IN MANY CASES BEGINNING OF LENGTH OF NEED MAY FALL INSIDE THE HORIZONTAL CURVE. IT IS RECOMMENDED TO EXTEND THE BEGINNING OF BARRIER

APPROACH SIDE
IT IS RECOMMENDED TO EXTEND THE BEGINNING OF GUARDRAIL TERMINAL OUTSIDE THE CURVE

APPROACH SIDE
IF A TANGENTIAL GUARDRAIL END TERMINAL NEEDS TO BE INSTALLED INSIDE THE CURVE, IT MUST BE INSTALLED TANGENT OFFSETTING FROM ROADWAY EDGE LINE.

LENGTH OF NEED (LON$_n$)
CLEAR ZONE LINE FOR APPROACHING TRAFFIC
CZ$_C$
ROADWAY FILL SLOPE
EDGE OF LANE
GUARDRAIL TERMINAL OR ANCHOR
TANGENT SECTION
PC or TS
CLEAR ZONE LINE FOR OPPOSING TRAFFIC
HAZARD
GUARDRAIL
SHOULDER
CURVED SECTION
BEGINNING OF LENGTH OF NEED POINT

TRAILING END
IT IS RECOMMENDED TO EXTEND GUARDRAIL TO INTERSECT WITH AN ERRANT VEHICLE IF FEASIBLE.

TYPE 38 OR TYPE 13 GUARDRAIL ANCHOR (S-GRA-3) SEE NOTE Ⓓ

PT or ST

APPROACH SIDE GUARDRAIL OUTSIDE THE CURVE

BARRIER LENGTH OF NEED DISTANCE FOR FIXED OBJECTS SUCH AS RIVER

LENGTH OF NEED (LON$_n$)
CLEAR ZONE LINE FOR APPROACHING TRAFFIC
CZ$_C$
ROADWAY FILL SLOPE
EDGE OF LANE
HAZARD
GUARDRAIL
SHOULDER
BEGINNING OF LENGTH OF NEED POINT
GUARDRAIL TERMINAL OR ANCHOR
PC or TS

APPROACH SIDE GUARDRAIL
TANGENT TERMINAL INSTALLATION INSIDE THE CURVE

(NOT RECOMMENDED FOR THE DEGREES OF CURVATURE GREATER THAN 5°)

TABLE A

ADJUSTED CLEAR ZONE DISTANCE (CZ$_C$) (FT)

$$CZ_C = K_{CZ} * L_C$$

DESIGN SPEED (MPH)	L$_C$ (FT)	ADT > 6000											
		RADIUS (FT)											
		330	495	660	820	985	1150	1315	1475	1640	1970	2300	2950
70	46								69	64	64	60	55
65	46					69	69	64	64	60	60	55	55
60	44					66	66	62	62	57	57	53	53
55	32				48	48	45	42	42	42	38	38	38
50	28			42	39	39	36	36	36	34	34	34	31
45	24		36	34	31	31	29	29	29	29	29	26	26
40	18	27	25	23	23	22	22	22	22	20	20	20	20

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 DESIRED DESIGN SPEED. REFER S-CZ-1 FOR MORE INFORMATION.

TABLE B

SUGGESTED LENGTH OF NEED (LON$_n$) (FT)
FOR APPROACHING TRAFFIC

DESIGN SPEED (MPH)	ADT > 6000											
	RADIUS (FT)											
	330	495	660	820	985	1150	1315	1475	1640	1970	2300	2950
70								311	329	361	354	445
65					251	273	293	296	313	344	334	424
60				244	265	284	287	304	334	323	410
55				176	194	200	214	214	226	248	252	305
50			142	151	166	169	181	192	203	223	225	273
45		108	119	125	137	138	148	157	166	182	181	223
40	68	79	85	95	97	104	112	119	125	137	135	168

NOTES: 1 POSTED SPEED SHALL BE 5 MPH LESS THAN THE SHOWN DESIGN SPEED.
2 SUGGESTED LON SHOWN ABOVE ON TABLE B IS BASED ON 6' SHOULDER.
3 LENGTH OF NEED MAY BE REDUCED AT LOCATIONS WHERE A WIDE SHOULDER IS PRESENT OR WHERE AN END TREATMENT OTHER THAN TANGENT GUARDRAIL END TERMINAL IS USED (A FLARE TYPE).

LEGEND

CZ$_C$ = THE CLEAR ZONE DISTANCE AS DETERMINED BY THE CURVE EQUATION ON S-CZ-1:

$$CZ_C = (L_C)(K_{CZ})$$

WHERE L$_C$ = THE CLEAR ZONE DISTANCE AS DETERMINED IN TABLE "A" ON S-CZ-1.

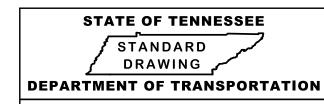K$_{CZ}$ = THE CURVE CORRECTION FACTOR FOUND IN TABLE "B" ON S-CZ-1.

GENERAL NOTES

Ⓐ EVERY LOCATION WHERE GUARDRAIL IS REQUIRED MUST BE INVESTIGATED SEPARATELY. THE OBJECT MUST BE IDENTIFIED AND THE "POINT OF NEED" CALCULATED TO DETERMINE THE BEST TREATMENT FOR PROTECTION OF VEHICLES FROM THE OBJECT. THIS DRAWING SHOWNS ONLY ONE DIRECTION.

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

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

Ⓓ 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.

Ⓔ SEE THE FOLLOWING STANDARD DRAWINGS :

S-PL-1: SAFETY PLAN FOR BARRIER LENGTH OF NEED

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

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.

Ⓕ THE MINIMUM BARRIER INSTALLATION LENGTH IS EQUAL TO THE LON$_n$ + LON$_f$ + THE LENGTH OF 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 ON CURVED ROADWAYS

01-28-2022 | S-PL-1B

NOT TO SCALE