

NMRA Recommended Practices
Proto:32 Scale
Straight Switch Turnout

**TURNOUT
DIMENSIONS**

Revised: February 2015

RP-12.3

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	4.780	4.642	4.629	7.107	7.302	7.263	7.617	9.620	9.653
(4)	Switch Heel Spread	0.247	0.247	0.247	0.247	0.247	0.247	0.247	0.247	0.247
(5)	Switch Heel Angle (deg.)	2.967	3.055	3.064	1.995	1.941	1.952	1.861	1.474	1.468
LEAD TO THEORETICAL POINT OF FROG										
(8)	Lead	14.031	15.875	17.718	23.172	25.375	26.969	29.375	34.273	36.062
CLOSURE DISTANCE										
(9)	Straight Rail Length	8.062	9.981	11.775	14.406	16.288	17.452	19.504	22.196	23.670
(10)	Curved Rail Length	8.204	10.095	11.871	14.487	16.359	17.516	19.562	22.248	23.718
(11)	Curved Rail Radius	41.661	69.135	105.228	134.382	179.861	227.679	290.090	341.597	411.357
GAGE LINE OFFSETS ON CURVED CLOSURE RAIL										
(12)	1st Point Y1	0.401	0.426	0.446	0.421	0.432	0.438	0.447	0.435	0.442
(13)	1st Point X1	6.795	7.137	7.572	10.708	11.374	11.626	12.493	15.169	15.571
(14)	Mid-Point Y2	0.654	0.696	0.729	0.692	0.708	0.713	0.729	0.714	0.721
(15)	Mid-Point X2	8.811	9.632	10.516	14.310	15.446	15.989	17.369	20.718	21.488
(16)	3rd Point Y3	1.007	1.057	1.095	1.061	1.078	1.071	1.093	1.082	1.086
(17)	3rd Point X3	10.827	12.128	13.460	17.911	19.518	20.352	22.245	26.267	27.406
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	3.002	3.377	3.752	4.503	4.878	6.004	6.192	7.020	7.630
(20)	Toe Length	1.189	1.252	1.315	1.659	1.784	2.253	2.254	2.457	2.739
(21)	Heel Length	1.813	2.125	2.438	2.844	3.094	3.750	3.938	4.563	4.891
(22)	Toe Spread	0.295	0.249	0.218	0.236	0.223	0.250	0.225	0.223	0.228
(23)	Heel Spread	0.450	0.423	0.405	0.405	0.386	0.416	0.393	0.414	0.407
(35)	Wing Rail Extension	1.110	1.258	1.407	1.555	1.703	1.852	2.000	2.149	2.297
(36)	Wing Rail Flare Length	0.563	0.563	0.563	0.563	0.750	0.750	1.000	1.000	1.125
(37)	Wing Rail Flare Width	0.075	0.075	0.075	0.075	0.071	0.071	0.068	0.068	0.067
(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	0.109	0.109	0.109	0.109	0.109	0.109	0.109	0.109	0.109
POINT OF FROG TO INTERSECTION OF CENTERLINES										
(24)	PF to ICL	7.064	8.830	10.596	12.362	14.128	15.894	17.660	19.426	21.192
DATA FOR CROSSOVERS: PF TO PF ON PARALLEL TRACKS										
For Track Centers of:		4.875	(13 prototype feet)							
(25)	Straight Track Dist.	5.067	6.471	7.855	9.227	10.592	11.952	13.308	14.662	16.014
(26)	Crossover Track Dist.	5.677	6.959	8.261	9.575	10.896	12.222	13.552	14.884	16.218
For Track Center Increment of:		0.375	(1 prototype foot)							
(28)	Straight Track Incr.	1.477	1.856	2.234	2.612	2.988	3.365	3.741	4.116	4.492
(29)	Crossover Track Incr.	1.523	1.894	2.266	2.638	3.012	3.385	3.759	4.134	4.508
GUARD RAILS										
(30)	Parallel End Setback	0.250	0.266	0.282	0.297	0.313	0.328	0.344	0.360	0.375
(31)	Bevel Length	0.406	0.406	0.406	0.406	0.406	0.406	0.406	0.406	0.406
(32)	Flare Length	0.906	0.906	0.906	0.906	0.906	0.906	0.906	0.906	0.906
(33)	Overall Length	3.094	3.094	3.094	3.094	3.094	3.094	3.094	3.094	3.094
(34)	Parallel Length	1.281	1.281	1.281	1.281	1.281	1.281	1.281	1.281	1.281
(37)	Flare Width	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060
(38)	Plane Width	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035
(39)	End Chamfer	0.094	0.094	0.094	0.094	0.094	0.094	0.094	0.094	0.094

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(1)	FROG NUMBERS	13	14	15	16	17	18	19	20
PROPERTIES OF STRAIGHT SWITCHES									
(2)	Switch Rail Length	9.763	9.899	13.372	13.326	13.380	13.455	13.613	13.788
(4)	Switch Heel Spread	0.247	0.247	0.247	0.247	0.247	0.247	0.247	0.247
(5)	Switch Heel Angle (deg.)	1.452	1.432	1.060	1.064	1.059	1.053	1.041	1.028
LEAD TO THEORETICAL POINT OF FROG									
(8)	Lead	37.996	39.930	47.156	49.000	50.789	52.578	54.625	56.672
CLOSURE DISTANCE									
(9)	Straight Rail Length	25.353	27.010	30.481	32.387	33.832	35.256	37.161	39.047
(10)	Curved Rail Length	25.397	27.051	30.519	32.422	33.865	35.288	37.191	39.076
(11)	Curved Rail Radius	492.718	582.920	633.924	738.295	839.953	949.724	1079.657	1219.312
GAGE LINE OFFSETS ON CURVED CLOSURE RAIL									
(12)	1st Point Y1	0.449	0.455	0.434	0.442	0.446	0.450	0.456	0.462
(13)	1st Point X1	16.101	16.651	20.993	21.422	21.838	22.269	22.903	23.550
(14)	Mid-Point Y2	0.732	0.742	0.713	0.726	0.731	0.735	0.745	0.754
(15)	Mid-Point X2	22.439	23.404	28.613	29.519	30.296	31.083	32.193	33.312
(16)	3rd Point Y3	1.097	1.106	1.083	1.098	1.100	1.102	1.114	1.125
(17)	3rd Point X3	28.778	30.156	36.233	37.616	38.754	39.897	41.483	43.074
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	8.240	8.849	9.147	9.757	10.366	10.976	11.281	11.586
(20)	Toe Length	2.880	3.021	3.303	3.288	3.577	3.867	3.851	3.836
(21)	Heel Length	5.360	5.828	5.844	6.469	6.789	7.109	7.430	7.750
(22)	Toe Spread	0.221	0.216	0.220	0.205	0.210	0.215	0.203	0.192
(23)	Heel Spread	0.412	0.416	0.389	0.404	0.399	0.395	0.391	0.387
(35)	Wing Rail Extension	2.547	2.797	2.945	3.250	3.399	3.547	3.797	4.047
(36)	Wing Rail Flare Length	1.466	1.659	1.732	1.940	2.008	2.076	2.272	2.468
(37)	Wing Rail Flare Width	0.065	0.065	0.065	0.064	0.064	0.064	0.064	0.063
(38)	Wing Rail Bend Width	0.065	0.065	0.065	0.064	0.064	0.064	0.064	0.063
(39)	Wing Rail End Chamfer	0.109	0.109	0.109	0.109	0.109	0.109	0.109	0.109
POINT OF FROG TO INTERSECTION OF CENTERLINES									
(24)	PF to ICL	22.958	24.724	26.490	28.256	30.022	31.788	33.554	35.320
DATA FOR CROSSOVERS: PF TO PF ON PARALLEL TRACKS									
For Track Centers of:		4.875	(13 prototype feet)						
(25)	Straight Track Dist.	17.365	18.715	20.064	21.412	22.759	24.106	25.453	26.799
(26)	Crossover Track Dist.	17.553	18.889	20.226	21.564	22.903	24.242	25.581	26.921
For Track Center Increment of:		0.375	(1 prototype foot)						
(28)	Straight Track Incr.	4.868	5.243	5.619	5.994	6.369	6.745	7.120	7.495
(29)	Crossover Track Incr.	4.882	5.257	5.631	6.006	6.381	6.755	7.130	7.505
GUARD RAILS									
(30)	Parallel End Setback	0.391	0.406	0.422	0.438	0.453	0.469	0.484	0.500
(31)	Bevel Length	0.406	0.406	0.406	0.406	0.406	0.406	0.406	0.406
(32)	Flare Length	0.906	0.906	1.031	1.031	1.031	1.031	1.031	1.031
(33)	Overall Length	3.094	3.094	4.125	4.125	4.125	4.125	4.125	4.125
(34)	Parallel Length	1.281	1.281	2.063	2.063	2.063	2.063	2.063	2.063
(37)	Total Flare at End	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060
(38)	Bevel Cut at End	0.035	0.035	0.032	0.032	0.032	0.032	0.032	0.032
(39)	End Chamfer	0.094	0.094	0.094	0.094	0.094	0.094	0.094	0.094