

NMRA Recommended Practices
 $\frac{3}{4}$ Inch Scale
Curved Switch Turnout

**TURNOUT
DIMENSIONS**

Revised: February 2015

RP-12.20

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	9.489	9.378	9.493	16.177	16.491	16.772	16.727	16.877	25.389
(3)	Switch Point Angle (deg.)	1.464	1.481	1.463	0.858	0.842	0.828	0.830	0.823	0.547
(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.)	4.079	4.127	4.077	2.392	2.347	2.307	2.313	2.293	1.524
(6)	Switch Rail Radius	207.890	203.074	208.080	604.318	628.015	649.610	646.088	657.733	1488.625
(7)	Switch Mid-Ordinate	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054
LEAD TO THEORETICAL POINT OF FROG										
(8)	Lead	26.874	30.327	33.781	47.015	51.031	54.531	57.828	61.109	77.468
CLOSURE DISTANCE										
(9)	Straight Rail Length	14.752	18.128	21.278	27.077	30.465	32.683	35.962	38.623	45.844
(10)	Curved Rail Length	15.045	18.365	21.478	27.243	30.611	32.815	36.081	38.733	45.941
(11)	Curved Rail Radius	84.751	144.260	225.804	270.089	364.924	463.951	606.010	762.041	810.446
GAGE LINE OFFSETS ON CURVED CLOSURE RAIL										
(12)	1st Point Y1	0.803	0.858	0.901	0.827	0.851	0.860	0.889	0.907	0.845
(13)	1st Point X1	13.177	13.910	14.812	22.946	24.107	24.943	25.717	26.532	36.850
(14)	Mid-Point Y2	1.311	1.401	1.471	1.365	1.402	1.406	1.453	1.478	1.393
(15)	Mid-Point X2	16.865	18.442	20.132	29.716	31.724	33.114	34.708	36.188	48.311
(16)	3rd Point Y3	1.986	2.091	2.168	2.076	2.115	2.097	2.151	2.172	2.105
(17)	3rd Point X3	20.553	22.974	25.451	36.485	39.340	41.284	43.698	45.844	59.772
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

¾ Inch Scale **Curved Switch Turnout**

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(1)	FROG NUMBERS	13	14	15	16	17	18	19	20
PROPERTIES OF CURVED SWITCHES									
(2)	Switch Rail Length	25.514	25.708	26.002	26.268	32.664	33.028	33.251	33.520
(3)	Switch Point Angle (deg.)	0.544	0.540	0.534	0.529	0.425	0.420	0.418	0.414
(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.)	1.517	1.505	1.488	1.473	1.185	1.172	1.164	1.154
(6)	Switch Rail Radius	1503.342	1526.241	1561.328	1593.504	2463.965	2519.160	2553.287	2594.827
(7)	Switch Mid-Ordinate	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054
LEAD TO THEORETICAL POINT OF FROG									
(8)	Lead	81.101	84.734	88.312	92.031	105.203	108.937	112.672	116.406
CLOSURE DISTANCE									
(9)	Straight Rail Length	49.007	52.101	54.759	58.179	64.313	67.041	70.520	73.953
(10)	Curved Rail Length	49.097	52.185	54.838	58.253	64.382	67.107	70.583	74.012
(11)	Curved Rail Radius	973.822	1156.356	1348.385	1584.227	1688.392	1912.183	2184.565	2480.046
GAGE LINE OFFSETS ON CURVED CLOSURE RAIL									
(12)	1st Point Y1	0.860	0.874	0.884	0.900	0.868	0.875	0.888	0.900
(13)	1st Point X1	37.766	38.733	39.691	40.813	48.742	49.788	50.881	52.008
(14)	Mid-Point Y2	1.416	1.437	1.448	1.474	1.430	1.438	1.460	1.480
(15)	Mid-Point X2	50.018	51.758	53.381	55.357	64.820	66.549	68.511	70.497
(16)	3rd Point Y3	2.127	2.147	2.152	2.183	2.146	2.149	2.174	2.197
(17)	3rd Point X3	62.269	64.783	67.071	69.902	80.899	83.309	86.141	88.985
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