

NMRA Recommended Practices
Fine:HO Scale
Straight Switch Turnout

**TURNOUT
DIMENSIONS**

Revised: February 2015

RP-12.11

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	1.833	1.789	1.789	2.734	2.814	2.805	2.943	3.710	3.728
(4)	Switch Heel Spread	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095
(5)	Switch Heel Angle (deg.)	2.972	3.045	3.046	1.992	1.935	1.941	1.850	1.468	1.461
LEAD TO THEORETICAL POINT OF FROG										
(8)	Lead	5.156	5.833	6.511	8.514	9.324	9.910	10.794	12.594	13.251
CLOSURE DISTANCE										
(9)	Straight Rail Length	2.812	3.492	4.128	5.042	5.707	6.111	6.839	7.779	8.297
(10)	Curved Rail Length	2.864	3.534	4.164	5.072	5.733	6.135	6.860	7.798	8.314
(11)	Curved Rail Radius	14.551	24.175	36.807	47.027	62.954	79.561	101.436	119.540	143.867
GAGE LINE OFFSETS ON CURVED CLOSURE RAIL										
(12)	1st Point Y1	0.149	0.157	0.164	0.156	0.159	0.162	0.165	0.161	0.163
(13)	1st Point X1	2.536	2.662	2.821	3.995	4.241	4.333	4.653	5.655	5.802
(14)	Mid-Point Y2	0.237	0.252	0.263	0.251	0.256	0.257	0.263	0.258	0.261
(15)	Mid-Point X2	3.239	3.535	3.853	5.255	5.668	5.861	6.363	7.600	7.876
(16)	3rd Point Y3	0.360	0.378	0.391	0.380	0.386	0.383	0.391	0.387	0.389
(17)	3rd Point X3	3.942	4.408	4.885	6.516	7.095	7.388	8.072	9.544	9.950
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	1.177	1.333	1.490	1.783	1.940	2.371	2.459	2.782	3.024
(20)	Toe Length	0.511	0.552	0.594	0.738	0.803	0.993	1.012	1.105	1.227
(21)	Heel Length	0.666	0.781	0.896	1.045	1.137	1.378	1.447	1.677	1.797
(22)	Toe Spread	0.127	0.110	0.099	0.105	0.100	0.110	0.101	0.100	0.102
(23)	Heel Spread	0.165	0.155	0.149	0.149	0.142	0.153	0.145	0.152	0.150
(35)	Wing Rail Extension	0.408	0.462	0.517	0.571	0.626	0.680	0.735	0.790	0.844
(36)	Wing Rail Flare Length	0.207	0.207	0.207	0.207	0.276	0.276	0.367	0.367	0.413
(37)	Wing Rail Flare Width	0.028	0.028	0.028	0.028	0.026	0.026	0.025	0.025	0.025
(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	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
POINT OF FROG TO INTERSECTION OF CENTERLINES										
(24)	PF to ICL	2.596	3.245	3.894	4.543	5.192	5.841	6.490	7.139	7.788
DATA FOR CROSSOVERS: PF TO PF ON PARALLEL TRACKS										
For Track Centers of:		1.791	(13 prototype feet)							
(25)	Straight Track Dist.	1.861	2.377	2.885	3.389	3.891	4.390	4.889	5.386	5.883
(26)	Crossover Track Dist.	2.085	2.556	3.035	3.517	4.003	4.490	4.978	5.467	5.957
For Track Center Increment of:		0.138	(1 prototype foot)							
(28)	Straight Track Incr.	0.543	0.682	0.821	0.960	1.098	1.236	1.375	1.513	1.651
(29)	Crossover Track Incr.	0.560	0.696	0.833	0.969	1.107	1.244	1.381	1.519	1.656
GUARD RAILS										
(30)	Parallel End Setback	0.092	0.098	0.103	0.109	0.115	0.121	0.126	0.132	0.138
(31)	Bevel Length	0.149	0.149	0.149	0.149	0.149	0.149	0.149	0.149	0.149
(32)	Flare Length	0.333	0.333	0.333	0.333	0.333	0.379	0.379	0.379	0.379
(33)	Overall Length	1.137	1.137	1.137	1.137	1.137	1.516	1.516	1.516	1.516
(34)	Parallel Length	0.471	0.471	0.471	0.471	0.471	0.758	0.758	0.758	0.758
(37)	Flare Width	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.022
(38)	Plane Width	0.013	0.013	0.013	0.013	0.013	0.012	0.012	0.012	0.012
(39)	End Chamfer	0.034	0.034	0.034	0.034	0.034	0.034	0.034	0.034	0.034

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(1)	FROG NUMBERS	13	14	15	16	17	18	19	20
PROPERTIES OF STRAIGHT SWITCHES									
(2)	Switch Rail Length	3.773	3.828	5.156	5.143	5.168	5.201	5.264	5.334
(4)	Switch Heel Spread	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095
(5)	Switch Heel Angle (deg.)	1.443	1.422	1.056	1.059	1.053	1.047	1.034	1.021
LEAD TO THEORETICAL POINT OF FROG									
(8)	Lead	13.962	14.672	17.328	18.005	18.663	19.320	20.072	20.824
CLOSURE DISTANCE									
(9)	Straight Rail Length	8.891	9.477	10.683	11.361	11.868	12.368	13.045	13.714
(10)	Curved Rail Length	8.908	9.492	10.697	11.374	11.881	12.380	13.056	13.725
(11)	Curved Rail Radius	172.299	203.805	221.881	258.477	293.927	332.184	377.699	426.611
GAGE LINE OFFSETS ON CURVED CLOSURE RAIL									
(12)	1st Point Y1	0.165	0.168	0.160	0.163	0.165	0.166	0.168	0.170
(13)	1st Point X1	5.996	6.198	7.827	7.983	8.135	8.293	8.525	8.762
(14)	Mid-Point Y2	0.264	0.268	0.258	0.262	0.264	0.266	0.269	0.272
(15)	Mid-Point X2	8.219	8.567	10.497	10.823	11.102	11.385	11.786	12.191
(16)	3rd Point Y3	0.392	0.396	0.388	0.393	0.394	0.394	0.399	0.402
(17)	3rd Point X3	10.442	10.936	13.168	13.664	14.069	14.477	15.047	15.619
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	3.266	3.509	3.636	3.878	4.121	4.363	4.494	4.624
(20)	Toe Length	1.297	1.367	1.489	1.501	1.626	1.751	1.764	1.776
(21)	Heel Length	1.969	2.142	2.147	2.377	2.495	2.612	2.730	2.848
(22)	Toe Spread	0.100	0.098	0.099	0.094	0.096	0.097	0.093	0.089
(23)	Heel Spread	0.151	0.153	0.143	0.148	0.147	0.145	0.144	0.142
(35)	Wing Rail Extension	0.936	1.028	1.082	1.194	1.249	1.303	1.395	1.487
(36)	Wing Rail Flare Length	0.539	0.610	0.636	0.713	0.738	0.763	0.835	0.907
(37)	Wing Rail Flare Width	0.024	0.024	0.024	0.024	0.024	0.023	0.023	0.023
(38)	Wing Rail Bend Width	0.024	0.024	0.024	0.024	0.024	0.023	0.023	0.023
(39)	Wing Rail End Chamfer	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
POINT OF FROG TO INTERSECTION OF CENTERLINES									
(24)	PF to ICL	8.437	9.086	9.735	10.384	11.033	11.682	12.331	12.980
DATA FOR CROSSOVERS: PF TO PF ON PARALLEL TRACKS									
For Track Centers of:		1.791	(13 prototype feet)						
(25)	Straight Track Dist.	6.379	6.875	7.370	7.865	8.360	8.855	9.350	9.844
(26)	Crossover Track Dist.	6.448	6.939	7.430	7.921	8.413	8.905	9.397	9.889
For Track Center Increment of:		0.138	(1 prototype foot)						
(28)	Straight Track Incr.	1.789	1.927	2.065	2.203	2.340	2.478	2.616	2.754
(29)	Crossover Track Incr.	1.794	1.932	2.069	2.207	2.345	2.482	2.620	2.758
GUARD RAILS									
(30)	Parallel End Setback	0.144	0.149	0.155	0.161	0.167	0.172	0.178	0.184
(31)	Bevel Length	0.149	0.149	0.149	0.149	0.149	0.149	0.149	0.149
(32)	Flare Length	0.379	0.379	0.379	0.413	0.413	0.413	0.413	0.471
(33)	Overall Length	1.516	1.516	1.516	1.791	1.791	1.791	1.791	2.274
(34)	Parallel Length	0.758	0.758	0.758	0.965	0.965	0.965	0.965	1.332
(37)	Total Flare at End	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.022
(38)	Bevel Cut at End	0.012	0.012	0.012	0.011	0.011	0.011	0.011	0.011
(39)	End Chamfer	0.034	0.034	0.034	0.034	0.034	0.034	0.034	0.034