

FREIGHT-TRAIN REDUCING DISTANCES

GRADE	VELOCITY AT ORIGIN (Vo)																		GRADE		
	REDUCTION TO 15 M.P.H.									REDUCTION TO 25 M.P.H.						REDUCTION TO 40 M.P.H.					
	20	25	30	35	40	45	50	55	60	30	35	40	45	50	55	60	45	50		55	60
2	787	1119	1498	1923	2397	2919	3489	4108	4776	1307	1733	2207	2729	3299	3918	4585	2310	2881	3499	4167	2
1.9	813	1153	1539	1972	2453	2982	3559	4185	4860	1341	1774	2255	2784	3362	3988	4662	2348	2925	3551	4226	1.9
1.8	841	1188	1582	2023	2512	3049	3634	4267	4950	1377	1818	2307	2844	3429	4062	4745	2388	2973	3607	4289	1.8
1.7	871	1227	1629	2078	2575	3120	3714	4355	5046	1416	1865	2362	2907	3501	4143	4833	2432	3025	3667	4357	1.7
1.6	903	1267	1678	2137	2642	3196	3799	4449	5148	1457	1916	2422	2976	3578	4228	4928	2479	3082	3732	4431	1.6
1.5	936	1310	1731	2199	2714	3278	3889	4550	5258	1502	1970	2485	3048	3660	4320	5029	2531	3143	3803	4511	1.5
1.4	972	1356	1787	2265	2791	3364	3986	4657	5376	1549	2027	2553	3127	3748	4419	5138	2586	3208	3879	4598	1.4
1.3	1010	1405	1847	2336	2872	3457	4090	4771	5501	1600	2089	2625	3210	3843	4524	5254	2647	3279	3961	4691	1.3
1.2	1050	1457	1910	2411	2959	3556	4200	4893	5635	1654	2155	2703	3299	3944	4637	5379	2712	3356	4049	4791	1.2
1.1	1093	1512	1978	2491	3052	3661	4318	5024	5778	1712	2225	2786	3395	4052	4758	5512	2782	3439	4145	4899	1.1
1	1138	1570	2050	2576	3151	3773	4444	5164	5932	1773	2300	2875	3497	4168	4887	5655	2857	3528	4248	5016	1
0.9	1186	1633	2126	2667	3256	3893	4579	5312	6095	1839	2381	2969	3606	4292	5026	5809	2939	3625	4358	5141	0.9
0.8	1237	1699	2207	2764	3368	4021	4722	5472	6270	1910	2466	3071	3723	4424	5174	5972	3027	3728	4478	5276	0.8
0.7	1291	1769	2294	2867	3488	4157	4875	5641	6457	1985	2558	3179	3848	4566	5333	6148	3122	3840	4607	5422	0.7
0.6	1349	1844	2386	2977	3615	4302	5038	5823	6656	2066	2656	3295	3982	4718	5502	6336	3225	3960	4745	5578	0.6
0.5	1410	1923	2484	3093	3751	4457	5212	6016	6870	2152	2761	3418	4125	4880	5684	6537	3335	4090	4894	5747	0.5
0.4	1474	2007	2588	3218	3896	4622	5398	6223	7097	2243	2872	3551	4277	5053	5878	6752	3453	4229	5054	5928	0.4
0.3	1543	2097	2699	3350	4050	4799	5597	6444	7341	2341	2992	3692	4441	5239	6086	6983	3581	4379	5226	6123	0.3
0.2	1616	2192	2817	3491	4214	4986	5808	6680	7601	2445	3119	3842	4615	5437	6308	7229	3718	4540	5412	6333	0.2
0.1	1693	2293	2942	3640	4389	5187	6034	6931	7878	2556	3255	4003	4801	5649	6546	7493	3866	4714	5611	6558	0.1
0	1775	2400	3075	3800	4575	5400	6275	7200	8175	2675	3400	4175	5000	5875	6800	7775	4025	4900	5825	6800	0
-0.1	1862	2514	3217	3970	4773	5628	6532	7487	8492	2802	3555	4358	5213	6117	7072	8077	4196	5100	6055	7060	-0.1
-0.2	1954	2635	3367	4150	4985	5870	6806	7793	8830	2936	3720	4554	5440	6376	7362	8400	4379	5315	6302	7339	-0.2
-0.3	2052	2763	3527	4343	5210	6129	7099	8120	9192	3080	3896	4763	5682	6652	7673	8745	4576	5546	6567	7639	-0.3
-0.4	2156	2900	3697	4547	5450	6404	7411	8469	9578	3234	4084	4986	5941	6947	8005	9115	4788	5794	6852	7961	-0.4
-0.5	2266	3045	3878	4765	5705	6698	7744	8841	9991	3397	4284	5224	6217	7263	8360	9510	5015	6060	7158	8307	-0.5
-0.6	2382	3198	4070	4997	5977	7011	8099	9239	10431	3571	4498	5478	6512	7600	8740	9932	5259	6346	7486	8678	-0.6
-0.7	2506	3362	4275	5243	6267	7345	8477	9663	10902	3757	4726	5750	6828	7960	9145	10384	5520	6652	7838	9077	-0.7
-0.8	2637	3535	4492	5506	6576	7701	8881	10116	11404	3955	4969	6039	7164	8344	9579	10867	5801	6981	8215	9504	-0.8
-0.9	2776	3719	4723	5785	6904	8080	9312	10599	11941	4166	5228	6347	7523	8755	10042	11384	6102	7334	8621	9962	-0.9
-1	2923	3915	4968	6082	7254	8485	9772	11115	12514	4390	5504	6676	7907	9194	10537	11936	6425	7712	9055	10454	-1
-1.1	3079	4122	5229	6398	7627	8915	10262	11666	13126	4630	5798	7028	8316	9662	11066	12527	6771	8117	9521	10981	-1.1
-1.2	3245	4342	5506	6734	8024	9374	10784	12253	13780	4884	6112	7402	8753	10162	11631	13158	7141	8551	10020	11547	-1.2
-1.3	3420	4576	5801	7092	8446	9864	11342	12880	14478	5156	6447	7802	9219	10697	12235	13833	7539	9017	10556	12153	-1.3
-1.4	3606	4824	6114	7472	8896	10385	11936	13550	15223	5445	6803	8227	9716	11267	12881	14554	7965	9516	11129	12803	-1.4
-1.5	3803	5087	6447	7877	9376	10941	12571	14264	16019	5753	7183	8682	10247	11877	13570	15325	8421	10051	11744	13500	-1.5
-1.6	4012	5367	6800	8307	9886	11533	13247	15026	16869	6080	7588	9166	10813	12527	14306	16150	8910	10624	12403	14246	-1.6
-1.7	4233	5664	7176	8765	10429	12164	13968	15839	17777	6429	8019	9682	11417	13221	15093	17031	9433	11237	13109	15046	-1.7
-1.8	4468	5978	7575	9253	11007	12836	14737	16707	18746	6801	8478	10233	12062	13963	15933	17972	9993	11894	13865	15904	-1.8
-1.9	4717	6312	7999	9771	11623	13553	15557	17634	19781	7196	8968	10820	12750	14754	16831	18978	10593	12598	14674	16822	-1.9
-2	4980	6667	8450	10322	12279	14316	16431	18622	20886	7617	9489	11446	13483	15598	17789	20053	11235	13351	15541	17806	-2

ASCENDING

DESCENDING

ASCENDING

DESCENDING

D = DISTANCE REQUIRED FOR SAFE BRAKING
 TB = TONS PER OPERATIVE BRAKE [100]
 Vo = INITIAL VELOCITY AT BEGINNING OF BRAKING
 Vf = FINAL VELOCITY AT END OF BRAKING [40]
 G = AVERAGE GRADE IN PERCENT

FORMULA:

$$\text{DISTANCE} = 0.01TBV_o^2 + (80V_o)^{1-(G/1300)} - (0.01TBV_f^2)^{1-(G/1900)}$$

REV	DATE	BY	CHK	APP	DESCRIPTION

PENINSULA CORRIDOR JOINT POWERS BOARD		STANDARD DRAWINGS	CADD FILE NO.: SD-5005
APPROVED BY: <i>Bernard Anagnostis</i> <i>Stephen Chen</i>		 1250 San Carlos Avenue San Carlos, CA 94070	REV: 0 DATE: 093011
ENGINEERING MANAGER DEPUTY DIRECTOR OF ENGINEERING			SIGNAL AND COMMUNICATION SPEED CHARTS REDUCING DISTANCE CHART FOR 100 TPOB FREIGHT TRAIN
			SIGNAL STANDARD NO.: SD-5005