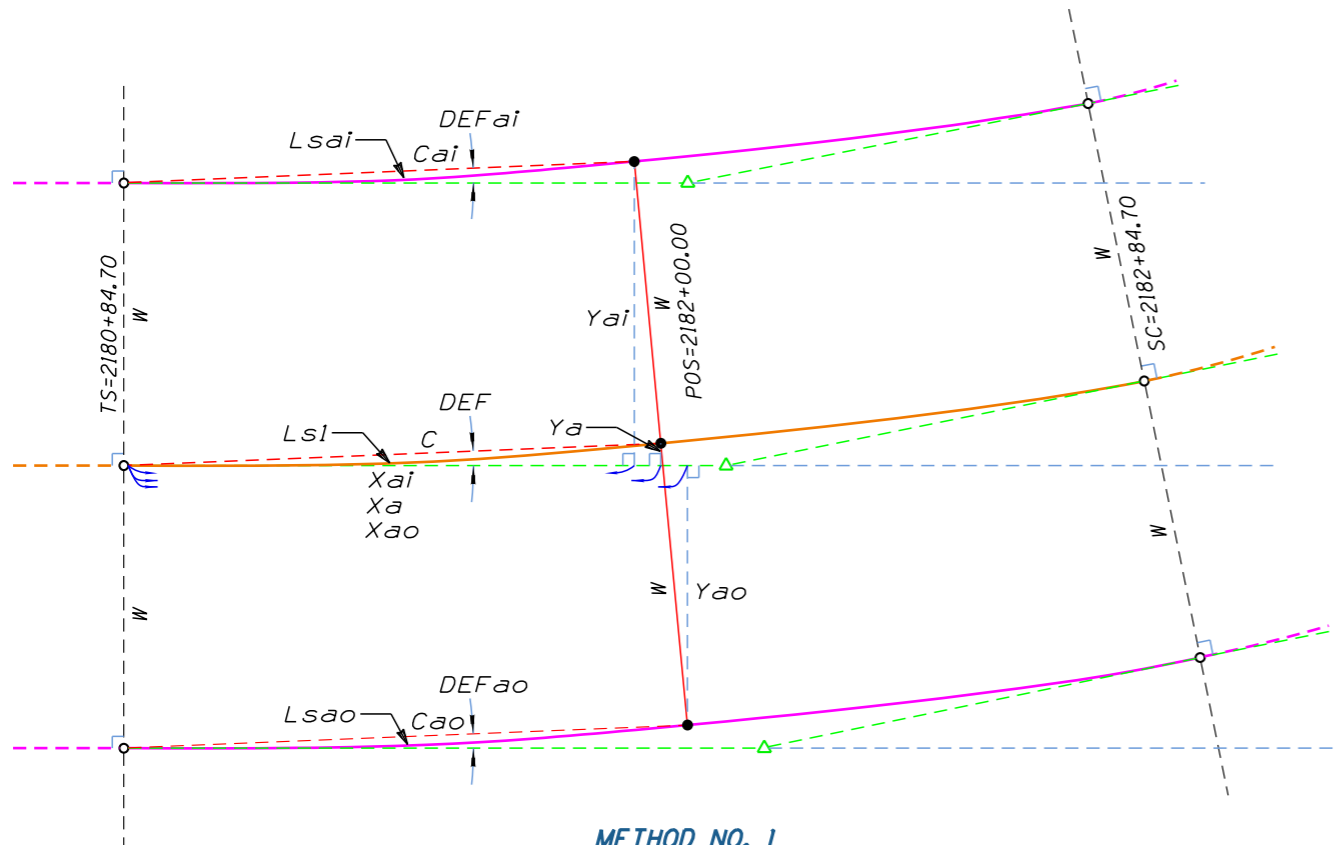
$$Xao = 115.29845 + (\sin(0.22157 * 3) * 100) = 116.45856$$

$$Yao = 0.44588 - (\cos(0.22157 * 3) * 100) = -99.54739$$

$$Cao = \sqrt{116.45856^2 + (-99.54739 + 100)^2} = 116.45944$$

$$Lsao = 116.45944 * 115.30 / 115.29931 = 116.46014$$

$$DEFao = \arctan((-99.54739 + 100) / 116.45856) = 0.22268^\circ \text{ or } 0^\circ 13' 22''$$



METHOD NO. 1
Not to scale

FORMULAS

$$C = Lsl - (0.00034 * a^2 * (Lsl / 100)^5); \quad Lsl = POS - TS$$

$$DEF = (a * Lsl^2) / 60000$$

$$Xb = C * \cos(DEF) \quad Cbi = \sqrt{Xbi^2 + Ybi^2}$$

$$Yb = C * \sin(DEF) \quad Lsbi = Cbi * Lsl / C$$

$$Xbi = Xb - (\sin(DEF * 3) * W) \quad DEFbi = \arctan(Ybi / Xbi)$$

$$Ybi = Yb + (\cos(DEF * 3) * W) - W \quad Cbo = \sqrt{Xbo^2 + Ybo^2}$$

$$Xbo = Xb + (\sin(DEF * 3) * W) \quad Lsbo = Cbo * Lsl / C$$

$$Ybo = Yb + W - (\cos(DEF * 3) * W) \quad DEFbo = \arctan(Ybo / Xbo)$$

EXAMPLE

Given: $a = 1$ TS = 2180+84.70 (From SC-1) POS = 2182+50.00 W = 100'

$$Lsl = 2182+50.00 - 2180+84.70 = 165.30'$$

$$C = 165.30 - (0.00034 * 1^2 * (165.30 / 100)^5) = 165.29580$$

$$DEF = (1 * 165.30^2) / 60000 = 0.45540^\circ \text{ or } 0^\circ 27' 19''$$

$$Xb = 165.29580 * \cos(0.45540) = 165.29058$$

$$Yb = 165.29580 * \sin(0.45540) = 1.31380$$

$$Xbi = 165.29058 - (\sin(0.45540 * 3) * 100) = 162.90634$$

$$Ybi = 1.31380 + (\cos(0.45540 * 3) * 100) - 100 = 1.28537$$

$$Cbi = \sqrt{162.90634^2 + 1.28537^2} = 162.91141$$

$$Lsbi = 162.91141 * 165.30 / 165.29580 = 162.91555$$

$$DEFbi = \arctan(1.28537 / 162.90634) = 0.45207^\circ \text{ or } 0^\circ 27' 07''$$

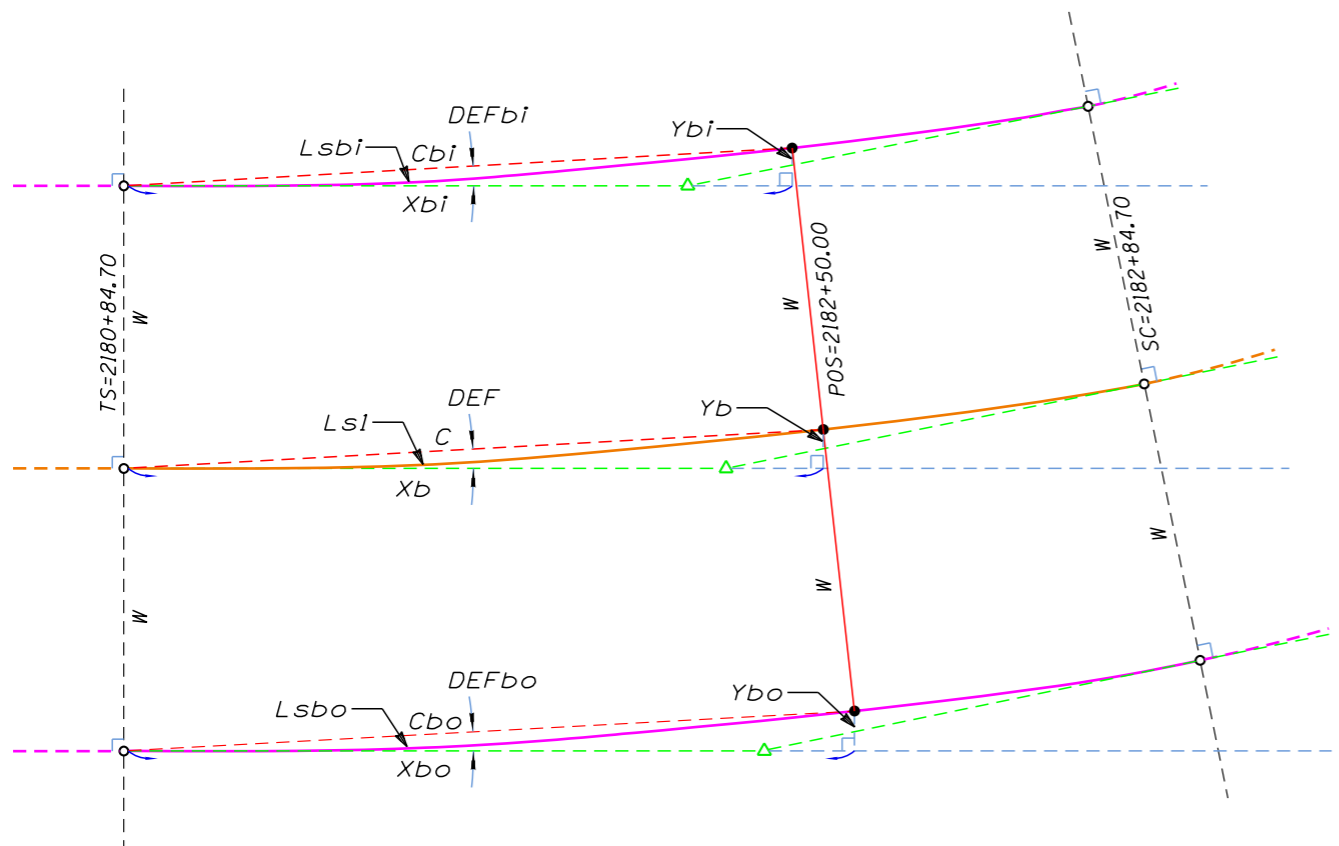
$$Xbo = 165.29058 + (\sin(0.45540 * 3) * 100) = 167.67482$$

$$Ybo = 1.31380 + 100 - (\cos(0.45540 * 3) * 100) = 1.34223$$

$$Cbo = \sqrt{167.67482^2 + 1.34223^2} = 167.68019$$

$$Lsbo = 167.67882 * 165.30 / 165.29580 = 167.68308$$

$$DEFbo = \arctan(1.34223 / 167.67482) = 0.45864^\circ \text{ or } 0^\circ 27' 31''$$



METHOD NO. 2
Not to scale