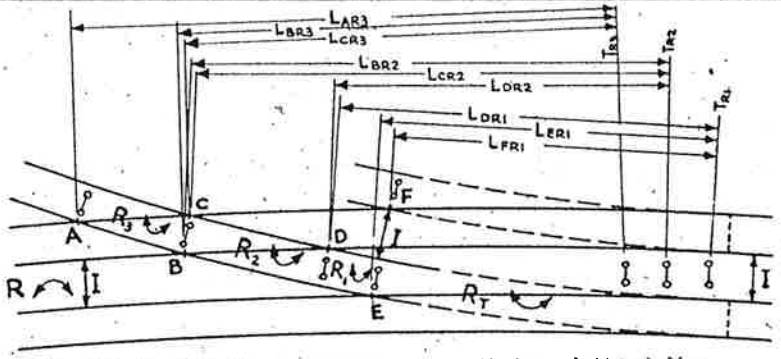
PERMANENT WAY

NOTES

DOUBLE JUNCTIONS (10)

STANDARD XING ANGLE BASI
CURVE OUT OF CURVE.
CONTRARY FLEXURE.

THESE NOTES ARE INTENDED FOR THE GUIDANCE AND ASSISTANCE OF STAFF ENGAGED UPON PERMANENT WAY WORK THEY DO NOT IN ANY WAY MODIFY, SUPPLEMENT OR AMEND THE INSTRUCTIONS LAID DOWN IN E.D.I., STANDARD DRAWINGS, CIRCULARS ETC., WHICH SHOULD BE REFERRED TO IN ALL CASES.



GIVEN :- R, N_A, $N_{B/c}$, N_D, N_E & N_F WHERE: $N_F = N_E > N_D > N_{B/c} > N_A$.

RADII

$$R_1 = \frac{2RI - G\{R(K_{NE}+K_{ND}) - \frac{I}{2}(K_{NE}-K_{ND})\}}{2R(K_{NE}-K_{ND}) - I(K_{NE}+K_{ND}) + 2G}$$

$$R_2 = \frac{G(R+\frac{I}{2})(K_{ND}+1)}{(2R+I)(K_{ND}-K_{NB/c}) - G(K_{NB/c}+1)}$$

$$R_3 = \frac{G(R+\frac{I}{2}+G)(K_{NA}+1)}{(2R+I+2G)(K_{NB/c}-K_{NA}) - G(K_{NB/c}+1)}$$

$$i_1 = R+\tfrac{I}{2}+R_1-\tfrac{G}{2} - \sqrt{(R+\tfrac{I}{2}+R_1-\tfrac{G}{2})^2 - \frac{(R+\frac{I}{2})(R_1-\frac{G}{2})}{N_D^2+\frac{1}{4}}}$$

$$i_2 = R+\tfrac{I}{2}+R_2-\tfrac{G}{2} - \sqrt{(R+\tfrac{I}{2}+R_2-\tfrac{G}{2})^2 - \frac{(R+\frac{I}{2})(R_2-\frac{G}{2})}{N_D^2+\frac{1}{4}}}$$

$$i_3 = R+\tfrac{I}{2}+R_3-\tfrac{G}{2} - \sqrt{(R+\tfrac{I}{2}+R_3+\tfrac{3G}{2})^2 - \frac{(R+\frac{I}{2}+G)(R_3+\frac{G}{2})}{N_A^2+\frac{1}{4}}}$$

$3G/2 = 7{\cdot}0625$.

$i - \frac{I}{2} + \frac{G}{2}$ is the interval between the through radius and the turnout radius produced to their common tangent.

TANGENT LENGTHS

$$L_{BR3} = \frac{1}{(R+\frac{I}{2}+R_3-\frac{G}{2}-i_3)}\sqrt{2(i_3+G)(R+\tfrac{I}{2}-\tfrac{G}{2}-i_3)(R_3-i_3)(R+\tfrac{I}{2}+R_3-i_3)}$$

$$L_{CR3} = \frac{1}{(R+\frac{I}{2}+R_3-\frac{G}{2}-i_3)}\sqrt{2(i_3+G)(R+\tfrac{I}{2}+\tfrac{G}{2}-i_3)(R_3-G-i_3)(R+\tfrac{I}{2}+R_3-i_3)}$$

$$L_{BR2} = \frac{1}{(R+\frac{I}{2}+R_2-\frac{G}{2}-i_2)}\sqrt{2(i_2+G)(R+\tfrac{I}{2}-\tfrac{G}{2}-i_2)(R_2-i_2)(R+\tfrac{I}{2}+R_2-i_2)}$$

$$L_{CR2} = \frac{1}{(R+\frac{I}{2}+R_2-\frac{G}{2}-i_2)}\sqrt{2(i_2+G)(R+\tfrac{I}{2}+\tfrac{G}{2}-i_2)(R_2-G-i_2)(R+\tfrac{I}{2}+R_2-i_2)}$$

$$L_{FR1} = \frac{1}{(R+\frac{I}{2}+R_1-\frac{G}{2}-i_1)}\sqrt{2(i_1+G-I)(R+I+\tfrac{G}{2}-i_1)(R_1-i_1-G-i_1)(R+R_1-i_1)}$$

$$L_{AR3} = \frac{(R+\frac{I}{2}+G)(R_3+\frac{G}{2})N_A}{(R+\frac{I}{2}+R_3-\frac{G}{2}-i_3)(N_A^2+\frac{1}{4})} \qquad L_{DR1} = \frac{(R+\frac{I}{2})(R_1-\frac{G}{2})N_D}{(R+\frac{I}{2}+R_1-\frac{G}{2}-i_1)(N_D^2+\frac{1}{4})}$$

$$L_{DR2} = \frac{(R+\frac{I}{2})(R_2-\frac{G}{2})N_D}{(R+\frac{I}{2}+R_2-\frac{G}{2}-i_2)(N_D^2+\frac{1}{4})} \qquad L_{ER1} = \frac{(R-\frac{I}{2})(R_1+\frac{G}{2})N_E}{(R+\frac{I}{2}+R_1-\frac{G}{2}-i_1)(N_E^2+\frac{1}{4})}$$

$$Aa = \frac{(R+\frac{I}{2}+\frac{G}{2})G}{(R+\frac{I}{2}+R_3-\frac{G}{2}-i_3)} \qquad Bb = \frac{R_2G}{(R+\frac{I}{2}+R_2-\frac{G}{2}-i_2)} \qquad Cc = \frac{R_3G}{(R+\frac{I}{2}+R_3-\frac{G}{2}-i_3)}$$

$$Dd = \frac{(R+\frac{I}{2}+\frac{G}{2})G}{(R+\frac{I}{2}+R_2-\frac{G}{2}-i_2)} \qquad Ee = \frac{RI+R_1G}{(R+\frac{I}{2}+R_1-\frac{G}{2}-i_1)} \qquad Ff = \frac{(R_1-\frac{I}{2}-\frac{G}{2})I+(R+\frac{I}{2}+\frac{G}{2})G}{(R+\frac{I}{2}+R_1-\frac{G}{2}-i_1)}$$

CROSSING TO CROSSING DIMENSIONS (1.)

$$AB = \sqrt{(L_{AR3}-L_{BR3})^2+Aa^2} \qquad BD = \sqrt{(L_{BR2}-L_{DR2})^2+Bb^2} \qquad DE = \sqrt{(L_{DR1}-L_{ER1})^2+Ee^2}$$

$$AC = \sqrt{(L_{AR3}-L_{CR3})^2+Cc^2} \qquad CD = \sqrt{(L_{CR2}-L_{DR2})^2+Dd^2} \qquad DF = \sqrt{(L_{DR1}-L_{FR1})^2+Ff^2}$$

$$x_1 = \sqrt{\frac{(R+\frac{I}{2})(R-\frac{I}{2})}{(DE+I)(DE-I)}-\frac{1}{4}} \qquad y_1 = \sqrt{\frac{(R+\frac{I}{2})^2}{BD^2}-\frac{1}{4}} \qquad z_1 = \frac{x_1y_1-\frac{1}{4}}{x_1+y_1}$$

$$x_2 = \sqrt{\frac{(R+\frac{I}{2}+G)(R+\frac{I}{2})}{(DF+G)(DF-G)}-\frac{1}{4}} \qquad y_2 = \sqrt{\frac{(R+\frac{I}{2}+G)(R+\frac{I}{2})}{(CD+G)(CD-G)}-\frac{1}{4}} \qquad z_2 = \frac{x_2y_2-\frac{1}{4}}{x_2+y_2}$$

CROSSING TO CROSSING DIMENSIONS (2.)

$$EB = \sqrt{I^2+\frac{(R+\frac{I}{2})(R-\frac{I}{2})}{z_1^2+\frac{1}{4}}} \qquad CF = \frac{(R+\frac{I}{2}+G)}{\sqrt{z_2^2+\frac{1}{4}}}$$

NB: Since the values of standard Xing angles N_C, N_B, N_F are not theoretically correct, all dimensions to these crossings involve slight approximations.

N	$K_N = \frac{N^2-\frac{1}{4}}{N^2+\frac{1}{4}}$
2½	0·9230769230
2⅝	0·9299781181
2¾	0·936
2⅞	0·9412844036
3	0·9459459459
3⅛	0·9500780031
3¼	0·9537572254
3⅜	0·9570469798
3½	0·96
3⅝	0·9626604434
3¾	0·9650655021
3⅞	0·9672466734
4	0·9692307692
4¼	0·9726962457
4½	0·9756097560
4¾	0·9780821917
5	0·9801980198
5¼	0·9820224719
5½	0·9836065573
5¾	0·9849906191
6	0·9862068965
6¼	0·9872813990
6½	0·9882352941
6¾	0·9890859481
7	0·9898477157
7¼	0·9905325443
7½	0·9911504424
7¾	0·9917098445
8	0·9922178988
8¼	0·9926806953
8½	0·9931034482
8¾	0·9934906427
9	0·9938461538
9½	0·9944751381
10	0·9950124688
10½	0·9954751131
11	0·9958762886
11½	0·9962264150
12	0·9965337954
12½	0·9968051118
13	0·9970457902
13½	0·9972602739
14	0·9974522292
14½	0·9976247030
15	0·9977802441
16	0·9980487804
18	0·9984579799
20	0·9987507807