

APPENDIX C

Exercise 7

p. 7-2

Metric				US Customary			
Design speed (km/h)	Stopping sight distance (m)	Rate of vertical curvature, K^a		Design speed (mph)	Stopping sight distance (ft)	Rate of vertical curvature, K^a	
		Calculated	Design			Calculated	Design
20	20	0.6	1	15	80	3.0	3
30	35	1.9	2	20	115	6.1	7
40	50	3.8	4	25	155	11.1	12
50	65	6.4	7	30	200	18.5	19
60	85	11.0	11	35	250	29.0	29
70	105	16.8	17	40	305	43.1	44
80	130	25.7	26	45	360	60.1	61
90	160	38.9	39	50	425	83.7	84
100	185	52.0	52	55	495	113.5	114
110	220	73.6	74	60	570	150.6	151
120	250	95.0	95	65	645	192.8	193
130	285	123.4	124	70	730	246.9	247
				75	820	311.6	312
				80	910	383.7	384

^a Rate of vertical curvature, K , is the length of curve per percent algebraic difference in intersecting grades (A). $K = L/A$

Exhibit 3-72. Design Controls for Stopping Sight Distance and for Crest Vertical Curves

Metric			US Customary		
Design speed (km/h)	Passing sight distance (m)	Rate of vertical curvature, K^* design	Design speed (mph)	Passing sight distance (ft)	Rate of vertical curvature, K^* design
30	200	46	20	710	180
40	270	84	25	900	289
50	345	138	30	1090	424
60	410	195	35	1280	585
70	485	272	40	1470	772
80	540	338	45	1625	943
90	615	438	50	1835	1203
100	670	520	55	1985	1407
110	730	617	60	2135	1628
120	775	695	65	2285	1865
130	815	769	70	2480	2197
			75	2580	2377
			80	2680	2565

Note: ^{*}Rate of vertical curvature, K , is the length of curve per percent algebraic difference in intersecting grades (A). $K = L/A$

Exhibit 3-73. Design Controls for Crest Vertical Curves Based on Passing Sight Distance

Generally, it is impractical to design crest vertical curves to provide for passing sight distance because of high cost where crest cuts are involved and the difficulty of fitting the resulting long vertical curves to the terrain, particularly for high-speed roads. Passing sight



Metric				US Customary			
Design speed (km/h)	Stopping sight distance (m)	Rate of vertical curvature, K^a		Design speed (mph)	Stopping sight distance (ft)	Rate of vertical curvature, K^a	
		Calculated	Design			Calculated	Design
20	20	2.1	3	15	80	9.4	10
30	35	5.1	6	20	115	16.5	17
40	50	8.5	9	25	155	25.5	26
50	65	12.2	13	30	200	36.4	37
60	85	17.3	18	35	250	49.0	49
70	105	22.6	23	40	305	63.4	64
80	130	29.4	30	45	360	78.1	79
90	160	37.6	38	50	425	95.7	96
100	185	44.6	45	55	495	114.9	115
110	220	54.4	55	60	570	135.7	136
120	250	62.8	63	65	645	156.5	157
130	285	72.7	73	70	730	180.3	181
				75	820	205.6	206
				80	910	231.0	231

^a Rate of vertical curvature, K , is the length of curve (m) per percent algebraic difference intersecting grades (A). $K = L/A$

Exhibit 3-75. Design Controls for Sag Vertical Curves

Sight Distance at Undercrossings

Sight distance on the highway through a grade separation should be at least as long as the minimum stopping sight distance and preferably longer. Design of the vertical alignment is the same as at any other point on the highway except in some cases of sag vertical curves underpassing a structure as illustrated in Exhibit 3-76. While not a frequent problem, the structure fascia may cut the line of sight and limit the sight distance to less than otherwise is attainable. It is generally practical to provide the minimum length of sag vertical curve discussed above at grade separation structures, and even where the recommended grades are exceeded, the sight distance should not need to be reduced below the minimum recommended values for stopping sight distance.

For some conditions, the designer may wish to check the available sight distance at an undercrossing, such as at a two-lane undercrossing without ramps where it would be desirable to provide passing sight distance. Such checks are best made graphically on the profile, but may be performed through computations.

