

# Z Scale

## Straight Switch Turnout

# TURNOUT DIMENSIONS

Revised: February 2015

RP-12.37

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	0.851	0.854	0.871	1.293	1.347	1.359	1.436	1.784	1.808
(4)	Switch Heel Spread	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
(5)	Switch Heel Angle (deg.)	3.351	3.338	3.272	2.204	2.116	2.097	1.985	1.598	1.576
<b>LEAD TO THEORETICAL POINT OF FROG</b>										
(8)	Lead	2.041	2.309	2.577	3.370	3.691	3.923	4.273	4.985	5.245
<b>CLOSURE DISTANCE</b>										
(9)	Straight Rail Length	0.950	1.190	1.415	1.721	1.953	2.087	2.345	2.663	2.842
(10)	Curved Rail Length	0.971	1.206	1.429	1.732	1.963	2.097	2.353	2.671	2.849
(11)	Curved Rail Radius	5.103	8.550	13.089	16.633	22.328	28.179	36.046	42.416	51.074
<b>GAGE LINE OFFSETS ON CURVED CLOSURE RAIL</b>										
(12)	1st Point Y1	0.069	0.072	0.075	0.072	0.073	0.074	0.075	0.074	0.074
(13)	1st Point X1	1.088	1.152	1.225	1.723	1.835	1.881	2.022	2.449	2.518
(14)	Mid-Point Y2	0.100	0.105	0.109	0.105	0.107	0.107	0.109	0.108	0.109
(15)	Mid-Point X2	1.326	1.449	1.579	2.153	2.323	2.403	2.608	3.115	3.229
(16)	3rd Point Y3	0.142	0.149	0.154	0.150	0.152	0.151	0.154	0.153	0.153
(17)	3rd Point X3	1.564	1.747	1.933	2.583	2.811	2.925	3.194	3.781	3.939
<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	0.503	0.574	0.645	0.770	0.841	1.021	1.065	1.202	1.307
(20)	Toe Length	0.240	0.265	0.290	0.357	0.391	0.476	0.492	0.538	0.596
(21)	Heel Length	0.264	0.309	0.355	0.414	0.450	0.545	0.573	0.664	0.711
(22)	Toe Spread	0.059	0.053	0.048	0.051	0.049	0.053	0.049	0.049	0.050
(23)	Heel Spread	0.065	0.062	0.059	0.059	0.056	0.061	0.057	0.060	0.059
(35)	Wing Rail Extension	0.161	0.183	0.205	0.226	0.248	0.269	0.291	0.313	0.334
(36)	Wing Rail Flare Length	0.082	0.082	0.082	0.082	0.109	0.109	0.145	0.145	0.164
(37)	Wing Rail Flare Width	0.011	0.011	0.011	0.011	0.010	0.010	0.010	0.010	0.010
(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	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016
<b>POINT OF FROG TO INTERSECTION OF CENTERLINES</b>										
(24)	PF to ICL	1.028	1.285	1.542	1.799	2.056	2.313	2.570	2.827	3.084
<b>DATA FOR CROSSOVERS: PF TO PF ON PARALLEL TRACKS</b>										
<b>For Track Centers of:</b>		0.709	<b>(13 prototype feet)</b>							
(25)	Straight Track Dist.	0.736	0.940	1.141	1.340	1.539	1.736	1.933	2.130	2.326
(26)	Crossover Track Dist.	0.825	1.011	1.200	1.391	1.583	1.776	1.969	2.162	2.356
<b>For Track Center Increment of:</b>		0.055	<b>(1 prototype foot)</b>							
(28)	Straight Track Incr.	0.215	0.270	0.325	0.380	0.435	0.489	0.544	0.599	0.653
(29)	Crossover Track Incr.	0.222	0.275	0.330	0.384	0.438	0.492	0.547	0.601	0.656
<b>GUARD RAILS</b>										
(30)	Parallel End Setback	0.036	0.039	0.041	0.043	0.045	0.048	0.050	0.052	0.055
(31)	Bevel Length	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059
(32)	Flare Length	0.132	0.132	0.150	0.150	0.150	0.150	0.164	0.164	0.164
(33)	Overall Length	0.450	0.450	0.600	0.600	0.600	0.600	0.709	0.709	0.709
(34)	Parallel Length	0.186	0.186	0.300	0.300	0.300	0.300	0.382	0.382	0.382
(37)	Flare Width	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009
(38)	Plane Width	0.005	0.005	0.005	0.005	0.005	0.005	0.004	0.004	0.004
(39)	End Chamfer	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014

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(1)	FROG NUMBERS	13	14	15	16	17	18	19	20
<b>PROPERTIES OF STRAIGHT SWITCHES</b>									
(2)	Switch Rail Length	1.843	1.882	2.474	2.486	2.513	2.542	2.585	2.629
(4)	Switch Heel Spread	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
(5)	Switch Heel Angle (deg.)	1.546	1.514	1.152	1.146	1.134	1.121	1.103	1.084
<b>LEAD TO THEORETICAL POINT OF FROG</b>									
(8)	Lead	5.527	5.808	6.859	7.127	7.387	7.648	7.945	8.243
<b>CLOSURE DISTANCE</b>									
(9)	Straight Rail Length	3.051	3.256	3.659	3.900	4.075	4.247	4.488	4.727
(10)	Curved Rail Length	3.057	3.262	3.664	3.905	4.080	4.252	4.493	4.731
(11)	Curved Rail Radius	61.258	72.550	78.735	91.935	104.562	118.187	134.606	152.259
<b>GAGE LINE OFFSETS ON CURVED CLOSURE RAIL</b>									
(12)	1st Point Y1	0.075	0.076	0.073	0.074	0.075	0.075	0.076	0.077
(13)	1st Point X1	2.606	2.696	3.388	3.461	3.532	3.604	3.707	3.811
(14)	Mid-Point Y2	0.110	0.111	0.108	0.109	0.110	0.110	0.112	0.113
(15)	Mid-Point X2	3.369	3.510	4.303	4.436	4.550	4.666	4.829	4.993
(16)	3rd Point Y3	0.154	0.156	0.153	0.155	0.155	0.155	0.157	0.158
(17)	3rd Point X3	4.131	4.324	5.217	5.411	5.569	5.728	5.951	6.175
<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	1.412	1.517	1.577	1.682	1.787	1.892	1.953	2.014
(20)	Toe Length	0.633	0.670	0.727	0.741	0.800	0.858	0.872	0.887
(21)	Heel Length	0.780	0.848	0.850	0.941	0.988	1.034	1.081	1.127
(22)	Toe Spread	0.049	0.048	0.048	0.046	0.047	0.048	0.046	0.044
(23)	Heel Spread	0.060	0.061	0.057	0.059	0.058	0.057	0.057	0.056
(35)	Wing Rail Extension	0.370	0.407	0.428	0.473	0.494	0.516	0.552	0.589
(36)	Wing Rail Flare Length	0.213	0.241	0.252	0.282	0.292	0.302	0.330	0.359
(37)	Wing Rail Flare Width	0.010	0.009	0.009	0.009	0.009	0.009	0.009	0.009
(38)	Wing Rail Bend Width	0.010	0.009	0.009	0.009	0.009	0.009	0.009	0.009
(39)	Wing Rail End Chamfer	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016
<b>POINT OF FROG TO INTERSECTION OF CENTERLINES</b>									
(24)	PF to ICL	3.341	3.598	3.855	4.112	4.369	4.626	4.883	5.140
<b>DATA FOR CROSSOVERS: PF TO PF ON PARALLEL TRACKS</b>									
<b>For Track Centers of:</b>		0.709	<b>(13 prototype feet)</b>						
(25)	Straight Track Dist.	2.523	2.719	2.915	3.110	3.306	3.502	3.697	3.893
(26)	Crossover Track Dist.	2.550	2.744	2.938	3.133	3.327	3.521	3.716	3.911
<b>For Track Center Increment of:</b>		0.055	<b>(1 prototype foot)</b>						
(28)	Straight Track Incr.	0.708	0.763	0.817	0.872	0.926	0.981	1.036	1.090
(29)	Crossover Track Incr.	0.710	0.765	0.819	0.874	0.928	0.983	1.037	1.092
<b>GUARD RAILS</b>									
(30)	Parallel End Setback	0.057	0.059	0.061	0.064	0.066	0.068	0.070	0.073
(31)	Bevel Length	0.059	0.059	0.059	0.059	0.059	0.059	0.059	0.059
(32)	Flare Length	0.186	0.186	0.186	0.186	0.186	0.186	0.209	0.209
(33)	Overall Length	0.900	0.900	0.900	0.900	0.900	0.900	1.064	1.064
(34)	Parallel Length	0.527	0.527	0.527	0.527	0.527	0.527	0.645	0.645
(37)	Total Flare at End	0.009	0.009	0.009	0.009	0.009	0.009	0.009	0.009
(38)	Bevel Cut at End	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004
(39)	End Chamfer	0.014	0.014	0.014	0.014	0.014	0.014	0.014	0.014