

# Zdf Scale

## Curved Switch Turnout

# TURNOUT DIMENSIONS

Revised: February 2015

RP-12.52

Design and calculations by Van S. Fehr

(1)	FROG NUMBERS	4	5	6	7	8	9	10	11	12
<b>PROPERTIES OF CURVED SWITCHES</b>										
(2)	Switch Rail Length	0.879	0.900	0.933	1.507	1.562	1.611	1.632	1.665	2.396
(3)	Switch Point Angle (deg.)	1.714	1.674	1.614	0.999	0.964	0.935	0.923	0.904	0.628
(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.)	4.774	4.663	4.497	2.784	2.685	2.605	2.571	2.519	1.751
(6)	Switch Rail Radius	16.457	17.247	18.541	48.353	51.992	55.260	56.706	59.066	122.264
(7)	Switch Mid-Ordinate	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006
<b>LEAD TO THEORETICAL POINT OF FROG</b>										
(8)	Lead	1.954	2.206	2.457	3.419	3.711	3.966	4.206	4.444	5.634
<b>CLOSURE DISTANCE</b>										
(9)	Straight Rail Length	0.836	1.041	1.233	1.556	1.758	1.879	2.082	2.241	2.643
(10)	Curved Rail Length	0.856	1.057	1.247	1.567	1.768	1.888	2.090	2.248	2.649
(11)	Curved Rail Radius	5.175	8.962	14.206	16.670	22.671	28.812	37.968	47.959	50.246
<b>GAGE LINE OFFSETS ON CURVED CLOSURE RAIL</b>										
(12)	1st Point Y1	0.071	0.075	0.077	0.073	0.075	0.075	0.077	0.078	0.074
(13)	1st Point X1	1.088	1.160	1.241	1.896	2.002	2.080	2.152	2.225	3.056
(14)	Mid-Point Y2	0.102	0.108	0.112	0.106	0.108	0.108	0.111	0.112	0.108
(15)	Mid-Point X2	1.297	1.420	1.550	2.285	2.441	2.550	2.672	2.786	3.717
(16)	3rd Point Y3	0.141	0.148	0.153	0.148	0.150	0.149	0.152	0.153	0.150
(17)	3rd Point X3	1.506	1.680	1.858	2.674	2.881	3.020	3.193	3.346	4.378
<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	1.000	1.250	1.500	1.750	2.000	2.250	2.500	2.750	3.000
<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.	0.792	1.010	1.225	1.438	1.651	1.862	2.073	2.284	2.494
(26)	Crossover Track Dist.	0.881	1.081	1.284	1.489	1.695	1.902	2.109	2.316	2.524
<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 CURVED SWITCHES</b>									
(2)	Switch Rail Length	2.434	2.476	2.524	2.570	3.127	3.182	3.225	3.272
(3)	Switch Point Angle (deg.)	0.618	0.608	0.596	0.586	0.481	0.473	0.467	0.460
(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.)	1.723	1.694	1.662	1.632	1.341	1.318	1.300	1.282
(6)	Switch Rail Radius	126.226	130.628	135.748	140.716	208.269	215.666	221.632	228.044
(7)	Switch Mid-Ordinate	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006
<b>LEAD TO THEORETICAL POINT OF FROG</b>									
(8)	Lead	5.898	6.162	6.423	6.693	7.651	7.923	8.194	8.466
<b>CLOSURE DISTANCE</b>									
(9)	Straight Rail Length	2.831	3.017	3.171	3.382	3.725	3.883	4.097	4.308
(10)	Curved Rail Length	2.838	3.022	3.177	3.387	3.730	3.887	4.101	4.312
(11)	Curved Rail Radius	60.620	72.248	84.400	99.634	105.374	119.489	137.045	156.137
<b>GAGE LINE OFFSETS ON CURVED CLOSURE RAIL</b>									
(12)	1st Point Y1	0.075	0.076	0.076	0.077	0.076	0.076	0.077	0.078
(13)	1st Point X1	3.142	3.230	3.317	3.416	4.058	4.152	4.250	4.349
(14)	Mid-Point Y2	0.109	0.110	0.111	0.112	0.110	0.110	0.112	0.113
(15)	Mid-Point X2	3.850	3.985	4.110	4.261	4.989	5.123	5.274	5.426
(16)	3rd Point Y3	0.151	0.152	0.152	0.154	0.152	0.152	0.154	0.155
(17)	3rd Point X3	4.558	4.739	4.903	5.107	5.920	6.094	6.298	6.502
<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	3.250	3.500	3.750	4.000	4.250	4.500	4.750	5.000
<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.	2.705	2.915	3.125	3.334	3.544	3.754	3.963	4.173
(26)	Crossover Track Dist.	2.732	2.940	3.148	3.357	3.565	3.773	3.982	4.191
<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