

NMRA Recommended Practices
Proto:48 Scale
Straight Switch Turnout

**TURNOUT
DIMENSIONS**

Revised: February 2015

RP-12.5

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	3.200	3.110	3.103	4.761	4.893	4.869	5.107	6.447	6.472
(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.)	2.977	3.063	3.070	2.001	1.947	1.956	1.865	1.477	1.472
LEAD TO THEORETICAL POINT OF FROG										
(8)	Lead	9.354	10.583	11.812	15.448	16.917	17.979	19.583	22.849	24.042
CLOSURE DISTANCE										
(9)	Straight Rail Length	5.363	6.640	7.834	9.584	10.836	11.611	12.977	14.767	15.748
(10)	Curved Rail Length	5.458	6.716	7.898	9.637	10.884	11.653	13.015	14.801	15.780
(11)	Curved Rail Radius	27.739	46.039	70.081	89.487	119.779	151.625	193.197	227.490	273.954
GAGE LINE OFFSETS ON CURVED CLOSURE RAIL										
(12)	1st Point Y1	0.269	0.285	0.299	0.282	0.289	0.293	0.299	0.291	0.296
(13)	1st Point X1	4.541	4.770	5.062	7.157	7.602	7.772	8.351	10.139	10.409
(14)	Mid-Point Y2	0.437	0.465	0.487	0.462	0.473	0.476	0.487	0.477	0.482
(15)	Mid-Point X2	5.881	6.430	7.021	9.552	10.311	10.674	11.596	13.831	14.346
(16)	3rd Point Y3	0.672	0.706	0.730	0.708	0.720	0.715	0.729	0.722	0.725
(17)	3rd Point X3	7.222	8.090	8.979	11.948	13.021	13.577	14.840	17.522	18.283
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 STRAIGHT SWITCHES									
(2)	Switch Rail Length	6.547	6.639	8.962	8.933	8.971	9.023	9.130	9.249
(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.)	1.455	1.435	1.063	1.066	1.062	1.055	1.043	1.030
LEAD TO THEORETICAL POINT OF FROG									
(8)	Lead	25.331	26.620	31.437	32.667	33.859	35.052	36.417	37.781
CLOSURE DISTANCE									
(9)	Straight Rail Length	16.868	17.971	20.279	21.548	22.509	23.457	24.725	25.982
(10)	Curved Rail Length	16.898	17.999	20.304	21.571	22.532	23.479	24.746	26.001
(11)	Curved Rail Radius	328.147	388.229	422.167	491.692	559.402	632.515	719.066	812.093
GAGE LINE OFFSETS ON CURVED CLOSURE RAIL									
(12)	1st Point Y1	0.300	0.305	0.291	0.296	0.299	0.301	0.305	0.309
(13)	1st Point X1	10.764	11.132	14.031	14.319	14.598	14.887	15.311	15.744
(14)	Mid-Point Y2	0.489	0.495	0.476	0.485	0.488	0.491	0.498	0.504
(15)	Mid-Point X2	14.981	15.625	19.101	19.706	20.226	20.752	21.493	22.239
(16)	3rd Point Y3	0.732	0.738	0.723	0.733	0.734	0.735	0.743	0.750
(17)	3rd Point X3	19.198	20.117	24.171	25.093	25.853	26.616	27.674	28.735
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