NMRA Recommended Practices

¾ Inch Scale

Straight Switch Turnout

TURNOUT DIMENSIONS

Revised: February 2015 | **RP-12.19**

Design and calculations by Van S. Fehr

(1)	**FROG NUMBERS**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
PROPERTIES OF STRAIGHT SWITCHES										
(2)	Switch Rail Length	9.511	9.176	9.095	14.080	14.423	14.301	14.963	18.978	18.998
(4)	Switch Heel Spread	0.459	0.459	0.459	0.459	0.459	0.459	0.459	0.459	0.459
(5)	Switch Heel Angle (deg.)	2.765	2.866	2.891	1.867	1.823	1.838	1.757	1.385	1.384
LEAD TO THEORETICAL POINT OF FROG										
(8)	Lead	28.062	31.749	35.437	46.343	50.750	53.937	58.750	68.547	72.125
CLOSURE DISTANCE										
(9)	Straight Rail Length	15.917	19.752	23.332	28.503	32.252	34.561	38.647	43.960	46.891
(10)	Curved Rail Length	16.203	19.981	23.524	28.665	32.395	34.689	38.763	44.064	46.987
(11)	Curved Rail Radius	80.831	133.819	203.117	260.534	348.250	439.605	559.740	660.932	794.591
GAGE LINE OFFSETS ON CURVED CLOSURE RAIL										
(12)	1st Point Y1	0.750	0.798	0.838	0.789	0.809	0.821	0.839	0.816	0.829
(13)	1st Point X1	13.491	14.114	14.928	21.205	22.486	22.941	24.625	29.968	30.721
(14)	Mid-Point Y2	1.239	1.321	1.386	1.315	1.347	1.354	1.386	1.357	1.372
(15)	Mid-Point X2	17.470	19.052	20.761	28.331	30.549	31.581	34.287	40.957	42.444
(16)	3rd Point Y3	1.931	2.031	2.104	2.038	2.073	2.058	2.101	2.081	2.088
(17)	3rd Point X3	21.449	23.990	26.594	35.457	38.612	40.221	43.949	51.947	54.166
PROPERTIES OF FROGS										
(18)	Frog Angle (deg.)	14.250	11.421	9.527	8.171	7.153	6.360	5.725	5.205	4.772
(19)	Overall Length	6.259	7.072	7.886	9.449	10.262	12.576	13.015	14.735	16.017
(20)	Toe Length	2.633	2.821	3.010	3.761	4.075	5.076	5.139	5.609	6.236
(21)	Heel Length	3.626	4.251	4.876	5.688	6.188	7.500	7.875	9.125	9.782
(22)	Toe Spread	0.653	0.561	0.500	0.536	0.508	0.563	0.513	0.509	0.519
(23)	Heel Spread	0.899	0.846	0.810	0.811	0.772	0.832	0.787	0.829	0.814
(35)	Wing Rail Extension	2.220	2.516	2.813	3.110	3.407	3.704	4.000	4.297	4.594
(36)	Wing Rail Flare Length	1.125	1.125	1.125	1.125	1.500	1.500	2.000	2.000	2.250
(37)	Wing Rail Flare Width	0.150	0.150	0.150	0.150	0.142	0.142	0.136	0.136	0.134
(38)	Wing Rail Bend Width	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
(39)	Wing Rail End Chamfer	0.219	0.219	0.219	0.219	0.219	0.219	0.219	0.219	0.219
POINT OF FROG TO INTERSECTION OF CENTERLINES										
(24)	PF to ICL	14.000	17.500	21.000	24.500	28.000	31.500	35.000	38.500	42.000
DATA FOR CROSSOVERS: PF TO PF ON PARALLEL TRACKS										
	For Track Centers of:	9.750	**(13 prototype feet)**							
(25)	Straight Track Dist.	10.391	13.263	16.094	18.902	21.695	24.479	27.256	30.028	32.797
(26)	Crossover Track Dist.	11.609	14.238	16.906	19.598	22.305	25.021	27.744	30.472	33.203
	For Track Center Increment of:	0.750	**(1 prototype foot)**							
(28)	Straight Track Incr.	2.953	3.713	4.469	5.223	5.977	6.729	7.481	8.233	8.984
(29)	Crossover Track Incr.	3.047	3.788	4.531	5.277	6.023	6.771	7.519	8.267	9.016
GUARD RAILS										
(30)	Parallel End Setback	0.501	0.532	0.563	0.594	0.625	0.657	0.688	0.719	0.750
(31)	Bevel Length	0.813	0.813	0.813	0.813	0.813	0.813	0.813	0.813	0.813
(32)	Flare Length	1.813	1.813	1.813	1.813	1.813	1.813	1.813	2.063	2.063
(33)	Overall Length	6.188	6.188	6.188	6.188	6.188	6.188	6.188	8.250	8.250
(34)	Parallel Length	2.563	2.563	2.563	2.563	2.563	2.563	2.563	4.125	4.125
(37)	Flare Width	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120
(38)	Plane Width	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.064	0.064
(39)	End Chamfer	0.188	0.188	0.188	0.188	0.188	0.188	0.188	0.188	0.188

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(1)	**FROG NUMBERS**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
PROPERTIES OF STRAIGHT SWITCHES									
(2)	Switch Rail Length	19.170	19.397	26.394	26.243	26.308	26.414	26.681	26.984
(4)	Switch Heel Spread	0.459	0.459	0.459	0.459	0.459	0.459	0.459	0.459
(5)	Switch Heel Angle (deg.)	1.371	1.355	0.996	1.002	0.999	0.995	0.985	0.974
LEAD TO THEORETICAL POINT OF FROG									
(8)	Lead	75.992	79.859	94.312	98.000	101.578	105.156	109.250	113.344
CLOSURE DISTANCE									
(9)	Straight Rail Length	50.241	53.537	60.366	64.172	67.044	69.874	73.668	77.426
(10)	Curved Rail Length	50.330	53.620	60.442	64.244	67.112	69.938	73.730	77.484
(11)	Curved Rail Radius	950.511	1123.083	1227.026	1427.751	1622.385	1832.220	2081.397	2348.963
GAGE LINE OFFSETS ON CURVED CLOSURE RAIL									
(12)	1st Point Y1	0.843	0.855	0.814	0.829	0.838	0.846	0.857	0.868
(13)	1st Point X1	31.731	32.781	41.486	42.286	43.069	43.883	45.098	46.341
(14)	Mid-Point Y2	1.393	1.412	1.355	1.381	1.390	1.399	1.418	1.436
(15)	Mid-Point X2	44.291	46.165	56.577	58.329	59.830	61.351	63.515	65.697
(16)	3rd Point Y3	2.109	2.128	2.082	2.113	2.116	2.119	2.143	2.165
(17)	3rd Point X3	56.851	59.549	71.669	74.372	76.591	78.820	81.932	85.054
PROPERTIES OF FROGS									
(18)	Frog Angle (deg.)	4.405	4.091	3.818	3.580	3.369	3.182	3.015	2.864
(19)	Overall Length	17.300	18.582	19.240	20.522	21.805	23.087	23.760	24.433
(20)	Toe Length	6.580	6.925	7.552	7.584	8.226	8.868	8.901	8.933
(21)	Heel Length	10.719	11.657	11.688	12.938	13.578	14.219	14.860	15.500
(22)	Toe Spread	0.506	0.494	0.503	0.474	0.484	0.492	0.468	0.447
(23)	Heel Spread	0.824	0.832	0.779	0.808	0.798	0.790	0.782	0.775
(35)	Wing Rail Extension	5.094	5.594	5.891	6.500	6.797	7.094	7.594	8.094
(36)	Wing Rail Flare Length	2.931	3.319	3.464	3.881	4.016	4.152	4.544	4.937
(37)	Wing Rail Flare Width	0.131	0.130	0.129	0.128	0.128	0.128	0.127	0.127
(38)	Wing Rail Bend Width	0.131	0.130	0.129	0.128	0.128	0.128	0.127	0.127
(39)	Wing Rail End Chamfer	0.219	0.219	0.219	0.219	0.219	0.219	0.219	0.219
POINT OF FROG TO INTERSECTION OF CENTERLINES									
(24)	PF to ICL	45.500	49.000	52.500	56.000	59.500	63.000	66.500	70.000
DATA FOR CROSSOVERS: PF TO PF ON PARALLEL TRACKS									
	For Track Centers of:	9.750	**(13 prototype feet)**						
(25)	Straight Track Dist.	35.563	38.326	41.088	43.848	46.607	49.365	52.122	54.878
(26)	Crossover Track Dist.	35.938	38.674	41.413	44.152	46.893	49.635	52.378	55.122
For Track Center Increment of:		0.750	**(1 prototype foot)**						
(28)	Straight Track Incr.	9.736	10.487	11.238	11.988	12.739	13.490	14.240	14.991
(29)	Crossover Track Incr.	9.764	10.513	11.263	12.012	12.761	13.510	14.260	15.009
GUARD RAILS									
(30)	Parallel End Setback	0.782	0.813	0.844	0.875	0.906	0.938	0.969	1.000
(31)	Bevel Length	0.813	0.813	0.813	0.813	0.813	0.813	0.813	0.813
(32)	Flare Length	2.063	2.063	2.063	2.063	2.063	2.250	2.250	2.250
(33)	Overall Length	8.250	8.250	8.250	8.250	8.250	9.750	9.750	9.750
(34)	Parallel Length	4.125	4.125	4.125	4.125	4.125	5.250	5.250	5.250
(37)	Total Flare at End	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120
(38)	Bevel Cut at End	0.064	0.064	0.064	0.064	0.064	0.061	0.061	0.061
(39)	End Chamfer	0.188	0.188	0.188	0.188	0.188	0.188	0.188	0.188