NMRA Recommended Practices

O Scale

Curved Switch Turnout

TURNOUT DIMENSIONS

Revised: February 2015 | **RP-12.26**

Design and calculations by Van S. Fehr

(1)	**FROG NUMBERS**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
PROPERTIES OF CURVED SWITCHES										
(2)	Switch Rail Length	3.040	3.020	3.074	5.190	5.303	5.398	5.403	5.465	8.157
(3)	Switch Point Angle (deg.)	1.742	1.753	1.723	1.020	0.998	0.980	0.979	0.968	0.649
(4)	Switch Heel Spread	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175
(5)	Switch Heel Angle (deg.)	4.854	4.885	4.799	2.842	2.781	2.732	2.730	2.699	1.808
(6)	Switch Rail Radius	55.966	55.266	57.260	163.212	170.405	176.528	176.903	180.974	403.157
(7)	Switch Mid-Ordinate	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021
LEAD TO THEORETICAL POINT OF FROG										
(8)	Lead	8.958	10.109	11.260	15.672	17.010	18.177	19.276	20.370	25.823
CLOSURE DISTANCE										
(9)	Straight Rail Length	4.965	6.054	7.070	9.097	10.199	10.919	11.972	12.829	15.363
(10)	Curved Rail Length	5.070	6.140	7.143	9.156	10.252	10.967	12.016	12.869	15.398
(11)	Curved Rail Radius	30.917	53.819	86.553	98.435	134.362	173.228	229.845	294.175	297.659
GAGE LINE OFFSETS ON CURVED CLOSURE RAIL										
(12)	1st Point Y1	0.306	0.326	0.342	0.314	0.323	0.327	0.337	0.344	0.321
(13)	1st Point X1	4.281	4.534	4.842	7.464	7.853	8.127	8.396	8.672	11.998
(14)	Mid-Point Y2	0.487	0.520	0.545	0.506	0.520	0.522	0.539	0.547	0.517
(15)	Mid-Point X2	5.522	6.047	6.609	9.738	10.403	10.857	11.390	11.880	15.838
(16)	3rd Point Y3	0.721	0.758	0.785	0.752	0.766	0.760	0.779	0.787	0.762
(17)	3rd Point X3	6.763	7.561	8.377	12.013	12.952	13.587	14.383	15.087	19.679
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	2.162	2.452	2.741	3.281	3.571	4.361	4.525	5.117	5.563
(20)	Toe Length	0.954	1.035	1.116	1.385	1.508	1.860	1.900	2.076	2.303
(21)	Heel Length	1.209	1.417	1.625	1.896	2.063	2.500	2.625	3.042	3.261
(22)	Toe Spread	0.237	0.206	0.185	0.197	0.188	0.206	0.190	0.188	0.192
(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	5.000	6.250	7.500	8.750	10.000	11.250	12.500	13.750	15.000
DATA FOR CROSSOVERS: PF TO PF ON PARALLEL TRACKS										
	For Track Centers of:	3.250	**(13 prototype feet)**							
(25)	Straight Track Dist.	2.797	3.588	4.365	5.134	5.898	6.660	7.419	8.176	8.932
(26)	Crossover Track Dist.	3.203	3.913	4.635	5.366	6.102	6.840	7.581	8.324	9.068
	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	0.688	0.688	0.688	0.688
(33)	Overall Length	2.063	2.063	2.063	2.063	2.063	2.750	2.750	2.750	2.750
(34)	Parallel Length	0.854	0.854	0.854	0.854	0.854	1.375	1.375	1.375	1.375
(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	0.021	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	0.063

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(1)	**FROG NUMBERS**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
PROPERTIES OF CURVED SWITCHES									
(2)	Switch Rail Length	8.211	8.288	8.392	8.497	10.521	10.647	10.738	10.843
(3)	Switch Point Angle (deg.)	0.644	0.638	0.631	0.623	0.503	0.497	0.493	0.488
(4)	Switch Heel Spread	0.175	0.175	0.175	0.175	0.175	0.175	0.175	0.175
(5)	Switch Heel Angle (deg.)	1.796	1.779	1.757	1.736	1.402	1.385	1.373	1.360
(6)	Switch Rail Radius	408.539	416.191	426.764	437.438	670.774	686.949	698.670	712.408
(7)	Switch Mid-Ordinate	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021
LEAD TO THEORETICAL POINT OF FROG									
(8)	Lead	27.034	28.245	29.437	30.677	35.068	36.312	37.557	38.802
CLOSURE DISTANCE									
(9)	Straight Rail Length	16.386	17.387	18.248	19.353	21.487	22.373	23.498	24.608
(10)	Curved Rail Length	16.419	17.417	18.276	19.381	21.512	22.396	23.520	24.629
(11)	Curved Rail Radius	360.541	431.747	508.062	602.125	626.355	713.980	820.940	938.167
GAGE LINE OFFSETS ON CURVED CLOSURE RAIL									
(12)	1st Point Y1	0.327	0.332	0.335	0.341	0.329	0.332	0.337	0.341
(13)	1st Point X1	12.308	12.634	12.954	13.335	15.893	16.241	16.612	16.995
(14)	Mid-Point Y2	0.525	0.533	0.537	0.546	0.530	0.533	0.541	0.548
(15)	Mid-Point X2	16.404	16.981	17.516	18.173	21.265	21.834	22.487	23.147
(16)	3rd Point Y3	0.770	0.777	0.779	0.790	0.777	0.778	0.787	0.795
(17)	3rd Point X3	20.501	21.328	22.078	23.012	26.636	27.427	28.361	29.299
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	6.010	6.456	6.693	7.140	7.586	8.032	8.275	8.518
(20)	Toe Length	2.437	2.570	2.798	2.827	3.060	3.292	3.322	3.351
(21)	Heel Length	3.573	3.886	3.896	4.313	4.526	4.740	4.953	5.167
(22)	Toe Spread	0.187	0.183	0.186	0.177	0.180	0.183	0.175	0.168
(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	16.250	17.500	18.750	20.000	21.250	22.500	23.750	25.000
DATA FOR CROSSOVERS: PF TO PF ON PARALLEL TRACKS									
	For Track Centers of:	3.250	**(13 prototype feet)**						
(25)	Straight Track Dist.	9.688	10.442	11.196	11.949	12.702	13.455	14.207	14.959
(26)	Crossover Track Dist.	9.813	10.558	11.304	12.051	12.798	13.545	14.293	15.041
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	0.688	0.750	0.750	0.750	0.750	0.750	0.854	0.854
(33)	Overall Length	2.750	3.250	3.250	3.250	3.250	3.250	4.125	4.125
(34)	Parallel Length	1.375	1.750	1.750	1.750	1.750	1.750	2.417	2.417
(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	0.021	0.020	0.020	0.020	0.020	0.020	0.019	0.019
(39)	End Chamfer	0.063	0.063	0.063	0.063	0.063	0.063	0.063	0.063