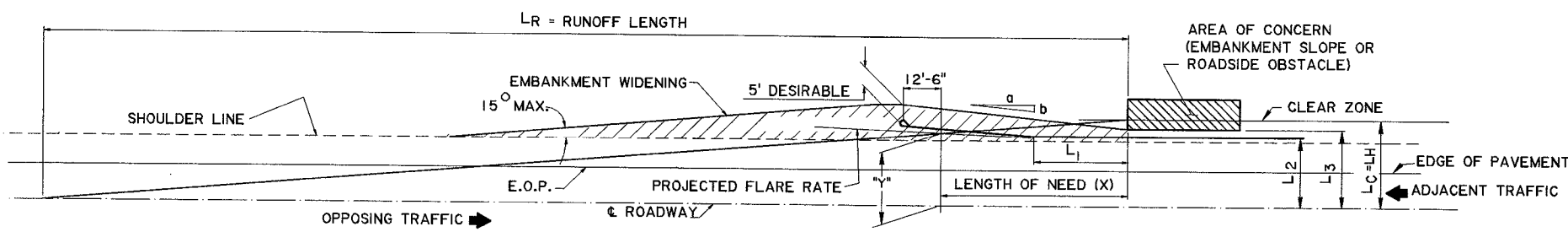


APPROACH TRAFFIC GUARD RAIL REQUIREMENTS



OPPOSING TRAFFIC GUARD RAIL REQUIREMENTS

NOTES:

- ON TWO-WAY TRAFFIC "Y" IS MEASURED FROM THE E. OF THE ROADWAY TO THE GUARD RAIL FOR THE OPPOSING TRAFFIC. THEREFORE, "Y" FOR GUARD RAIL ON THE LEFT SIDE OF A BRIDGE WITH TWO-WAY TRAFFIC IS MEASURED FROM THE CENTERLINE OF THE ROADWAY.
- EQUATIONS FOR COMPUTING LENGTH OF NEED (X) AND OFFSETS (Y&Z). (ALL DIMENSIONS ARE IN FEET)
 
$$X = \frac{L_H + (\frac{b}{a})(L_1) - (L_2)}{(\frac{b}{a}) + (\frac{L_H}{L_R})}$$

$$"Y" = L_H - (\frac{L_H}{L_R})(X)$$

$$"Z" = "Y" + \frac{b}{a}(12.5) + 9'$$
- FLARE RATES SHOWN FOR BARRIERS INSIDE THE SHY LINE ARE DESIRABLE RATES AND MAY BE WAIVED IF THE GUARD RAIL LENGTH BECOMES TOO LONG FOR A GIVEN SITUATION.
- SEE SHT. NO. 5 OF 9 FOR FORMULAS FOR COMPUTING GUARD RAIL IN A CURVE.

**TABLE 1**  
CLEAR ZONE DISTANCE (Lc)  
(IN FEET FROM EDGE OF TRAVELED LANE)

SPEED (MPH)	DESIGN ADT	CUT SECTION			FILL SECTION	
		3:1	4:1 TO 5:1	6:1 OR FLATTER	6:1 OR FLATTER	5:1 TO 4:1
40 OR LESS	UNDER 750	7 - 10	7 - 10	7 - 10	7 - 10	7 - 10
	750-1500	10 - 12	10 - 12	10 - 12	10 - 12	12 - 14
	1500-6000	12 - 14	12 - 14	12 - 14	12 - 14	14 - 16
	OVER 6000	14 - 16	14 - 16	14 - 16	14 - 16	16 - 18
45 TO 50	UNDER 750	8 - 10	8 - 10	10 - 12	10 - 12	12 - 14
	750-1500	10 - 12	12 - 14	14 - 16	12 - 14	16 - 20
	1500-6000	12 - 14	14 - 16	16 - 18	16 - 18	20 - 26
	OVER 6000	14 - 16	18 - 20	20 - 22	18 - 20	24 - 28
55	UNDER 750	8 - 10	10 - 12	10 - 12	12 - 14	14 - 18
	750-1500	10 - 12	14 - 16	16 - 18	16 - 18	20 - 24
	1500-6000	14 - 16	16 - 18	20 - 22	20 - 22	24 - 30
	OVER 6000	16 - 18	20 - 22	22 - 24	22 - 24	*26 - 32
60	UNDER 750	10 - 12	12 - 14	14 - 16	16 - 18	20 - 24
	750-1500	12 - 14	16 - 18	20 - 22	20 - 24	*26 - 32
	1500-6000	14 - 18	18 - 22	24 - 26	26 - 30	*32 - 40
	OVER 6000	20 - 22	24 - 26	26 - 28	*30 - 32	*36 - 44
65 TO 70	UNDER 750	10 - 12	14 - 16	14 - 16	18 - 20	20 - 26
	750-1500	12 - 16	18 - 20	20 - 22	24 - 26	*28 - 36
	1500-6000	16 - 20	22 - 24	26 - 28	*28 - 32	*34 - 42
	OVER 6000	22 - 24	26 - 30	28 - 30	*30 - 34	*38 - 46

\* WHERE A SITES SPECIFIC INVESTIGATION INDICATES A HIGH PROBABILITY OF CONTINUING ACCIDENTS OR SUCH OCCURRENCES ARE INDICATED BY ACCIDENT HISTORY, THE DESIGNER MAY PROVIDE CLEAR ZONE DISTANCES GREATER THAN 30 FEET AS INDICATED. CLEAR ZONES MAY BE LIMITED TO 30 FEET FOR PRACTICALITY AND TO PROVIDE A CONSISTENT ROADWAY TEMPLATE IF PREVIOUS EXPERIENCE WITH SIMILAR PROJECTS OR DESIGNS INDICATES SATISFACTORY PERFORMANCE.

**TABLE 2**  
HORIZONTAL CURVE ADJUSTMENTS  
 $CZ_c = (L_c)(K_{cz})$

WHERE:  
CZc = CLEAR ZONE ON OUTSIDE OF CURVATURE, FEET  
Lc = CLEAR ZONE ON TANGENT SECTION, FEET  
Kcz = CURVE CORRECTION FACTOR

Kcz = CURVE CORRECTION FACTOR

DEGREE OF CURVE	DESIGN SPEED (MPH)						
	40	45	50	55	60	65	70
2.0	1.08	1.10	1.12	1.15	1.19	1.22	1.27
2.5	1.10	1.12	1.15	1.19	1.23	1.28	1.33
3.0	1.11	1.15	1.18	1.23	1.28	1.33	1.40
3.5	1.13	1.17	1.22	1.26	1.32	1.39	1.46
4.0	1.15	1.19	1.25	1.30	1.37	1.44	
4.5	1.17	1.22	1.28	1.34	1.41	1.49	
5.0	1.19	1.24	1.31	1.37	1.46		
6.0	1.23	1.29	1.36	1.45	1.54		
7.0	1.26	1.34	1.42	1.52			
8.0	1.30	1.38	1.48				
9.0	1.34	1.43	1.53				
10.0	1.37	1.47					
15.0	1.54						

EXAMPLE PROBLEMS:  
DESIGN SPEED = 70 MPH, 2.5° CURVE, ADT > 6000, 6:1 FILL SECTION  
 $CZ_c = (L_c)(K_{cz}) = (34)(1.33) = 45.22$  FEET  
CLEAR ZONE ON OUTSIDE OF CURVE = 45 FEET

**TABLE 3**  
LR = RUNOFF LENGTH

DESIGN SPEED (MPH)	DESIGN TRAFFIC VOLUME (ADT)			
	OVER 6000	2000-6000	800-2000	UNDER 800
	RUNOFF LENGTH LR (FT.)	RUNOFF LENGTH LR (FT.)	RUNOFF LENGTH LR (FT.)	RUNOFF LENGTH LR (FT.)
70	480	440	400	360
65	440	400	365	330
60	400	360	330	300
55	360	325	295	270
50	320	290	260	240
45	280	255	230	210
40	240	220	200	180
35	205	190	170	155
30	170	160	140	130

**TABLE 4**  
SHYLINE & FLARE RATES

DESIGN SPEED (MPH)	Ls SHYLINE OFFSET (FT.)	* FLARE RATE (a:b) FOR BARRIER INSIDE SHYLINE	FLARE RATE (a:b) FOR BARRIER BEYOND SHYLINE	
			RIGID BARRIERS □	SEMI-RIGID BARRIERS □
70	10.0	30:1	20:1	15:1
60	8.0	26:1	17:1	13:1
50	6.5	21:1	14:1	11:1
40	5.0	17:1	11:1	9:1
30	3.5	13:1	8:1	7:1

□ SUCH AS TEMPORARY PRECAST CONCRETE BARRIER UNITS  
□ SUCH AS W BEAM OR THRIE BEAM GUARD RAIL SECTIONS

SHEET NUMBER: \_\_\_\_\_

DESIGNED BY: \_\_\_\_\_

CHECKED BY: \_\_\_\_\_

DATE: \_\_\_\_\_

APPROVED BY: \_\_\_\_\_

DATE: 4/1/01

Original Signed by Chief Engineer

STANDARD PLAN: GR-200

HIGHWAY GUARD RAILS GUARD RAIL TABLES AND LAYOUTS

BRIDGE AND STRUCTURAL DESIGN