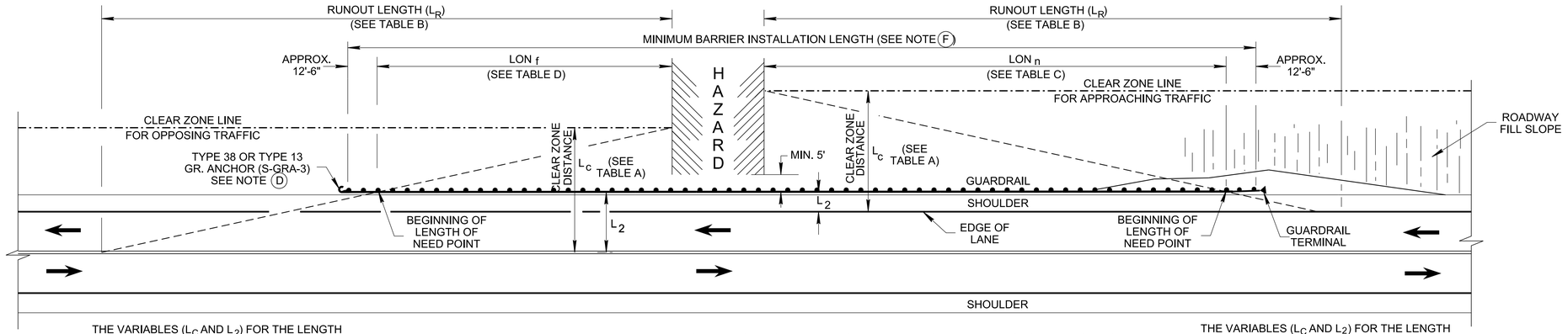
REV. 01-28-2022: UPDATED THE TANGENT ROADWAYS DRAWING. REMOVED CURVED ROAD AND END TERMINAL DRAWINGS FROM THE SHEET. UPDATED TABLE B, AND ADDED TABLES A, C AND D. REVISED SHEET NAME AND GENERAL NOTES (B), (C) AND (E). ADDED GENERAL NOTE (D).

REV. 03-01-2023: REPLACED S-PL-2 WITH S-GRS-7 AND S-GRS-7A ON GENERAL NOTE (E).



THE VARIABLES (L_C AND L_2) FOR THE LENGTH OF NEED FOR THE FARSIDE APPROACH (LON_f) ARE TO BE MEASURED FROM THE CENTERLINE OR THE INSIDE EDGE OF THE LANE FOR DIVIDED ROADS.

BARRIER LENGTH OF NEED ON TANGENT ROADWAYS AT NON-TRAVERSABLE HAZARDS

(SUCH AS RIVER CROSSING, BRIDGE GRADE SEPARATIONS, BRIDGE ABUTMENT)

THE VARIABLES (L_C AND L_2) FOR THE LENGTH OF NEED FOR THE NEARSIDE APPROACH (LON_n) ARE TO BE MEASURED FROM THE NEARSIDE EDGE OF LANE.

TABLE A

MAXIMUM CLEAR ZONE DISTANCE (L_C) (FT)

DESIGN SPEED (MPH)	DESIGN TRAFFIC VOLUME (ADT) OVER 6000
70	46
65	46
60	44
55	32
50	28
45	24
40	18
35	16
30	14
25	12
20	10

NOTE: CLEAR ZONE VALUES SHOWN IN TABLE A ARE BASED ON THE LARGEST CLEAR ZONE FOR ADT > 6000, AND FILL SLOPE 1:5 TO 1:4 FOR A GIVEN SPEED. REFER S-CZ-1 FOR MORE INFORMATION.

TABLE B

RUNOUT LENGTHS (L_R) FOR BARRIER DESIGN (FT)

DESIGN SPEED (MPH)	TRAFFIC VOLUME (ADT)			
	OVER 10000	5000- 10000	1000- 5000	UNDER 1000
70	360	330	290	250
65	330	290	250	225
60	300	250	210	200
55	265	220	185	175
50	230	190	160	150
45	195	160	135	125
40	160	130	110	100
35	135	110	95	85
30	110	90	80	70
25	85	70	60	50
20	60	50	35	25

NOTE: SEE "ROADSIDE DESIGN GUIDE", AASHTO, 2011, FOR MORE INFORMATION.

TABLE C

SUGGESTED LENGTH OF NEED (LON_n) (FT) FOR NEARSIDE TRAFFIC

DESIGN SPEED (MPH)	TRAFFIC VOLUME (ADT)			
	OVER 10000	5000- 10000	1000- 5000	UNDER 1000
70	313	287	252	217
65	287	252	217	196
60	259	216	181	173
55	215	179	150	142
50	181	149	126	118
45	146	120	101	94
40	107	87	73	67
35	84	69	59	53
30	63	51	46	40
25	43	35	30	25
20	24	20	14	10

NOTE: SUGGESTED LON SHOWN ABOVE ON TABLES C AND D ARE BASED ON THE MAXIMUM CLEAR ZONE DISTANCE (L_C) FROM TABLE A, SUGGESTED RUNOUT LENGTH (L_R) SHOWN ON TABLE B AND USED 6' SHOULDER.
FOR LOCATIONS WITH 0'-2' SHOULDER, USE THE FORMULA TO DETERMINE THE LENGTH OF NEED.

TABLE D

SUGGESTED LENGTH OF NEED (LON_f) (FT) FOR FARSIDE TRAFFIC

DESIGN SPEED (MPH)	TRAFFIC VOLUME (ADT)			
	OVER 10000	5000- 10000	1000- 5000	UNDER 1000
70	266	244	214	185
65	244	214	185	166
60	218	182	153	145
55	166	138	116	109
50	131	109	91	86
45	98	80	68	63
40	53	43	37	33
35	34	28	24	21
30	16	13	11	10

FOR SPEEDS LESS THAN 30 MPH LON_f IS NOT CALCULATED. USE BEST ENGINEERING JUDGEMENT FOR PLACEMENT OF END TREATMENT.

BARRIER LENGTH OF NEED (LON) CALCULATION

$$LON_f \text{ or } LON_n = \frac{L_C - L_2}{L_C / L_R}$$

SEE "ROADSIDE DESIGN GUIDE" SECTION 5.6.4, AASHTO, 2011, FOR ADDITIONAL INFORMATION.

LEGEND

L_C = THE CLEAR ZONE DISTANCE AS DETERMINED IN TABLE "A" ON S-CZ-1.

L_2 = DISTANCE FROM EDGE OF TRAVELED WAY TO BARRIER.

L_R = RUNOUT LENGTH.

NOTES: 1 THE EQUATION FOR LON FOR THE NEARSIDE AND FARSIDE APPROACHES IS THE SAME. THE ONLY DIFFERENCE IS THE FARSIDE VARIABLES ARE MEASURED FROM THE CENTERLINE OR THE INSIDE EDGE OF THE LANE FOR DIVIDED ROADS.

2 AS A CONSERVATIVE APPROACH DESIGNER MAY USE RUNOUT LENGTH (L_R) DIMENSIONS WHEN DETERMINING LENGTH OF NEED.

GENERAL NOTES

(A) EVERY LOCATION WHERE GUARDRAIL IS REQUIRED MUST BE INVESTIGATED SEPARATELY. THE HAZARD MUST BE IDENTIFIED AND THE "POINT OF NEED" CALCULATED TO DETERMINE THE BEST TREATMENT FOR PROTECTION OF VEHICLES FROM THE HAZARD.

(B) LENGTH OF NEED STARTS FROM THE THIRD POST OF THE END TREATMENT.

(C) IF THE CLEAR ZONE FALLS INSIDE OF 3:1 SLOPE OR STEEPER, EXTEND THE CLEAR ZONE TO THE TOE OF THE SLOPE.

(D) TRAILING END GUARDRAIL ANCHORS (TYPE 13) MAY ONLY BE USED FOR DIVIDED ROADWAYS, ONE WAY ROADS, OR TWO WAY MULTI-LANE ROADS WHERE LOCATION IS OUTSIDE THE CLEAR ZONE FOR THE OPPOSING DIRECTION TRAFFIC.

(E) SEE THE FOLLOWING STANDARD DRAWINGS :

S-PL-1A: SAFETY PLAN FOR BARRIER LENGTH OF NEED (FOR RIGID OBJECTS)

S-PL-1B: SAFETY PLAN FOR BARRIER LENGTH OF NEED ON CURVED ROADWAYS

S-PL-3: SAFETY PLAN MINIMUM INSTALLATION AT BRIDGE ENDS

S-PL-4: SAFETY PLAN FOR BRIDGE PIERS IN CLEAR ZONE

S-PL-5: SAFETY PLAN FOR BRIDGE ENDS IN MEDIANS

S-PL-6: SAFETY PLAN SAFETY HARDWARE PLACEMENT ON OUTSIDE EDGE

S-PL-6A: SAFETY PLAN SAFETY HARDWARE PLACEMENT IN MEDIAN

S-GRS-7 & S-GRS-7A: SHORT- RADIUS GUARDRAIL SYSTEM AND DETAILS

S-GRT SERIES FOR GUARDRAIL TERMINALS.

(F) THE MINIMUM BARRIER INSTALLATION LENGTH IS EQUAL TO THE LON_n + LON_f + THE LENGTH OF THE HAZARD + (2 x 12.5'). CALCULATE THE FINAL GUARDRAIL QUANTITY IN AN INCREMENT OF 12'-6".

STATE OF TENNESSEE
STANDARD DRAWING
DEPARTMENT OF TRANSPORTATION

SAFETY PLAN FOR BARRIER LENGTH OF NEED

7-10-2013 S-PL-1

NOT TO SCALE