

**NMRA Recommended Practices**  
**Fine:TT Scale**  
**Straight Switch Turnout**

**TURNOUT  
DIMENSIONS**

Revised: February 2015

RP-12.13

Design and calculations by Van S. Fehr

(1)	FROG NUMBERS	4	5	6	7	8	9	10	11	12
<b>PROPERTIES OF STRAIGHT SWITCHES</b>										
(2)	Switch Rail Length	1.387	1.364	1.372	2.080	2.148	2.148	2.259	2.835	2.856
(4)	Switch Heel Spread	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074
(5)	Switch Heel Angle (deg.)	3.069	3.120	3.103	2.046	1.981	1.981	1.885	1.501	1.490
<b>LEAD TO THEORETICAL POINT OF FROG</b>										
(8)	Lead	3.742	4.233	4.725	6.179	6.767	7.192	7.833	9.140	9.617
<b>CLOSURE DISTANCE</b>										
(9)	Straight Rail Length	1.967	2.448	2.898	3.535	4.004	4.286	4.801	5.458	5.823
(10)	Curved Rail Length	2.005	2.478	2.924	3.557	4.023	4.304	4.816	5.472	5.836
(11)	Curved Rail Radius	10.276	17.106	26.077	33.274	44.572	56.317	71.853	84.646	101.887
<b>GAGE LINE OFFSETS ON CURVED CLOSURE RAIL</b>										
(12)	1st Point Y1	0.113	0.119	0.124	0.118	0.120	0.122	0.124	0.121	0.123
(13)	1st Point X1	1.879	1.976	2.096	2.964	3.149	3.220	3.459	4.200	4.312
(14)	Mid-Point Y2	0.175	0.185	0.193	0.185	0.189	0.189	0.193	0.190	0.192
(15)	Mid-Point X2	2.371	2.588	2.821	3.848	4.150	4.292	4.659	5.565	5.767
(16)	3rd Point Y3	0.261	0.274	0.284	0.275	0.280	0.278	0.283	0.281	0.282
(17)	3rd Point X3	2.863	3.200	3.545	4.731	5.151	5.363	5.859	6.929	7.223
<b>PROPERTIES OF FROGS</b>										
(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	0.871	0.988	1.105	1.322	1.440	1.757	1.824	2.062	2.242
(20)	Toe Length	0.387	0.421	0.455	0.564	0.614	0.757	0.774	0.846	0.938
(21)	Heel Length	0.483	0.567	0.650	0.758	0.825	1.000	1.050	1.217	1.304
(22)	Toe Spread	0.096	0.084	0.076	0.080	0.077	0.084	0.077	0.077	0.078
(23)	Heel Spread	0.120	0.113	0.108	0.108	0.103	0.111	0.105	0.110	0.109
(35)	Wing Rail Extension	0.296	0.336	0.375	0.415	0.454	0.494	0.533	0.573	0.613
(36)	Wing Rail Flare Length	0.150	0.150	0.150	0.150	0.200	0.200	0.267	0.267	0.300
(37)	Wing Rail Flare Width	0.020	0.020	0.020	0.020	0.019	0.019	0.018	0.018	0.018
(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	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
<b>POINT OF FROG TO INTERSECTION OF CENTERLINES</b>										
(24)	PF to ICL	1.884	2.355	2.826	3.297	3.768	4.239	4.710	5.181	5.652
<b>DATA FOR CROSSOVERS: PF TO PF ON PARALLEL TRACKS</b>										
<b>For Track Centers of:</b>		1.300	<b>(13 prototype feet)</b>							
(25)	Straight Track Dist.	1.351	1.725	2.094	2.460	2.823	3.186	3.548	3.908	4.269
(26)	Crossover Track Dist.	1.513	1.855	2.202	2.552	2.905	3.258	3.613	3.968	4.323
<b>For Track Center Increment of:</b>		0.100	<b>(1 prototype foot)</b>							
(28)	Straight Track Incr.	0.394	0.495	0.596	0.696	0.797	0.897	0.998	1.098	1.198
(29)	Crossover Track Incr.	0.406	0.505	0.604	0.704	0.803	0.903	1.003	1.102	1.202
<b>GUARD RAILS</b>										
(30)	Parallel End Setback	0.067	0.071	0.075	0.079	0.083	0.088	0.092	0.096	0.100
(31)	Bevel Length	0.108	0.108	0.108	0.108	0.108	0.108	0.108	0.108	0.108
(32)	Flare Length	0.242	0.242	0.242	0.242	0.275	0.275	0.275	0.275	0.275
(33)	Overall Length	0.825	0.825	0.825	0.825	1.100	1.100	1.100	1.100	1.100
(34)	Parallel Length	0.342	0.342	0.342	0.342	0.550	0.550	0.550	0.550	0.550
(37)	Flare Width	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016
(38)	Plane Width	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009
(39)	End Chamfer	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025

NMRA Recommended Practices  
**Fine:TT Scale**  
**Straight Switch Turnout**

**TURNOUT  
DIMENSIONS**

Revised: February 2015

RP-12.13

Design and calculations by Van S. Fehr

(1)	FROG NUMBERS	13	14	15	16	17	18	19	20
<b>PROPERTIES OF STRAIGHT SWITCHES</b>									
(2)	Switch Rail Length	2.897	2.944	3.938	3.937	3.962	3.993	4.046	4.104
(4)	Switch Heel Spread	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074
(5)	Switch Heel Angle (deg.)	1.469	1.446	1.081	1.081	1.074	1.066	1.052	1.037
<b>LEAD TO THEORETICAL POINT OF FROG</b>									
(8)	Lead	10.132	10.648	12.575	13.067	13.544	14.021	14.567	15.112
<b>CLOSURE DISTANCE</b>									
(9)	Straight Rail Length	6.243	6.656	7.497	7.977	8.334	8.686	9.165	9.640
(10)	Curved Rail Length	6.255	6.667	7.507	7.986	8.343	8.694	9.173	9.647
(11)	Curved Rail Radius	122.064	144.426	157.114	183.125	208.253	235.370	267.720	302.488
<b>GAGE LINE OFFSETS ON CURVED CLOSURE RAIL</b>									
(12)	1st Point Y1	0.124	0.126	0.121	0.123	0.124	0.125	0.126	0.127
(13)	1st Point X1	4.457	4.608	5.812	5.931	6.046	6.164	6.338	6.514
(14)	Mid-Point Y2	0.194	0.197	0.190	0.193	0.194	0.195	0.198	0.200
(15)	Mid-Point X2	6.018	6.272	7.686	7.925	8.129	8.336	8.629	8.924
(16)	3rd Point Y3	0.284	0.287	0.281	0.285	0.285	0.286	0.289	0.292
(17)	3rd Point X3	7.579	7.936	9.561	9.919	10.213	10.507	10.920	11.334
<b>PROPERTIES OF FROGS</b>									
(18)	Frog Angle (deg.)	4.405	4.091	3.818	3.580	3.369	3.182	3.015	2.864
(19)	Overall Length	2.422	2.602	2.698	2.878	3.058	3.238	3.337	3.435
(20)	Toe Length	0.993	1.048	1.140	1.153	1.248	1.342	1.355	1.369
(21)	Heel Length	1.429	1.554	1.558	1.725	1.810	1.896	1.981	2.067
(22)	Toe Spread	0.076	0.075	0.076	0.072	0.073	0.075	0.071	0.068
(23)	Heel Spread	0.110	0.111	0.104	0.108	0.106	0.105	0.104	0.103
(35)	Wing Rail Extension	0.679	0.746	0.785	0.867	0.906	0.946	1.013	1.079
(36)	Wing Rail Flare Length	0.391	0.443	0.462	0.517	0.536	0.554	0.606	0.658
(37)	Wing Rail Flare Width	0.017	0.017	0.017	0.017	0.017	0.017	0.017	0.017
(38)	Wing Rail Bend Width	0.017	0.017	0.017	0.017	0.017	0.017	0.017	0.017
(39)	Wing Rail End Chamfer	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
<b>POINT OF FROG TO INTERSECTION OF CENTERLINES</b>									
(24)	PF to ICL	6.123	6.594	7.065	7.536	8.007	8.478	8.949	9.420
<b>DATA FOR CROSSOVERS: PF TO PF ON PARALLEL TRACKS</b>									
<b>For Track Centers of:</b>		1.300	<b>(13 prototype feet)</b>						
(25)	Straight Track Dist.	4.629	4.989	5.348	5.708	6.067	6.426	6.785	7.144
(26)	Crossover Track Dist.	4.679	5.035	5.392	5.748	6.105	6.462	6.819	7.176
<b>For Track Center Increment of:</b>		0.100	<b>(1 prototype foot)</b>						
(28)	Straight Track Incr.	1.298	1.398	1.498	1.598	1.699	1.799	1.899	1.999
(29)	Crossover Track Incr.	1.302	1.402	1.502	1.602	1.701	1.801	1.901	2.001
<b>GUARD RAILS</b>									
(30)	Parallel End Setback	0.104	0.108	0.113	0.117	0.121	0.125	0.129	0.133
(31)	Bevel Length	0.108	0.108	0.108	0.108	0.108	0.108	0.108	0.108
(32)	Flare Length	0.275	0.300	0.300	0.300	0.300	0.342	0.342	0.342
(33)	Overall Length	1.100	1.300	1.300	1.300	1.300	1.650	1.650	1.650
(34)	Parallel Length	0.550	0.700	0.700	0.700	0.700	0.967	0.967	0.967
(37)	Total Flare at End	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016
(38)	Bevel Cut at End	0.009	0.008	0.008	0.008	0.008	0.008	0.008	0.008
(39)	End Chamfer	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025