Plan Preparation Guide

Chapter 8

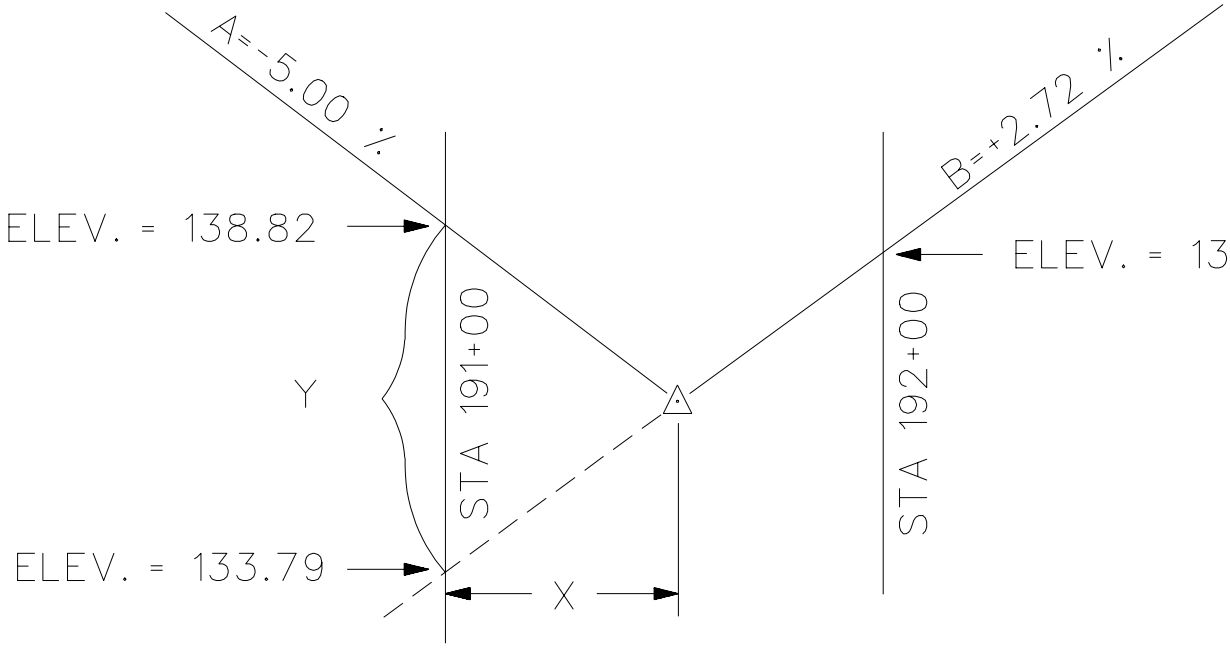
Vertical Alignment – Profile

1. VERTICAL ALIGNMENT

VERTICAL ALIGNMENT OF A ROADWAY WILL BE SHOWN ON A PROFILE SHEET. THIS MAY BE INCLUDED ON THE SAME SHEET AS THE TOPOGRAPHY OF THE ROADWAY OR ON A SEPARATE SHEET (PROFILE ONLY).

THE ROADWAY PROFILE MAY BE ONE SINGLE TANGENT LINE OR A MULTIPLE OF TANGENT LINES OF DIFFERENT PLUS OR MINUS PERCENTS OF GRADES WITH VERTICAL CURVES AT THE POINTS OF INTERSECTION. THE LENGTH OF VERTICAL CURVES ARE DETERMINED BY THE DESIGN SPEED OF THE ROADWAY BEING CONSTR-UCTED. THESE VERTICAL CURVES MAY BE CREST (HIGH POINT OF TWO TANGENT GRADES) OR SAG (LOW POINT OF TWO TANGENT GRADES).

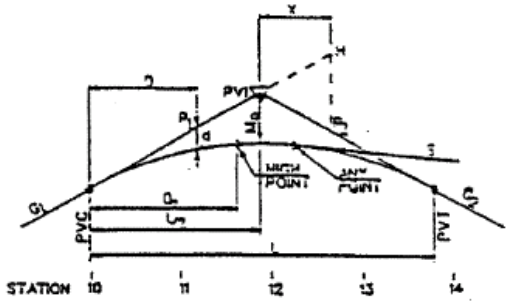
2. METHOD OF COMPUTING ODD POINT OF INTERSECTION

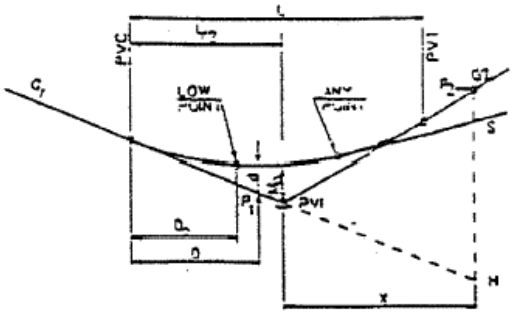


$$X = \frac{Y}{\text{ALGEBRAIC DIFF. IN GRADES}} = \frac{5.03}{7.72} = 0.6516$$

P.I. STA. = 191+65.16

3. PROPERTIES OF VERTICAL CURVES





L = Length of curve in 100 foot units or stations;

G_1 = First grade in percent;

G_2 = Second grade in percent;

M_o = Middle ordinate in feet;

d = Correction from tangent grade line to curve in feet;

D = Distance from PVC or PVT to any point on curve in stations;

S = Slope of the tangent to the curve at any point in percent;

X = Distance from P_2 to PVI in feet;

H = Elevation of grade G_1 produced at station of P_2;

P_1 = Elevation on respective grade;

P_2 = Elevation on respective grade;

D_o = Distance to low or high point from extremity of curve in stations.

A rising grade carries a plus sign while a falling grade carriers a minus sign.

$$M_o = (G_1 - G_2)\frac{L}{8}$$

$$M_o = \frac{1}{2}\left(\frac{Elev\ PVC + Elev\ PVT}{2} - Elev\ PVI\right)$$

$$d = M_o\left(\frac{D}{0.5L}\right)^2 = D^2\left(\frac{4M_o}{L^2}\right)$$

$$d = \frac{D^2(G_1 - G_2)}{2L}$$

$$X = \frac{100\,(Elev\ H - Elev\ P_2)}{(G_1 - G_2)}$$

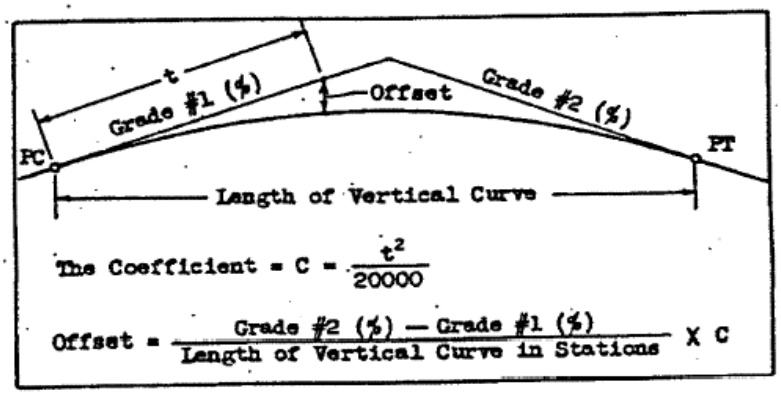
$$S = G_1 - D\left(\frac{G_1 - G_2}{L}\right)$$

$$D_o = \frac{L\,G_1}{(G_1 - G_2)}$$

COEFFICIENTS FOR TANGENT OFFSETS TO VERTICAL CURVES

THERE ARE MANY WAYS OF COMPUTING TANGENT OFFSETS FOR PARABOLIC CURVES. AMONG THEM THE SLIDE RULE METHOD AND THE DESK CALCULATOR METHOD. THIS PAMPHLET CONTAINS TABLES WHICH WILL PERMIT THEIR CALCULATION BY MEANS OF COEFFICIENTS FOLLOWING A METHOD PREFERRED BY SOME ENGINEERS. THE OFFSET FROM TANGENT TO CURVE AT ANY POINT IS OBTAINED BY MULTIPLYING THE COEFFICIENT LISTED IN THE TABLE FOR THE TANGENT DISTANCE TO THAT POINT BY THE QUOTIENT OF THE ALGEBRAIC DIFFERENCE OF THE TWO TANGENT GRADES DIVIDED BY THE LENGTH OF VERTICAL CURVE.

THESE TABLES WERE GENERATED ON AN ELECTRONIC COMPUTER.



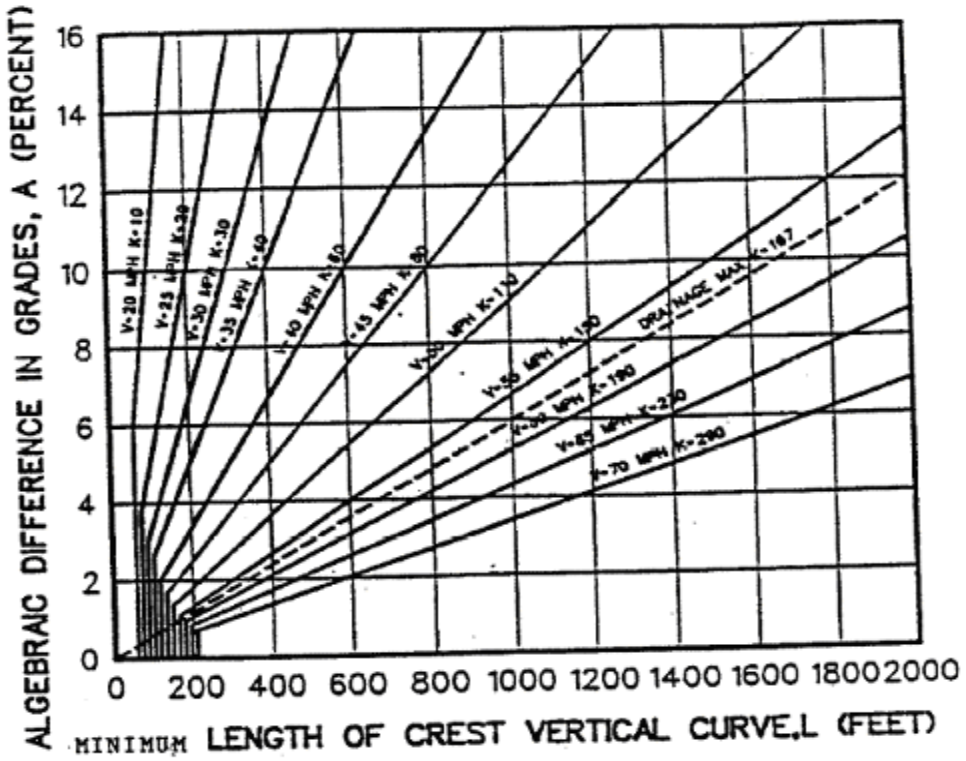
THE SYMBOLS SHOWN IN THE ABOVE SKETCH AND FORMULAS PROVIDE THE REFERENCE TO NOMENCLATURE USED IN THE TABLES.

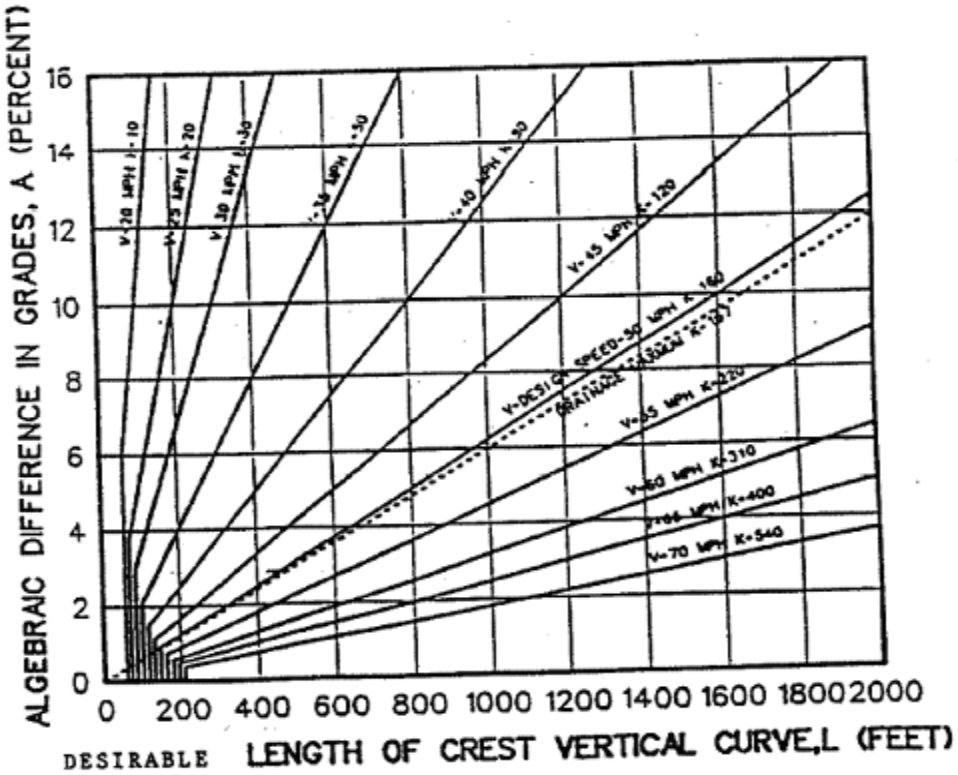
t in ft.	C	t in ft.	C	t in ft.	C	t in ft.	C	t in ft.	C
1	.00005	101	.51005	201	2.02005	301	4.53005	401	8.04005
2	.00020	102	.52020	202	2.04020	302	4.56020	402	8.08020
3	.00045	103	.53045	203	2.06045	303	4.59045	403	8.12045
4	.00080	104	.54080	204	2.08080	304	4.62080	404	8.16080
5	.00125	105	.55125	205	2.10125	305	4.65125	405	8.20125
6	.00180	106	.56180	206	2.12180	306	4.68180	406	8.24180
7	.00245	107	.57245	207	2.14245	307	4.71245	407	8.28245
8	.00320	108	.58320	208	2.16320	308	4.74320	408	8.32320
9	.00405	109	.59405	209	2.18405	309	4.77405	409	8.36405
10	.00500	110	.60500	210	2.20500	310	4.80500	410	8.40500
11	.00605	111	.61605	211	2.22605	311	4.83605	411	8.44605
12	.00720	112	.62720	212	2.24720	312	4.86720	412	8.48720
13	.00845	113	.63845	213	2.26845	313	4.89845	413	8.52845
14	.00980	114	.64980	214	2.28980	314	4.92980	414	8.56980
15	.01125	115	.66125	215	2.31125	315	4.96125	415	8.61125
16	.01280	116	.67280	216	2.33280	316	4.99280	416	8.65280
17	.01445	117	.68445	217	2.35445	317	5.02445	417	8.69445
18	.01620	118	.69620	218	2.37620	318	5.05620	418	8.73620
19	.01805	119	.70805	219	2.39805	319	5.08805	419	8.77805
20	.02000	120	.72000	220	2.42000	320	5.12000	420	8.82000
21	.02205	121	.73205	221	2.44205	321	5.15205	421	8.86205
22	.02420	122	.74420	222	2.46420	322	5.18420	422	8.90420
23	.02645	123	.75645	223	2.48645	323	5.21645	423	8.94645
24	.02880	124	.76880	224	2.50880	324	5.24880	424	8.98880
25	.03125	125	.78125	225	2.53125	325	5.28125	425	9.03125
26	.03380	126	.79380	226	2.55380	326	5.31380	426	9.07380
27	.03645	127	.80645	227	2.57645	327	5.34645	427	9.11645
28	.03920	128	.81920	228	2.59920	328	5.37920	428	9.15920
29	.04205	129	.83205	229	2.62205	329	5.41205	429	9.20205
30	.04500	130	.84500	230	2.64500	330	5.44500	430	9.24500
31	.04805	131	.85805	231	2.66805	331	5.47805	431	9.28805
32	.05120	132	.87120	232	2.69120	332	5.51120	432	9.33120
33	.05445	133	.88445	233	2.71445	333	5.54445	433	9.37445
34	.05780	134	.89780	234	2.73780	334	5.57780	434	9.41780
35	.06125	135	.91125	235	2.76125	335	5.61125	435	9.46125
36	.06480	136	.92480	236	2.78480	336	5.64480	436	9.50480
37	.06845	137	.93845	237	2.80845	337	5.67845	437	9.54845
38	.07220	138	.95220	238	2.83220	338	5.71220	438	9.59220
39	.07605	139	.96605	239	2.85605	339	5.74605	439	9.63605
40	.08000	140	.98000	240	2.88000	340	5.78000	440	9.68000
41	.08405	141	.99405	241	2.90405	341	5.81405	441	9.72405
42	.08820	142	1.00820	242	2.92820	342	5.84820	442	9.76820
43	.09245	143	1.02245	243	2.95245	343	5.88245	443	9.81245
44	.09680	144	1.03680	244	2.97680	344	5.91680	444	9.85680
45	.10125	145	1.05125	245	3.00125	345	5.95125	445	9.90125
46	.10580	146	1.06580	246	3.02580	346	5.98580	446	9.94580
47	.11045	147	1.08045	247	3.05045	347	6.02045	447	9.99045
48	.11520	148	1.09520	248	3.07520	348	6.05520	448	10.03520
49	.12005	149	1.11005	249	3.10005	349	6.09005	449	10.08005
50	.12500	150	1.12500	250	3.12500	350	6.12500	450	10.12500
51	.13005	151	1.14005	251	3.15005	351	6.16005	451	10.17005
52	.13520	152	1.15520	252	3.17520	352	6.19520	452	10.21520
53	.14045	153	1.17045	253	3.20045	353	6.23045	453	10.26045
54	.14580	154	1.18580	254	3.22580	354	6.26580	454	10.30580
55	.15125	155	1.20125	255	3.25125	355	6.30125	455	10.35125
56	.15680	156	1.21680	256	3.27680	356	6.33680	456	10.39680
57	.16245	157	1.23245	257	3.30245	357	6.37245	457	10.44245
58	.16820	158	1.24820	258	3.32820	358	6.40820	458	10.48820
59	.17405	159	1.26405	259	3.35405	359	6.44405	459	10.53405
60	.18000	160	1.28000	260	3.38000	360	6.48000	460	10.58000
61	.18605	161	1.29605	261	3.40605	361	6.51605	461	10.62605
62	.19220	162	1.31220	262	3.43220	362	6.55220	462	10.67220
63	.19845	163	1.32845	263	3.45845	363	6.58845	463	10.71845
64	.20480	164	1.34480	264	3.48480	364	6.62480	464	10.76480
65	.21125	165	1.36125	265	3.51125	365	6.66125	465	10.81125
66	.21780	166	1.37780	266	3.53780	366	6.69780	466	10.85780
67	.22445	167	1.39445	267	3.56445	367	6.73445	467	10.90445
68	.23120	168	1.41120	268	3.59120	368	6.77120	468	10.95120
69	.23805	169	1.42805	269	3.61805	369	6.80805	469	10.99805
70	.24500	170	1.44500	270	3.64500	370	6.84500	470	11.04500
71	.25205	171	1.46205	271	3.67205	371	6.88205	471	11.09205
72	.25920	172	1.47920	272	3.69920	372	6.91920	472	11.13920
73	.26645	173	1.49645	273	3.72645	373	6.95645	473	11.18645
74	.27380	174	1.51380	274	3.75380	374	6.99380	474	11.23380
75	.28125	175	1.53125	275	3.78125	375	7.03125	475	11.28125
76	.28880	176	1.54880	276	3.80880	376	7.06880	476	11.32880
77	.29645	177	1.56645	277	3.83645	377	7.10645	477	11.37645
78	.30420	178	1.58420	278	3.86420	378	7.14420	478	11.42420
79	.31205	179	1.60205	279	3.89205	379	7.18205	479	11.47205
80	.32000	180	1.62000	280	3.92000	380	7.22000	480	11.52000
81	.32805	181	1.63805	281	3.94805	381	7.25805	481	11.56805
82	.33620	182	1.65620	282	3.97620	382	7.29620	482	11.61620
83	.34445	183	1.67445	283	4.00445	383	7.33445	483	11.66445
84	.35280	184	1.69280	284	4.03280	384	7.37280	484	11.71280
85	.36125	185	1.71125	285	4.06125	385	7.41125	485	11.76125
86	.36980	186	1.72980	286	4.08980	386	7.44980	486	11.80980
87	.37845	187	1.74845	287	4.11845	387	7.48845	487	11.85845
88	.38720	188	1.76720	288	4.14720	388	7.52720	488	11.90720
89	.39605	189	1.78605	289	4.17605	389	7.56605	489	11.95605
90	.40500	190	1.80500	290	4.20500	390	7.60500	490	12.00500
91	.41405	191	1.82405	291	4.23405	391	7.64405	491	12.05405
92	.42320	192	1.84320	292	4.26320	392	7.68320	492	12.10320
93	.43245	193	1.86245	293	4.29245	393	7.72245	493	12.15245
94	.44180	194	1.88180	294	4.32180	394	7.76180	494	12.20180
95	.45125	195	1.90125	295	4.35125	395	7.80125	495	12.25125
96	.46080	196	1.92080	296	4.38080	396	7.84080	496	12.30080
97	.47045	197	1.94045	297	4.41045	397	7.88045	497	12.35045
98	.48020	198	1.96020	298	4.44020	398	7.92020	498	12.40020
99	.49005	199	1.98005	299	4.47005	399	7.96005	499	12.45005
100	.50000	200	2.00000	300	4.50000	400	8.00000	500	12.50000

t in ft.	C	t in ft.	C	t in ft.	C	t in ft.	C	t in ft.	C
501	12.55905	601	16.06095	701	24.57905	801	32.08095	901	40.59905
502	12.60920	602	16.12020	702	24.66920	802	32.18020	902	40.68020
503	12.65965	603	16.18045	703	24.71965	803	32.24065	903	40.77965
504	12.70980	604	16.24080	704	24.78980	804	32.32080	904	40.86080
505	12.75125	605	16.30125	705	24.85125	805	32.40125	905	40.95125
506	12.80180	606	16.36180	706	24.92180	806	32.48180	906	41.04180
507	12.85245	607	16.42245	707	24.99245	807	32.56245	907	41.13245
508	12.90320	608	16.48320	708	25.06320	808	32.64320	908	41.22320
509	12.95405	609	16.54405	709	25.13405	809	32.72405	909	41.31405
510	13.00500	610	16.60500	710	25.20500	810	32.80500	910	41.40500
511	13.05605	611	16.66605	711	25.27605	811	32.88605	911	41.49605
512	13.10720	612	16.72720	712	25.34720	812	32.96720	912	41.58720
513	13.15845	613	16.78845	713	25.41845	813	33.04845	913	41.67845
514	13.20980	614	16.84980	714	25.48980	814	33.12980	914	41.76980
515	13.26125	615	16.91125	715	25.56125	815	33.21125	915	41.86125
516	13.31280	616	16.97280	716	25.63280	816	33.29280	916	41.95280
517	13.36445	617	17.03445	717	25.70445	817	33.37445	917	42.04445
518	13.41620	618	17.09620	718	25.77620	818	33.45620	918	42.13620
519	13.46805	619	17.15805	719	25.84805	819	33.53805	919	42.22805
520	13.52000	620	17.22000	720	25.92000	820	33.62000	920	42.32000
521	13.57205	621	17.28205	721	25.99205	821	33.70205	921	42.41205
522	13.62420	622	17.34420	722	26.06420	822	33.78420	922	42.50420
523	13.67645	623	17.40645	723	26.13645	823	33.86645	923	42.59645
524	13.72880	624	17.46880	724	26.20880	824	33.94880	924	42.68880
525	13.78125	625	17.53125	725	26.28125	825	34.03125	925	42.78125
526	13.83380	626	17.59380	726	26.35380	826	34.11380	926	42.87380
527	13.88645	627	17.65645	727	26.42645	827	34.19645	927	42.96645
528	13.93920	628	17.71920	728	26.49920	828	34.27920	928	43.05920
529	13.99205	629	17.78205	729	26.57205	829	34.36205	929	43.15205
530	14.04500	630	17.84500	730	26.64500	830	34.44500	930	43.24500
531	14.09805	631	17.90805	731	26.71805	831	34.52805	931	43.33805
532	14.15120	632	17.97120	732	26.79120	832	34.61120	932	43.43120
533	14.20445	633	18.03445	733	26.86445	833	34.69445	933	43.52445
534	14.25780	634	18.09780	734	26.93780	834	34.77780	934	43.61780
535	14.31125	635	18.16125	735	27.01125	835	34.86125	935	43.71125
536	14.36480	636	18.22480	736	27.08480	836	34.94480	936	43.80480
537	14.41845	637	18.28845	737	27.15845	837	35.02845	937	43.89845
538	14.47220	638	18.35220	738	27.23220	838	35.11220	938	43.99220
539	14.52605	639	18.41605	739	27.30605	839	35.19605	939	44.08605
540	14.58000	640	18.48000	740	27.38000	840	35.28000	940	44.18000
541	14.63405	641	18.54405	741	27.45405	841	35.36405	941	44.27405
542	14.68820	642	18.60820	742	27.52820	842	35.44820	942	44.36820
543	14.74245	643	18.67245	743	27.60245	843	35.53245	943	44.46245
544	14.79680	644	18.73680	744	27.67680	844	35.61680	944	44.55680
545	14.85125	645	18.80125	745	27.75125	845	35.70125	945	44.65125
546	14.90580	646	18.86580	746	27.82580	846	35.78580	946	44.74580
547	14.96045	647	18.93045	747	27.90045	847	35.87045	947	44.84045
548	15.01520	648	18.99520	748	27.97520	848	35.95520	948	44.93520
549	15.07005	649	19.06005	749	28.05005	849	36.04005	949	45.03005
550	15.12500	650	19.12500	750	28.12500	850	36.12500	950	45.12500
551	15.18005	651	19.19005	751	28.20005	851	36.21005	951	45.22005
552	15.23520	652	19.25520	752	28.27520	852	36.29520	952	45.31520
553	15.29045	653	19.32045	753	28.35045	853	36.38045	953	45.41045
554	15.34580	654	19.38580	754	28.42580	854	36.46580	954	45.50580
555	15.40125	655	19.45125	755	28.50125	855	36.55125	955	45.60125
556	15.45680	656	19.51680	756	28.57680	856	36.63680	956	45.69680
557	15.51245	657	19.58245	757	28.65245	857	36.72245	957	45.79245
558	15.56820	658	19.64820	758	28.72820	858	36.80820	958	45.88820
559	15.62405	659	19.71405	759	28.80405	859	36.89405	959	45.98405
560	15.68000	660	19.78000	760	28.88000	860	36.98000	960	46.08000
561	15.73605	661	19.84605	761	28.95605	861	37.06605	961	46.17605
562	15.79220	662	19.91220	762	29.03220	862	37.15220	962	46.27220
563	15.84845	663	19.97845	763	29.10845	863	37.23845	963	46.36845
564	15.90480	664	20.04480	764	29.18480	864	37.32480	964	46.46480
565	15.96125	665	20.11125	765	29.26125	865	37.41125	965	46.56125
566	16.01780	666	20.17780	766	29.33780	866	37.49780	966	46.65780
567	16.07445	667	20.24445	767	29.41445	867	37.58445	967	46.75445
568	16.13120	668	20.31120	768	29.49120	868	37.67120	968	46.85120
569	16.18805	669	20.37805	769	29.56805	869	37.75805	969	46.94805
570	16.24500	670	20.44500	770	29.64500	870	37.84500	970	47.04500
571	16.30205	671	20.51205	771	29.72205	871	37.93205	971	47.14205
572	16.35920	672	20.57920	772	29.79920	872	38.01920	972	47.23920
573	16.41645	673	20.64645	773	29.87645	873	38.10645	973	47.33645
574	16.47380	674	20.71380	774	29.95380	874	38.19380	974	47.43380
575	16.53125	675	20.78125	775	30.03125	875	38.28125	975	47.53125
576	16.58880	676	20.84880	776	30.10880	876	38.36880	976	47.62880
577	16.64645	677	20.91645	777	30.18645	877	38.45645	977	47.72645
578	16.70420	678	20.98420	778	30.26420	878	38.54420	978	47.82420
579	16.76205	679	21.05205	779	30.34205	879	38.63205	979	47.92205
580	16.82000	680	21.12000	780	30.42000	880	38.72000	980	48.02000
581	16.87805	681	21.18805	781	30.49805	881	38.80805	981	48.11805
582	16.93620	682	21.25620	782	30.57620	882	38.89620	982	48.21620
583	16.99445	683	21.32445	783	30.65445	883	38.98445	983	48.31445
584	17.05280	684	21.39280	784	30.73280	884	39.07280	984	48.41280
585	17.11125	685	21.46125	785	30.81125	885	39.16125	985	48.51125
586	17.16980	686	21.52980	786	30.88980	886	39.24980	986	48.60980
587	17.22845	687	21.59845	787	30.96845	887	39.33845	987	48.70845
588	17.28720	688	21.66720	788	31.04720	888	39.42720	988	48.80720
589	17.34605	689	21.73605	789	31.12605	889	39.51605	989	48.90605
590	17.40500	690	21.80500	790	31.20500	890	39.60500	990	49.00500
591	17.46405	691	21.87405	791	31.28405	891	39.69405	991	49.10405
592	17.52320	692	21.94320	792	31.36320	892	39.78320	992	49.20320
593	17.58245	693	22.01245	793	31.44245	893	39.87245	993	49.30245
594	17.64180	694	22.08180	794	31.52180	894	39.96180	994	49.40180
595	17.70125	695	22.15125	795	31.60125	895	40.05125	995	49.50125
596	17.76080	696	22.22080	796	31.68080	896	40.14080	996	49.60080
597	17.82045	697	22.29045	797	31.76045	897	40.23045	997	49.70045
598	17.88020	698	22.36020	798	31.84020	898	40.32020	998	49.80020
599	17.94005	699	22.43005	799	31.92005	899	40.41005	999	49.90005
600	18.00000	700	22.50000	800	32.00000	900	40.50000	1000	50.00000

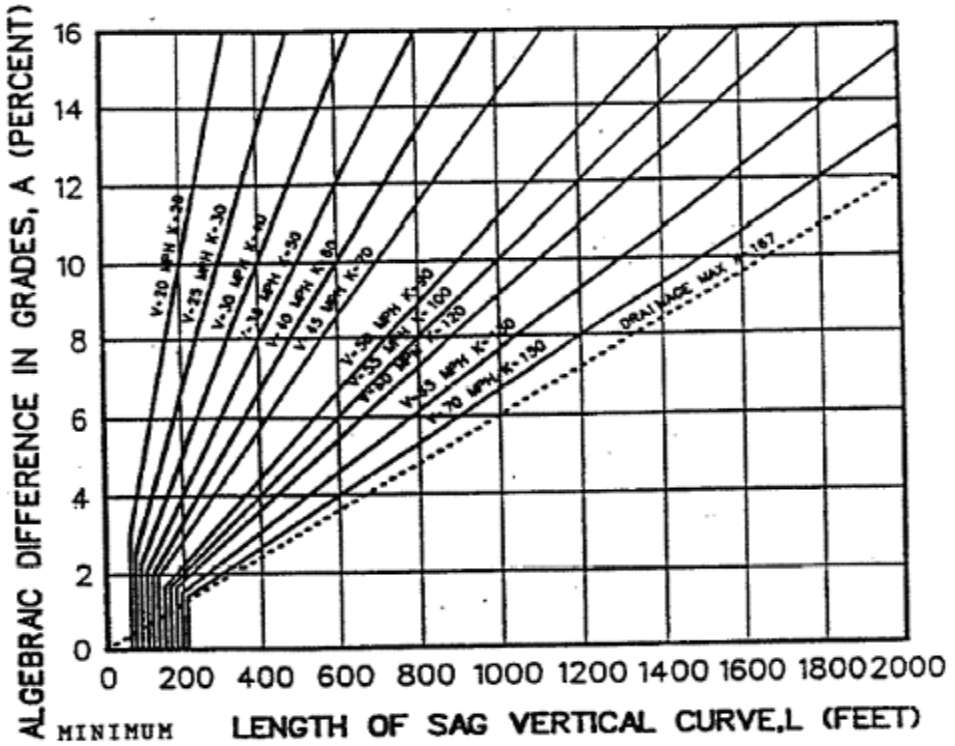
t in ft.	C	t in ft.	C	t in ft.	C	t in ft.	C	t in ft.	C
1001	50.30005	1101	60.61905	1201	72.12005	1301	84.61905	1401	98.14005
1002	50.29020	1102	60.72020	1202	72.24020	1302	84.76020	1402	98.28020
1003	50.30045	1103	60.83045	1203	72.36045	1303	84.89045	1403	98.42045
1004	50.40080	1104	60.94080	1204	72.48080	1304	85.02080	1404	98.56080
1005	50.50125	1105	61.05125	1205	72.60125	1305	85.15125	1405	98.70125
1006	50.60180	1106	61.16180	1206	72.72180	1306	85.28180	1406	98.84180
1007	50.70245	1107	61.27245	1207	72.84245	1307	85.41245	1407	98.98245
1008	50.80320	1108	61.38320	1208	72.96320	1308	85.54320	1408	99.12320
1009	50.90405	1109	61.49405	1209	73.08405	1309	85.67405	1409	99.26405
1010	51.00500	1110	61.60500	1210	73.20500	1310	85.80500	1410	99.40500
1011	51.10605	1111	61.71605	1211	73.32605	1311	85.93605	1411	99.54605
1012	51.20720	1112	61.82720	1212	73.44720	1312	86.06720	1412	99.68720
1013	51.30845	1113	61.93845	1213	73.56845	1313	86.19845	1413	99.82845
1014	51.40980	1114	62.04980	1214	73.68980	1314	86.32980	1414	99.96980
1015	51.51125	1115	62.16125	1215	73.81125	1315	86.46125	1415	100.11125
1016	51.61280	1116	62.27280	1216	73.93280	1316	86.59280	1416	100.25280
1017	51.71445	1117	62.38445	1217	74.05445	1317	86.72445	1417	100.39445
1018	51.81620	1118	62.49620	1218	74.17620	1318	86.85620	1418	100.53620
1019	51.91805	1119	62.60805	1219	74.29805	1319	86.98805	1419	100.67805
1020	52.02000	1120	62.72000	1220	74.42000	1320	87.12000	1420	100.82000
1021	52.12205	1121	62.83205	1221	74.54205	1321	87.25205	1421	100.96205
1022	52.22420	1122	62.94420	1222	74.66420	1322	87.38420	1422	101.10420
1023	52.32645	1123	63.05645	1223	74.78645	1323	87.51645	1423	101.24645
1024	52.42880	1124	63.16880	1224	74.90880	1324	87.64880	1424	101.38880
1025	52.53125	1125	63.28125	1225	75.03125	1325	87.78125	1425	101.53125
1026	52.63380	1126	63.39380	1226	75.15380	1326	87.91380	1426	101.67380
1027	52.73645	1127	63.50645	1227	75.27645	1327	88.04645	1427	101.81645
1028	52.83920	1128	63.61920	1228	75.39920	1328	88.17920	1428	101.95920
1029	52.94205	1129	63.73205	1229	75.52205	1329	88.31205	1429	102.10205
1030	53.04500	1130	63.84500	1230	75.64500	1330	88.44500	1430	102.24500
1031	53.14805	1131	63.95805	1231	75.76805	1331	88.57805	1431	102.38805
1032	53.25120	1132	64.07120	1232	75.89120	1332	88.71120	1432	102.53120
1033	53.35445	1133	64.18445	1233	76.01445	1333	88.84445	1433	102.67445
1034	53.45780	1134	64.29780	1234	76.13780	1334	88.97780	1434	102.81780
1035	53.56125	1135	64.41125	1235	76.26125	1335	89.11125	1435	102.96125
1036	53.66480	1136	64.52480	1236	76.38480	1336	89.24480	1436	103.10480
1037	53.76845	1137	64.63845	1237	76.50845	1337	89.37845	1437	103.24845
1038	53.87220	1138	64.75220	1238	76.63220	1338	89.51220	1438	103.39220
1039	53.97605	1139	64.86605	1239	76.75605	1339	89.64605	1439	103.53605
1040	54.08000	1140	64.98000	1240	76.88000	1340	89.78000	1440	103.68000
1041	54.18405	1141	65.09405	1241	77.00405	1341	89.91405	1441	103.82405
1042	54.28820	1142	65.20820	1242	77.12820	1342	90.04820	1442	103.96820
1043	54.39245	1143	65.32245	1243	77.25245	1343	90.18245	1443	104.11245
1044	54.49680	1144	65.43680	1244	77.37680	1344	90.31680	1444	104.25680
1045	54.60125	1145	65.55125	1245	77.50125	1345	90.45125	1445	104.40125
1046	54.70580	1146	65.66580	1246	77.62580	1346	90.58580	1446	104.54580
1047	54.81045	1147	65.78045	1247	77.75045	1347	90.72045	1447	104.69045
1048	54.91520	1148	65.89520	1248	77.87520	1348	90.85520	1448	104.83520
1049	55.02005	1149	66.01005	1249	78.00005	1349	90.99005	1449	104.98005
1050	55.12500	1150	66.12500	1250	78.12500	1350	91.12500	1450	105.12500
1051	55.23005	1151	66.25005	1251	78.25005	1351	91.26005	1451	105.27005
1052	55.33520	1152	66.35520	1252	78.37520	1352	91.39520	1452	105.41520
1053	55.44045	1153	66.47045	1253	78.50045	1353	91.53045	1453	105.56045
1054	55.54580	1154	66.58580	1254	78.62580	1354	91.66580	1454	105.70580
1055	55.65125	1155	66.70125	1255	78.75125	1355	91.80125	1455	105.85125
1056	55.75680	1156	66.81680	1256	78.87680	1356	91.93680	1456	105.99680
1057	55.86245	1157	66.93245	1257	79.00245	1357	92.07245	1457	106.14245
1058	55.96820	1158	67.04820	1258	79.12820	1358	92.20820	1458	106.28820
1059	56.07405	1159	67.16405	1259	79.25405	1359	92.34405	1459	106.43405
1060	56.18000	1160	67.28000	1260	79.38000	1360	92.48000	1460	106.58000
1061	56.28605	1161	67.39605	1261	79.50605	1361	92.61605	1461	106.72605
1062	56.39220	1162	67.51220	1262	79.63220	1362	92.75220	1462	106.87220
1063	56.49845	1163	67.62845	1263	79.75845	1363	92.88845	1463	107.01845
1064	56.60480	1164	67.74480	1264	79.88480	1364	93.02480	1464	107.16480
1065	56.71125	1165	67.86125	1265	80.01125	1365	93.16125	1465	107.31125
1066	56.81780	1166	67.97780	1266	80.13780	1366	93.29780	1466	107.45780
1067	56.92445	1167	68.09445	1267	80.26445	1367	93.43445	1467	107.60445
1068	57.03120	1168	68.21120	1268	80.39120	1368	93.57120	1468	107.75120
1069	57.13805	1169	68.32805	1269	80.51805	1369	93.70805	1469	107.89805
1070	57.24500	1170	68.44500	1270	80.64500	1370	93.84500	1470	108.04500
1071	57.35205	1171	68.56205	1271	80.77205	1371	93.98205	1471	108.19205
1072	57.45920	1172	68.67920	1272	80.89920	1372	94.11920	1472	108.33920
1073	57.56645	1173	68.79645	1273	81.02645	1373	94.25645	1473	108.48645
1074	57.67380	1174	68.91380	1274	81.15380	1374	94.39380	1474	108.63380
1075	57.78125	1175	69.03125	1275	81.28125	1375	94.53125	1475	108.78125
1076	57.88880	1176	69.14880	1276	81.40880	1376	94.66880	1476	108.92880
1077	57.99645	1177	69.26645	1277	81.53645	1377	94.80645	1477	109.07645
1078	58.10420	1178	69.38420	1278	81.66420	1378	94.94420	1478	109.22420
1079	58.21205	1179	69.50205	1279	81.79205	1379	95.08205	1479	109.37205
1080	58.32000	1180	69.62000	1280	81.92000	1380	95.22000	1480	109.52000
1081	58.42805	1181	69.73805	1281	82.04805	1381	95.35805	1481	109.66805
1082	58.53620	1182	69.85620	1282	82.17620	1382	95.49620	1482	109.81620
1083	58.64445	1183	69.97445	1283	82.30445	1383	95.63445	1483	109.96445
1084	58.75280	1184	70.09280	1284	82.43280	1384	95.77280	1484	110.11280
1085	58.86125	1185	70.21125	1285	82.56125	1385	95.91125	1485	110.26125
1086	58.96980	1186	70.32980	1286	82.68980	1386	96.04980	1486	110.40980
1087	59.07845	1187	70.44845	1287	82.81845	1387	96.18845	1487	110.55845
1088	59.18720	1188	70.56720	1288	82.94720	1388	96.32720	1488	110.70720
1089	59.29605	1189	70.68605	1289	83.07605	1389	96.46605	1489	110.85605
1090	59.40500	1190	70.80500	1290	83.20500	1390	96.60500	1490	111.00500
1091	59.51405	1191	70.92405	1291	83.33405	1391	96.74405	1491	111.15405
1092	59.62320	1192	71.04320	1292	83.46320	1392	96.88320	1492	111.30320
1093	59.73245	1193	71.16245	1293	83.59245	1393	97.02245	1493	111.45245
1094	59.84180	1194	71.28180	1294	83.72180	1394	97.16180	1494	111.60180
1095	59.95125	1195	71.40125	1295	83.85125	1395	97.30125	1495	111.75125
1096	60.06080	1196	71.52080	1296	83.98080	1396	97.44080	1496	111.90080
1097	60.17045	1197	71.64045	1297	84.11045	1397	97.58045	1497	112.05045
1098	60.28020	1198	71.76020	1298	84.24020	1398	97.72020	1498	112.20020
1099	60.39005	1199	71.88005	1299	84.37005	1399	97.86005	1499	112.35005
1100	60.50000	1200	72.00000	1300	84.50000	1400	98.00000	1500	112.50000

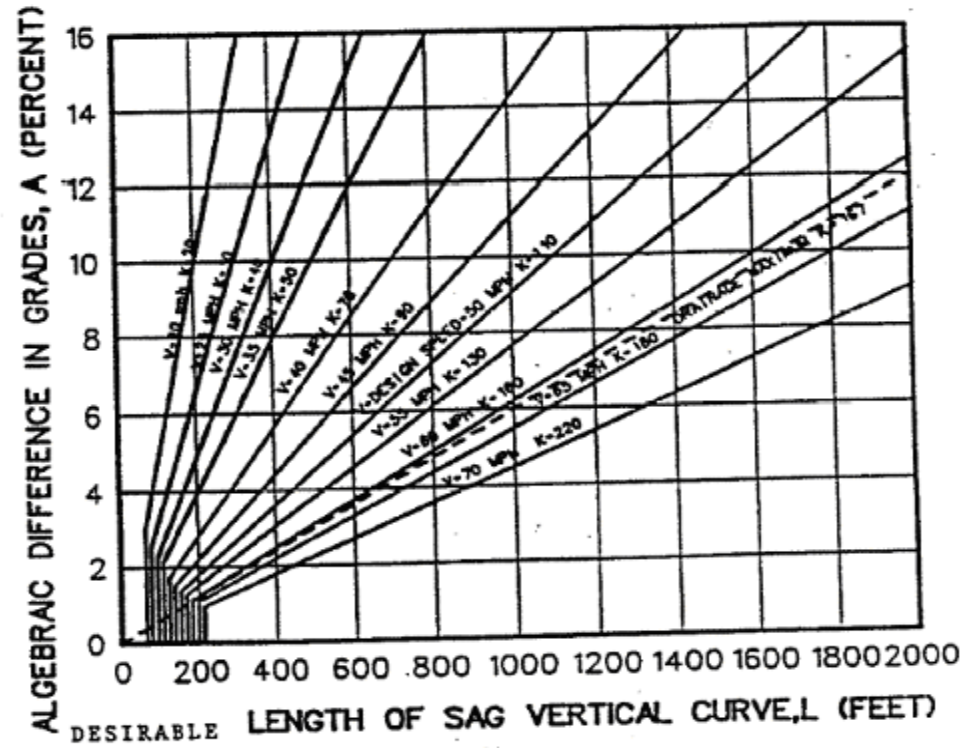
5. LENGTH OF CREST VERTICAL CURVES





6. LENGTH OF SAG VERTICAL CURVES





PIN NO. 23651

FED. ROAD DIV. NO.	STATE	COUNTY	FILE NO.		ROAD NO.	SHEET NO.	
3	S.C.	CHESTERFIELD			S-113	15