

NMRA Recommended Practices
Proto:48 Scale
Curved Switch Turnout

**TURNOUT
DIMENSIONS**

Revised: February 2015

RP-12.6

Design and calculations by Van S. Fehr

(1)	FROG NUMBERS	4	5	6	7	8	9	10	11	12
PROPERTIES OF CURVED SWITCHES										
(2)	Switch Rail Length	3.212	3.199	3.258	5.484	5.610	5.721	5.728	5.797	8.630
(3)	Switch Point Angle (deg.)	1.567	1.573	1.545	0.917	0.897	0.879	0.878	0.868	0.583
(4)	Switch Heel Spread	0.166	0.166	0.166	0.166	0.166	0.166	0.166	0.166	0.166
(5)	Switch Heel Angle (deg.)	4.366	4.384	4.305	2.556	2.499	2.450	2.447	2.418	1.624
(6)	Switch Rail Radius	65.759	65.214	67.638	191.713	200.636	208.650	209.152	214.179	474.734
(7)	Switch Mid-Ordinate	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020
LEAD TO THEORETICAL POINT OF FROG										
(8)	Lead	8.958	10.109	11.260	15.672	17.010	18.177	19.276	20.370	25.823
CLOSURE DISTANCE										
(9)	Straight Rail Length	4.955	6.078	7.128	9.084	10.213	10.956	12.049	12.939	15.371
(10)	Curved Rail Length	5.052	6.156	7.195	9.139	10.262	11.000	12.088	12.975	15.403
(11)	Curved Rail Radius	29.283	50.123	78.932	93.254	126.333	161.220	211.327	266.780	280.390
GAGE LINE OFFSETS ON CURVED CLOSURE RAIL										
(12)	1st Point Y1	0.287	0.306	0.321	0.295	0.304	0.307	0.316	0.322	0.302
(13)	1st Point X1	4.451	4.718	5.040	7.755	8.164	8.460	8.740	9.031	12.473
(14)	Mid-Point Y2	0.462	0.493	0.516	0.480	0.493	0.494	0.510	0.518	0.490
(15)	Mid-Point X2	5.690	6.238	6.822	10.026	10.717	11.199	11.752	12.266	16.315
(16)	3rd Point Y3	0.691	0.727	0.752	0.721	0.734	0.728	0.747	0.753	0.731
(17)	3rd Point X3	6.928	7.757	8.604	12.297	13.270	13.939	14.765	15.500	20.158
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	2.000	2.250	2.500	3.000	3.249	3.999	4.124	4.676	5.083
(20)	Toe Length	0.791	0.833	0.874	1.104	1.187	1.499	1.499	1.635	1.822
(21)	Heel Length	1.209	1.417	1.625	1.896	2.063	2.500	2.625	3.042	3.261
(22)	Toe Spread	0.196	0.166	0.145	0.157	0.148	0.166	0.150	0.148	0.152
(23)	Heel Spread	0.300	0.282	0.270	0.270	0.257	0.277	0.262	0.276	0.271
(35)	Wing Rail Extension	0.740	0.839	0.938	1.037	1.136	1.235	1.333	1.432	1.531
(36)	Wing Rail Flare Length	0.375	0.375	0.375	0.375	0.500	0.500	0.667	0.667	0.750
(37)	Wing Rail Flare Width	0.050	0.050	0.050	0.050	0.047	0.047	0.045	0.045	0.045
(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	0.073	0.073	0.073	0.073	0.073	0.073	0.073	0.073	0.073
POINT OF FROG TO INTERSECTION OF CENTERLINES										
(24)	PF to ICL	4.708	5.885	7.062	8.239	9.416	10.593	11.770	12.947	14.124
DATA FOR CROSSOVERS: PF TO PF ON PARALLEL TRACKS										
For Track Centers of:		3.250	(13 prototype feet)							
(25)	Straight Track Dist.	3.381	4.318	5.241	6.156	7.066	7.974	8.879	9.782	10.684
(26)	Crossover Track Dist.	3.787	4.643	5.511	6.388	7.270	8.154	9.041	9.930	10.820
For Track Center Increment of:		0.250	(1 prototype foot)							
(28)	Straight Track Incr.	0.984	1.238	1.490	1.741	1.992	2.243	2.494	2.744	2.995
(29)	Crossover Track Incr.	1.016	1.263	1.510	1.759	2.008	2.257	2.506	2.756	3.005
GUARD RAILS										
(30)	Parallel End Setback	0.167	0.177	0.188	0.198	0.208	0.219	0.229	0.240	0.250
(31)	Bevel Length	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
(32)	Flare Length	0.604	0.604	0.604	0.604	0.604	0.604	0.604	0.604	0.604
(33)	Overall Length	2.063	2.063	2.063	2.063	2.063	2.063	2.063	2.063	2.063
(34)	Parallel Length	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854	0.854
(37)	Flare Width	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
(38)	Plane Width	0.024	0.024	0.024	0.024	0.024	0.024	0.024	0.024	0.024
(39)	End Chamfer	0.063	0.063	0.063	0.063	0.063	0.063	0.063	0.063	0.063

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(1)	FROG NUMBERS	13	14	15	16	17	18	19	20
PROPERTIES OF CURVED SWITCHES									
(2)	Switch Rail Length	8.693	8.778	8.894	9.004	11.138	11.278	11.374	11.484
(3)	Switch Point Angle (deg.)	0.579	0.573	0.565	0.559	0.452	0.446	0.442	0.438
(4)	Switch Heel Spread	0.166	0.166	0.166	0.166	0.166	0.166	0.166	0.166
(5)	Switch Heel Angle (deg.)	1.613	1.597	1.576	1.557	1.259	1.243	1.232	1.221
(6)	Switch Rail Radius	481.715	491.199	504.302	516.806	790.836	810.808	824.643	840.759
(7)	Switch Mid-Ordinate	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020
LEAD TO THEORETICAL POINT OF FROG									
(8)	Lead	27.034	28.245	29.437	30.677	35.068	36.312	37.557	38.802
CLOSURE DISTANCE									
(9)	Straight Rail Length	16.425	17.457	18.346	19.487	21.550	22.463	23.622	24.767
(10)	Curved Rail Length	16.455	17.485	18.372	19.511	21.573	22.485	23.643	24.787
(11)	Curved Rail Radius	337.600	401.706	469.458	552.607	585.569	664.271	759.994	864.047
GAGE LINE OFFSETS ON CURVED CLOSURE RAIL									
(12)	1st Point Y1	0.307	0.312	0.315	0.320	0.309	0.312	0.316	0.320
(13)	1st Point X1	12.799	13.142	13.481	13.876	16.526	16.894	17.279	17.676
(14)	Mid-Point Y2	0.497	0.505	0.508	0.517	0.502	0.505	0.512	0.519
(15)	Mid-Point X2	16.905	17.507	18.067	18.747	21.913	22.509	23.185	23.868
(16)	3rd Point Y3	0.738	0.745	0.747	0.757	0.745	0.746	0.754	0.762
(17)	3rd Point X3	21.012	21.871	22.654	23.619	27.301	28.125	29.090	30.060
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	5.489	5.895	6.093	6.499	6.905	7.311	7.514	7.717
(20)	Toe Length	1.916	2.009	2.197	2.186	2.379	2.572	2.561	2.551
(21)	Heel Length	3.573	3.886	3.896	4.313	4.526	4.740	4.953	5.167
(22)	Toe Spread	0.147	0.143	0.146	0.137	0.140	0.143	0.135	0.127
(23)	Heel Spread	0.275	0.277	0.260	0.269	0.266	0.263	0.261	0.258
(35)	Wing Rail Extension	1.698	1.865	1.964	2.167	2.266	2.365	2.531	2.698
(36)	Wing Rail Flare Length	0.977	1.106	1.155	1.294	1.339	1.384	1.515	1.646
(37)	Wing Rail Flare Width	0.044	0.043	0.043	0.043	0.043	0.043	0.042	0.042
(38)	Wing Rail Bend Width	0.044	0.043	0.043	0.043	0.043	0.043	0.042	0.042
(39)	Wing Rail End Chamfer	0.073	0.073	0.073	0.073	0.073	0.073	0.073	0.073
POINT OF FROG TO INTERSECTION OF CENTERLINES									
(24)	PF to ICL	15.301	16.478	17.655	18.832	20.009	21.186	22.363	23.540
DATA FOR CROSSOVERS: PF TO PF ON PARALLEL TRACKS									
For Track Centers of:		3.250	(13 prototype feet)						
(25)	Straight Track Dist.	11.586	12.486	13.386	14.285	15.184	16.083	16.981	17.879
(26)	Crossover Track Dist.	11.711	12.602	13.494	14.387	15.280	16.173	17.067	17.961
For Track Center Increment of:		0.250	(1 prototype foot)						
(28)	Straight Track Incr.	3.245	3.496	3.746	3.996	4.246	4.497	4.747	4.997
(29)	Crossover Track Incr.	3.255	3.504	3.754	4.004	4.254	4.503	4.753	5.003
GUARD RAILS									
(30)	Parallel End Setback	0.261	0.271	0.281	0.292	0.302	0.313	0.323	0.333
(31)	Bevel Length	0.271	0.271	0.271	0.271	0.271	0.271	0.271	0.271
(32)	Flare Length	0.604	0.604	0.688	0.688	0.688	0.688	0.688	0.688
(33)	Overall Length	2.063	2.063	2.750	2.750	2.750	2.750	2.750	2.750
(34)	Parallel Length	0.854	0.854	1.375	1.375	1.375	1.375	1.375	1.375
(37)	Total Flare at End	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
(38)	Bevel Cut at End	0.024	0.024	0.021	0.021	0.021	0.021	0.021	0.021
(39)	End Chamfer	0.063	0.063	0.063	0.063	0.063	0.063	0.063	0.063