

NMRA Recommended Practices
Fine:N Scale
Straight Switch Turnout

**TURNOUT
DIMENSIONS**

Revised: February 2015

RP-12.15

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	1.050	1.035	1.043	1.577	1.631	1.632	1.717	2.153	2.170
(4)	Switch Heel Spread	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057
(5)	Switch Heel Angle (deg.)	3.121	3.165	3.143	2.078	2.010	2.007	1.908	1.522	1.510
LEAD TO THEORETICAL POINT OF FROG										
(8)	Lead	2.806	3.175	3.544	4.634	5.075	5.394	5.875	6.855	7.212
CLOSURE DISTANCE										
(9)	Straight Rail Length	1.465	1.822	2.158	2.633	2.982	3.192	3.575	4.065	4.336
(10)	Curved Rail Length	1.493	1.845	2.177	2.649	2.996	3.204	3.586	4.075	4.345
(11)	Curved Rail Radius	7.686	12.806	19.538	24.905	33.374	42.183	53.837	63.387	76.321
GAGE LINE OFFSETS ON CURVED CLOSURE RAIL										
(12)	1st Point Y1	0.086	0.091	0.094	0.090	0.092	0.093	0.094	0.092	0.093
(13)	1st Point X1	1.416	1.491	1.582	2.235	2.376	2.430	2.611	3.169	3.254
(14)	Mid-Point Y2	0.132	0.140	0.146	0.140	0.143	0.143	0.146	0.144	0.145
(15)	Mid-Point X2	1.782	1.947	2.122	2.893	3.121	3.228	3.504	4.185	4.338
(16)	3rd Point Y3	0.197	0.207	0.214	0.208	0.211	0.209	0.214	0.212	0.212
(17)	3rd Point X3	2.149	2.402	2.661	3.552	3.867	4.026	4.398	5.202	5.422
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	0.654	0.742	0.830	0.993	1.082	1.320	1.371	1.550	1.685
(20)	Toe Length	0.291	0.317	0.343	0.425	0.463	0.570	0.583	0.637	0.706
(21)	Heel Length	0.363	0.425	0.488	0.569	0.619	0.750	0.788	0.913	0.978
(22)	Toe Spread	0.072	0.063	0.057	0.061	0.058	0.063	0.058	0.058	0.059
(23)	Heel Spread	0.090	0.085	0.081	0.081	0.077	0.083	0.079	0.083	0.081
(35)	Wing Rail Extension	0.222	0.252	0.281	0.311	0.341	0.370	0.400	0.430	0.459
(36)	Wing Rail Flare Length	0.113	0.113	0.113	0.113	0.150	0.150	0.200	0.200	0.225
(37)	Wing Rail Flare Width	0.015	0.015	0.015	0.015	0.014	0.014	0.014	0.014	0.013
(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	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.022
POINT OF FROG TO INTERSECTION OF CENTERLINES										
(24)	PF to ICL	1.416	1.770	2.124	2.478	2.832	3.186	3.540	3.894	4.248
DATA FOR CROSSOVERS: PF TO PF ON PARALLEL TRACKS										
For Track Centers of:		0.975	(13 prototype feet)							
(25)	Straight Track Dist.	1.007	1.286	1.561	1.834	2.106	2.376	2.646	2.915	3.184
(26)	Crossover Track Dist.	1.129	1.384	1.643	1.904	2.166	2.430	2.694	2.959	3.224
For Track Center Increment of:		0.075	(1 prototype foot)							
(28)	Straight Track Incr.	0.295	0.371	0.447	0.522	0.598	0.673	0.748	0.823	0.898
(29)	Crossover Track Incr.	0.305	0.379	0.453	0.528	0.602	0.677	0.752	0.827	0.902
GUARD RAILS										
(30)	Parallel End Setback	0.050	0.053	0.056	0.059	0.063	0.066	0.069	0.072	0.075
(31)	Bevel Length	0.081	0.081	0.081	0.081	0.081	0.081	0.081	0.081	0.081
(32)	Flare Length	0.181	0.181	0.181	0.181	0.206	0.206	0.206	0.206	0.206
(33)	Overall Length	0.619	0.619	0.619	0.619	0.825	0.825	0.825	0.825	0.825
(34)	Parallel Length	0.256	0.256	0.256	0.256	0.413	0.413	0.413	0.413	0.413
(37)	Flare Width	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012
(38)	Plane Width	0.007	0.007	0.007	0.007	0.006	0.006	0.006	0.006	0.006
(39)	End Chamfer	0.019	0.019	0.019	0.019	0.019	0.019	0.019	0.019	0.019

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(1)	FROG NUMBERS	13	14	15	16	17	18	19	20
PROPERTIES OF STRAIGHT SWITCHES									
(2)	Switch Rail Length	2.203	2.240	2.990	2.991	3.012	3.036	3.078	3.124
(4)	Switch Heel Spread	0.057	0.057	0.057	0.057	0.057	0.057	0.057	0.057
(5)	Switch Heel Angle (deg.)	1.487	1.463	1.096	1.095	1.088	1.079	1.064	1.049
LEAD TO THEORETICAL POINT OF FROG									
(8)	Lead	7.599	7.986	9.431	9.800	10.158	10.516	10.925	11.334
CLOSURE DISTANCE									
(9)	Straight Rail Length	4.649	4.957	5.583	5.940	6.206	6.468	6.825	7.179
(10)	Curved Rail Length	4.658	4.965	5.590	5.948	6.213	6.475	6.831	7.185
(11)	Curved Rail Radius	91.463	108.251	117.649	137.165	156.019	176.371	200.655	226.761
GAGE LINE OFFSETS ON CURVED CLOSURE RAIL									
(12)	1st Point Y1	0.095	0.096	0.092	0.094	0.094	0.095	0.096	0.097
(13)	1st Point X1	3.365	3.479	4.385	4.476	4.563	4.653	4.785	4.919
(14)	Mid-Point Y2	0.147	0.149	0.144	0.146	0.147	0.148	0.150	0.151
(15)	Mid-Point X2	4.527	4.718	5.781	5.961	6.115	6.270	6.491	6.713
(16)	3rd Point Y3	0.214	0.216	0.212	0.215	0.215	0.215	0.218	0.220
(17)	3rd Point X3	5.689	5.957	7.177	7.446	7.666	7.887	8.197	8.508
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	1.820	1.955	2.028	2.163	2.298	2.433	2.507	2.581
(20)	Toe Length	0.748	0.789	0.859	0.869	0.940	1.011	1.021	1.031
(21)	Heel Length	1.072	1.166	1.169	1.294	1.358	1.422	1.486	1.550
(22)	Toe Spread	0.057	0.056	0.057	0.054	0.055	0.056	0.054	0.052
(23)	Heel Spread	0.082	0.083	0.078	0.081	0.080	0.079	0.078	0.077
(35)	Wing Rail Extension	0.509	0.559	0.589	0.650	0.680	0.709	0.759	0.809
(36)	Wing Rail Flare Length	0.293	0.332	0.346	0.388	0.402	0.415	0.454	0.494
(37)	Wing Rail Flare Width	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013
(38)	Wing Rail Bend Width	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013
(39)	Wing Rail End Chamfer	0.022	0.022	0.022	0.022	0.022	0.022	0.022	0.022
POINT OF FROG TO INTERSECTION OF CENTERLINES									
(24)	PF to ICL	4.602	4.956	5.310	5.664	6.018	6.372	6.726	7.080
DATA FOR CROSSOVERS: PF TO PF ON PARALLEL TRACKS									
For Track Centers of:		0.975	(13 prototype feet)						
(25)	Straight Track Dist.	3.452	3.721	3.989	4.257	4.525	4.792	5.060	5.328
(26)	Crossover Track Dist.	3.490	3.755	4.021	4.287	4.553	4.820	5.086	5.352
For Track Center Increment of:		0.075	(1 prototype foot)						
(28)	Straight Track Incr.	0.974	1.049	1.124	1.199	1.274	1.349	1.424	1.499
(29)	Crossover Track Incr.	0.976	1.051	1.126	1.201	1.276	1.351	1.426	1.501
GUARD RAILS									
(30)	Parallel End Setback	0.078	0.081	0.084	0.088	0.091	0.094	0.097	0.100
(31)	Bevel Length	0.081	0.081	0.081	0.081	0.081	0.081	0.081	0.081
(32)	Flare Length	0.206	0.225	0.225	0.225	0.225	0.256	0.256	0.256
(33)	Overall Length	0.825	0.975	0.975	0.975	0.975	1.238	1.238	1.238
(34)	Parallel Length	0.413	0.525	0.525	0.525	0.525	0.725	0.725	0.725
(37)	Total Flare at End	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012
(38)	Bevel Cut at End	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006
(39)	End Chamfer	0.019	0.019	0.019	0.019	0.019	0.019	0.019	0.019