STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
NASHVILLE, TENNESSEE 37243-0350

INSTRUCTIONAL BULLETIN NO. 05-20

Safety Appurtenances and Fence

Effective for the September 2, 2005 bid letting, the various guardrail drawings attached to this instructional bulletin are to be printed with the plans. They shall be identified on the lower left hand corner of the index sheet **"To be printed with the plans".**

Copies of these drawings are attached to this instructional bulletin.

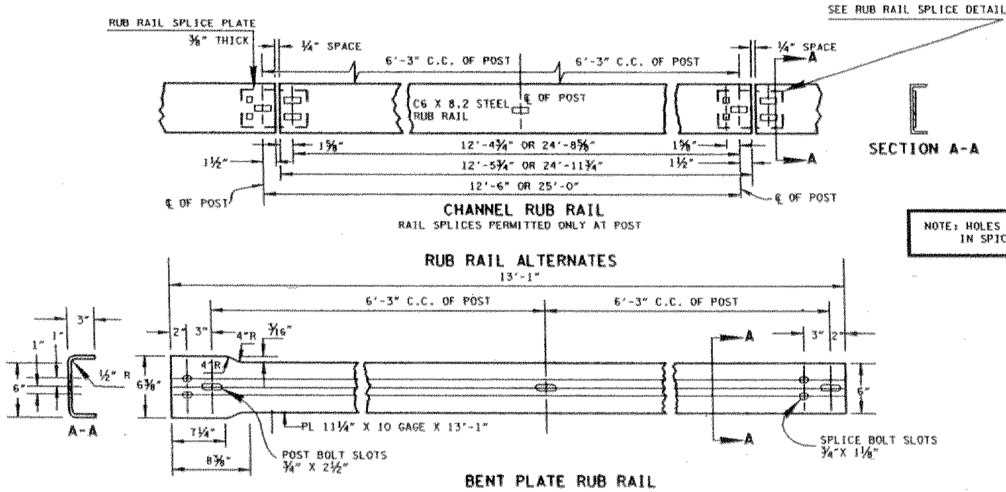
SAFETY APPURTENANCES AND FENCE

Drawing Number	Current Revision Date	Drawing Title
S-GR-11 SM-GR-11	2-22-05	W-BEAM & THRIE BEAM BARRIER RAIL AND RUB RAIL ALTERNATES
S-GR-19A SM-GR-19A	3-10-05	DETAILS FOR CONSTRUCTION OF TYPE 12 GUARDRAIL TERMINAL
S-GR-21 SM-GR-21	3-10-05	LENGTH OF NEED AND TERMINAL REQUIREMENTS IN FILLS
S-GR-37 SM-GR-37	5-5-05	SKT-35 (2-TUBE) POST AND ASSEMBLY DETAILS

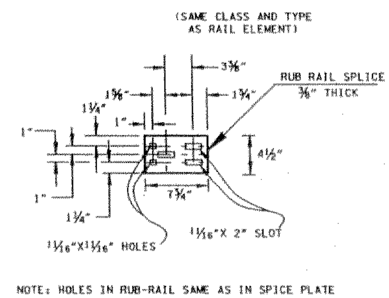
S-GR-38 SM-GR-38	5-5-05	DETAILS FOR CONSTRUCTION OF EARTH PAD FOR TYPE 38 GUARDRAIL END TERMINALS
S-GR-38A SM-GR-38A		DETAILS FOR CONSTRUCTION OF ALTERNATE EARTH PAD FOR TYPE 38 GUARDRAIL END TERMINALS

Jeff C. Jones, C.E. Director
Design Division

JW:mbd
Attachment
June 9, 2005

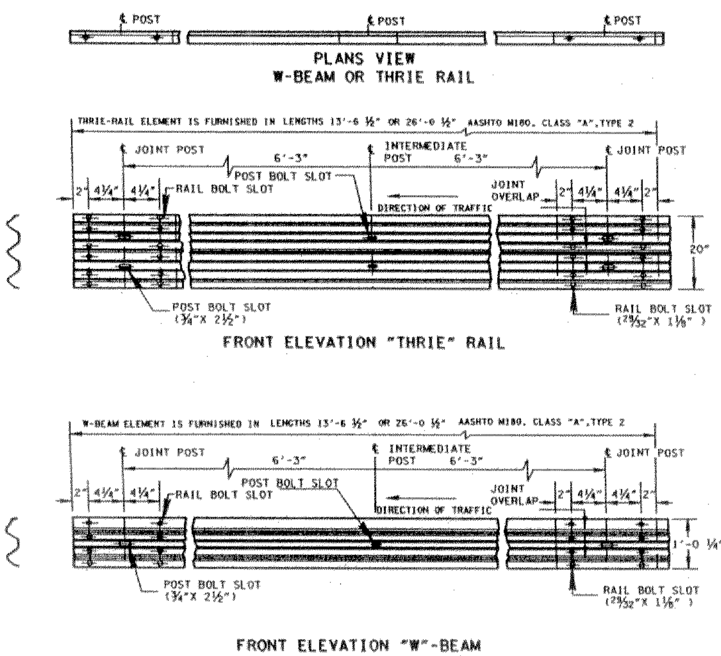


NOTE: HOLES IN RUB-RAIL SAME AS IN SPICE PLATE



NOTE: HOLES IN RUB-RAIL SAME AS IN SPICE PLATE

RUB RAIL SPLICE DETAIL



GENERAL NOTES

Ⓐ CORRUGATED SHEET STEEL BEAMS SHALL CONFORM TO THE CURRENT REQUIREMENTS OF AASHTO M180, CLASS A, TYPE 2 . RAIL MATERIAL SHALL HAVE A YIELD STRENGTH OF 50 KIPS PER SQUARE INCH AND A TENSILE STRENGTH OF 70 KIPS PER SQUARE INCH.

Ⓑ RUB RAILS AND RUB RAIL SPLICE PLATES SHALL CONFORM TO ASTM A36 AND SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A123.

Ⓒ WHERE GUARDRAIL IS TO BE PLACED ON A CURVE WITH A RADIUS LESS THAN 150 FEET, THE RAIL SECTION SHALL BE SHOP-FORMED TO THE REQUIRED RADIUS.

Ⓓ SEE THE "RD01-TS" STANDARD SERIES FOR GUARDRAIL PLACEMENT.

Ⓔ ITEM NUMBERS FOR PAYMENT AS DETAILED ON THESE "S-GR" SERIES OF DRAWINGS ARE AS FOLLOWS:

ITEM NO.	DESCRIPTION	ON DWG NO.
705-01.01	GUARDRAIL AT BRIDGE ENDS	S-GR-17 & S-GR-23
705-01.04	METAL BEAM GUARD FENCE	S-GR-22 & STD-15-6
705-02.01	SINGLE GUARDRAIL WITH RUB-RAIL (TYPE 2)	S-GR-13 & S-GR-18
705-02.02	SINGLE GUARDRAIL (TYPE 2)	S-GR-13 & S-GR-18
705-03.01	MEDIAN DIVIDER GUARDRAIL W/RUB-RAIL (TYPE 2)	S-GR-13 & S-GR-18
705-03.02	MEDIAN DIVIDER GUARDRAIL (TYPE 2)	S-GR-13 & S-GR-18
705-03.03	MEDIAN DIVIDER GUARDRAIL (TYPE 2)(27" MT. HT.)	S-GR-13 & S-GR-18
705-03.04	MEDIAN DIVIDER GUARDRAIL AT CONCRETE BARRIER	S-GR-20
705-04.02	GUARDRAIL TERMINAL (TYPE 12)	S-GR-19
705-04.03	GUARDRAIL TERMINAL (TYPE 13)	S-GR-19
705-04.04	GUARDRAIL TERMINAL (TYPE 21)	S-GR-26
705-04.05	GUARDRAIL TERMINAL (TYPE IN-LINE)	S-GR-18
705-04.07	TANGENT ENERGY ABSORBING TERMINAL (NCHRP 350 - TL3)	S-GR-32, S-GR-35 & S-GR-40

Ⓕ TYPE 1: 3'-1 ½" SPACING
TYPE 2: 6'-3' SPACING

REV. 9-15-82: CHANGED S-GR-1 TO S-GR-11 AND REDRAWN.

REV 7-1-84: ADDED ITEM 705-03.11. DELETED M-42-151 AS REFERENCE DWG. ADDED DIMENSION TO W-BEAM RAIL DETAIL.

REV. 9-1-86: CHANGED ITEM DESCRIPTIONS AND ADDED NOTE 7.

REV 9-5-87: CHANGED ITEM NOS. 705-01.01, 705-01.02 AND 705-01.03 TO 705-01.04, 705-01.05 AND 705-01.06. DELETED ITEM NO. 705-02.05.

REV. 11-4-87: ADDED ITEM NOS. 705-01.07 AND 705-06 CORRECTED REFERENCE FOR 705-01.04.

REV. 3-6-90: ADDED RUB RAIL ALTERNATES. ADDED ITEM NOS. 705-04.08 AND 705-06.01. DELETED ITEM NOS. 705-01.07 AND 705-06.

☐ REV. 10-26-91: REDREW AND REORGANIZED SHEET. UPDATED DRAWING TO 1991 STANDARDS.

☐ REV. 10-26-94: IN GENERAL NOTES Ⓕ CHANGED DRAWING NUMBER.

☐ REV. 1-19-95: IN GENERAL NOTE Ⓕ CHANGED DRAWING NUMBER.

☐ REV. 7-29-95: IN GENERAL NOTE Ⓕ ADDED ITEM NOS. 705-04.20 AND 705-04.21.

☐ REV. 5-27-96: IN GENERAL NOTE Ⓕ ADDED ITEM NO. 705-04.06.

☐ REV. 6-10-96: ADDED DIMENSION FOR WIDTH TO RUB RAIL SPLICE DETAIL.

REV. 7-29-98: MODIFIED GENERAL NOTE Ⓕ.

REV. 9-5-98: MODIFIED GENERAL NOTE Ⓕ.

☐ REV. 10-26-99: DELETED BACK UP PLATE DETAILS.

☐ REV. 9-5-00: IN GENERAL NOTES CORRECTED NOTE Ⓕ.

☐ REV. 5-27-01: IN GENERAL NOTE Ⓕ CHANGED ITEM NUMBERS OF GUARDRAIL TO CONCUR WITH NEW PAY ITEM SYSTEM.

☐ REV. 9-5-01: CORRECTED DESCRIPTION FOR ITEM NO. 705-04.07.

☐ REV. 9-11-02: DELETED ITEM NO. 705-01.02.

☐ REV. 9-5-03: CHANGED GENERAL NOTE Ⓐ. DELETED GENERAL NOTE Ⓑ. RENUMBERED REMAINING GENERAL NOTES.

☐ REV. 2-22-05: CHANGED GENERAL NOTES Ⓓ, Ⓔ, AND Ⓕ.

☐ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

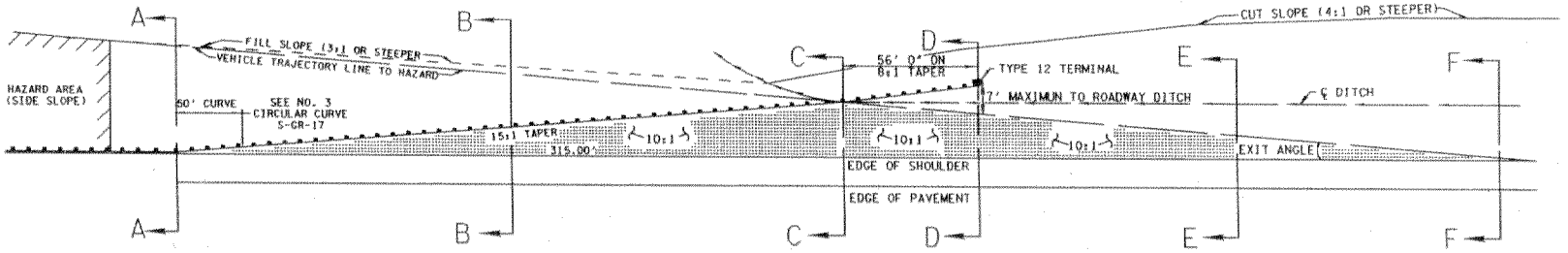
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

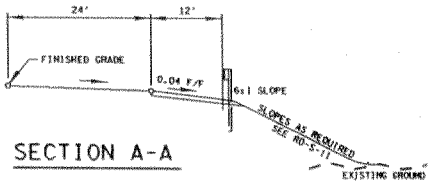
W-BEAM & THRIE BEAM BARRIER RAIL AND RUB RAIL ALTERNATES

S-GR-11

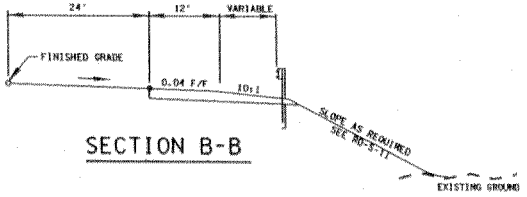
REV. 5-27-04: PRODUCED AN ENLARGED MORE DETAILED VIEW FOR CONSTRUCTION OF TYPE 12 GUARDRAIL TERMINAL, SEE STANDARD DRAWING S-GR-21 FOR FURTHER DETAILS.

REV. 3-10-05: ELIMINATED REFERENCE TO 15 DEGREE EXIT ANGLE AND CHANGED GENERAL NOTE Ⓓ.

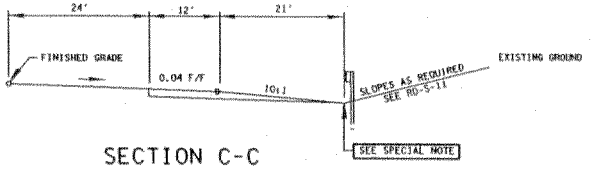




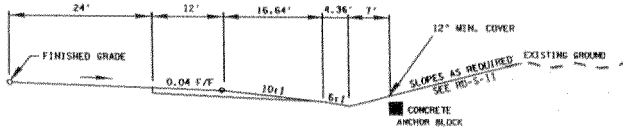
SECTION A-A



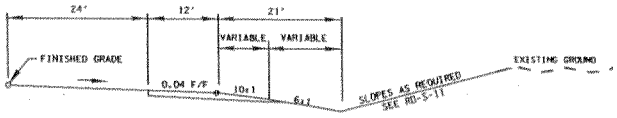
SECTION B-B



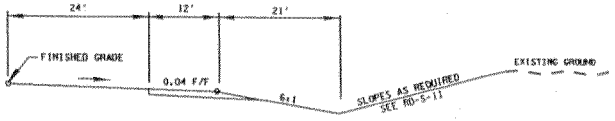
SECTION C-C



SECTION D-D



SECTION E-E



SECTION F-F

TYPICAL SKETCHES SHOWING TERMINATION OF GUARDRAIL ON FILLS

SKETCH SHOWING FLARE FOR TERMINAL ANCHOR TYPE 12

(THE INTENT IS TO TERMINATE THE GUARDRAIL IN THE CUT SLOPE SURFACE WHILE MAINTAINING THE GUARDRAIL PROFILE ON ITS GIVEN GRADE).

GENERAL NOTES

Ⓐ FOR DETAILS NOT SHOWN SEE GUARDRAIL STANDARD DRAWING NOS. S-GR-19 AND S-GR-21.

Ⓑ THE DESIGNER SHALL INCOPORATE THE DETAILS SHOWN ON THIS DRAWING IN THE RIGHT-OF-WAY AND CONSTRUCTION PLANS AS WELL AS THE ROADWAY CROSS-SECTION SHEETS.

Ⓒ THE CONTRACTOR SHALL CONSTRUCT THESE 10:1 SLOPES AS PART OF THE INITIAL GRADING OPERATIONS AS SHOWN ON THIS STANDARD DRAWING AFTER FIELD VERIFICATION OF HAZARD LOCATION AND ENGINEERS APPROVAL.

Ⓓ ON ALL NEW GRADE AND DRAIN PROJECTS THE 10:1 SLOPES SHALL BE BUILT AS SHOWN ON THIS STANDARD DRAWING WITHOUT EXCEPTION.

SPECIAL DITCH NOTE

THE CONTRACTOR IS TO ADD A RUBRAIL WHENEVER THE CLEARANCE FROM THE BOTTOM OF THE W-BEAM TO THE GROUND LINE EXCEEDS 18 INCHES.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

DETAILS FOR CONSTRUCTION OF TYPE 12 GUARDRAIL TERMINAL

5-27-04 | S-GR-19A

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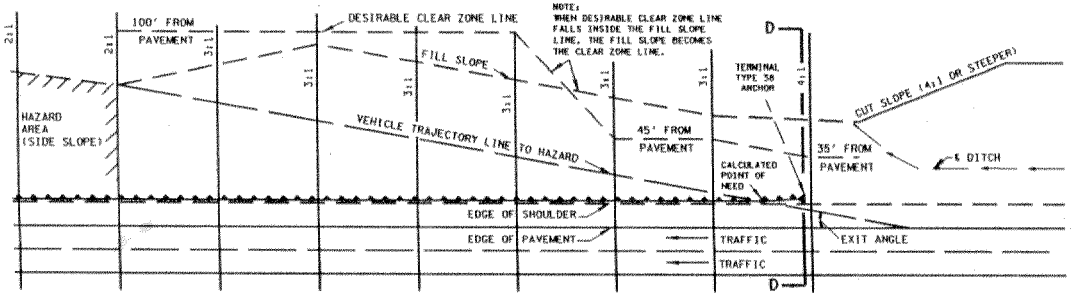
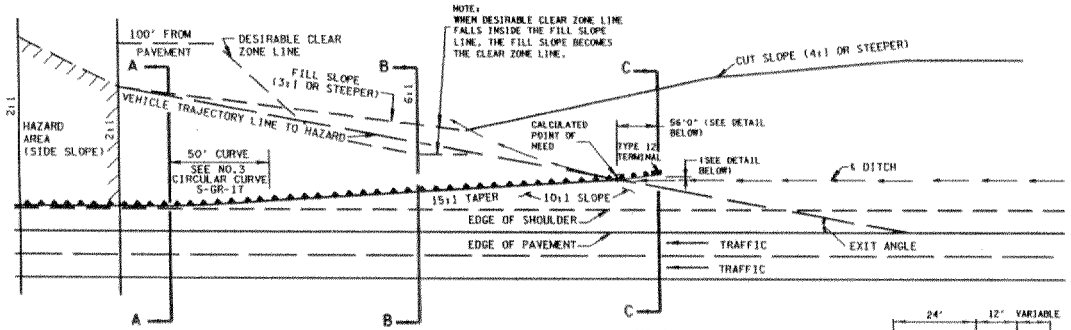


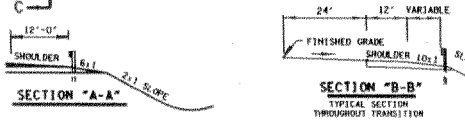
TYPICAL LAYOUT-CASE I
AVERAGE TERRAIN-DIVIDED HIGHWAY

POINT OF THEORETICAL NEED FOR EMBANKMENT GUARDRAIL

THE POINT OF NEED SHALL BE CONSIDERED THAT POINT WHERE, TO ONE SIDE OF THE POINT, IT WOULD BE SAFER FOR THE VEHICLE TO CONTACT AND BE DIRECTED BY THE GUARDRAIL INSTEAD OF GOING OVER THE SLOPE, TO THE OTHER SIDE OF THE POINT, IT WOULD BE SAFER FOR THE VEHICLE TO GO OVER THE SLOPE. AN EXIT ANGLE FROM THE ROADWAY AS DETERMINED BY THE CASE I EQUATION ON THIS DRAWING SHOULD BE UTILIZED FOR DETERMINING THE POINT OF THEORETICAL NEED. WHERE FEASIBLE CONSIDERATION SHOULD BE GIVEN TO FLATTENING OR FURTHER WARPING OF THE SLOPE IN ORDER TO "MOVE BACK" THE POINT OF NEED AND THEREBY REDUCE THE LENGTH OF NEEDED GUARDRAIL.

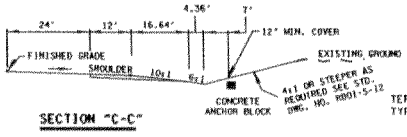


TYPICAL LAYOUT-CASE II
STEEPER TERRAIN-DIVIDED HIGHWAY

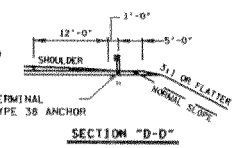


SECTION "A-A"

SECTION "B-B"
TYPICAL SECTION THROUGHOUT TRANSITION

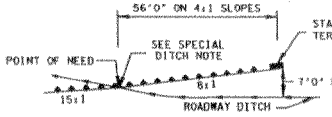


SECTION "C-C"



SECTION "D-D"

TYPICAL SKETCHES SHOWING TERMINATION OF GUARDRAIL ON FILLS



SKETCH SHOWING FLARE FOR TERMINAL ANCHOR TYPE 12
(THE INTENT IS TO TERMINATE THE GUARDRAIL IN THE CUT SLOPE SURFACE WHILE MAINTAINING THE GUARDRAIL PROFILE ON ITS GIVEN GRADE).

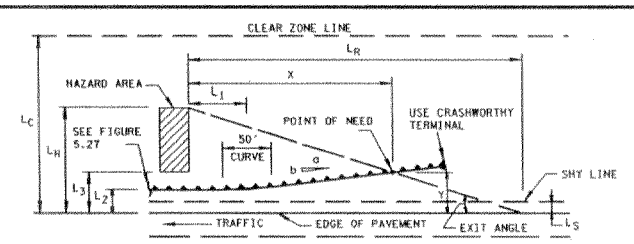


FIGURE 5.24 APPROACH BARRIER LAYOUT VARIABLES

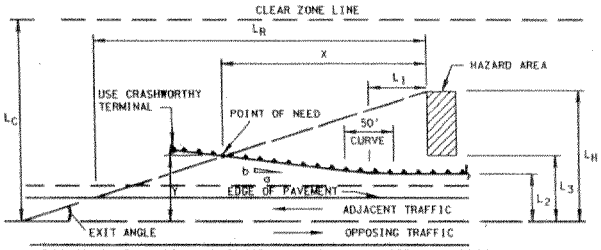


FIGURE 5.27 APPROACH BARRIER LAYOUT FOR OPPOSING TRAFFIC

REV. 9-15-82: S-GR-9 REDRAWN, NO. CHANGED TO S-GR-21.

REV. 7-1-84: ADDED REFERENCE FOR POST NO. 3 UNDER CASE (I) NOTE.

REV. 1-19-92: REDREW AND REORGANIZED SHEET. CHANGED ALL REFERENCES AND CROSS-REFERENCING FROM THE "BARRIER GUIDE" TO THE "ROADSIDE DESIGN GUIDE (1989)".

REV. 7-29-95: IN TYPICAL LAYOUT-CASE I DETAIL CHANGED GUARDRAIL APPROACH TERMINAL.

REV. 9-5-95: CORRECTED SECTION "D-D".

REV. 2-14-96: IN TYPICAL LAYOUT-CASE I DETAIL CHANGED GUARDRAIL APPROACH TERMINAL.

REV. 5-27-96: IN TYPICAL LAYOUT-CASE I DETAIL ELIMINATED 4' FLARE DIMENSION.

REV.7-29-98: REMOVED REFERENCE TO TYPE 11, 16, AND 20 GUARDRAIL TERMINALS. ADDED TYPE 38 GUARDRAIL TERMINAL.

REV. 5-27-01: MODIFIED REFERENCE REGARDING GUARDRAIL TERMINALS.

REV. 9-11-03: MADE GENERAL CHANGES TO TYPE 12 GUARDRAIL TERMINAL.

REV. 4-15-04: CHANGED CASE I EQUATION AND REFERENCES TO ROADSIDE DESIGN GUIDE.

REV. 3-10-05: ELIMINATED REFERENCE TO 15 DEGREE EXIT ANGLE ON THIS DRAWING.

DETAILS AND EQUATIONS COME FROM "ROADSIDE DESIGN GUIDE (2002)", CHAPTER 5. THE FOLLOWING EQUATIONS ARE TO BE USED TO CALCULATE THE "POINT OF NEED".

EQUATION NOTES

CASE I

WHEN b/a=0, THE POINT OF NEED WILL BE LOCATED AT POST NO. 3 OF THE TYPE 38 ANCHOR USING THE FOLLOWING EQUATIONS; (SEE DRAWING NOS. S-GR-32, S-GR-35, AND S-GR-40)

$$X = \frac{L_H - L_2 - 0.75}{L_H / L_R} \qquad Y = L_2 + 0.75$$

CASE II

WHEN b/a HAS A VALUE, THE POINT OF NEED WILL BE LOCATED AS SHOWN AT LEFT AND GUARDRAIL SHALL PASS THROUGH IT USING THE FOLLOWING EQUATIONS: (SEE DRAWING NOS. S-GR-19 AND S-GR-19A)

$$X = \frac{L_H\left(\frac{b}{a}\right)\left(\frac{L_H}{L_R}\right) - L_2}{\left(\frac{b}{a}\right) + \left(\frac{L_H}{L_R}\right)} \qquad Y = L_H - \left(\frac{L_H}{L_R}\right)(X)$$

EQUATION VARIABLE LEGEND

L_C = THE CLEAR DISTANCE

L_H = DISTANCE FROM EDGE OF TRAVELED WAY (EDGE OF PAVEMENT) TO THE LATERAL EXTENT OF HAZARD. NOTE THAT L_H SHOULD NEVER EXCEED THE "CLEAR DISTANCE" (L_C).

b/a = SLOPE OF FLARE

L_1 = LENGTH OF TANGENT SECTION OF BARRIER FROM HAZARD. TENNESSEE DEPARTMENT OF TRANSPORTATION WILL USE THIS POINT AS THE P.I. FOR A 50' CIRCULAR CURVE.

L_2 = DISTANCE FROM EDGE OF PAVEMENT TO TANGENT SECTION OF BARRIER.

L_R = RUNOUT LENGTH (SEE TABLE BELOW FOR VALUE).

L_3 = DISTANCE FROM EDGE OF PAVEMENT TO NEAR FACE OF HAZARD.

$L_3 - L_2$ = SHOULD BE GREATER THAN 4.0 FEET.

NOTES

CASE I

(A) IF ANY OBSTACLE (HAZARD) APPEARS IN THE DESIRABLE CLEAR ZONE AREA, IT MUST BE REMOVED. IF IT CANNOT BE REMOVED, THEN A NEW "POINT OF NEED" MUST BE COMPUTED USING THE OBSTACLE AS THE HAZARD AND NOT THE STEEP SIDE SLOPE WHICH WAS FIRST CONSIDERED AS THE HAZARD.

CASE II

(A) THE ROADWAY EMBANKMENT IS SHOWN GOING FROM A CUT SECTION INTO A STEEP FILL SECTION VERY CLOSE TO THE CUT TO FILL GRADE POINT. HERE THE "POINT OF NEED" FOR PROTECTION FROM THE STEEP SIDE SLOPE FALLS WITHIN THE CUT SLOPE AREA. THEREFORE, THE GUARDRAIL SHALL BE ANCHORED INTO THE CUT SECTION BACKSLOPE USING A STATIONARY GUARDRAIL TERMINAL ANCHOR TYPE 12.

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) R.O.W. FENCES WILL NOT BE CONSIDERED A HAZARD, BUT HAZARDS WHICH ARE OUTSIDE THE R.O.W. LINE BUT INSIDE THE DESIRABLE CLEAR ZONE SHOULD BE CONSIDERED AND APPROPRIATE ACTION TAKEN FOR VEHICLE PROTECTION. COST EFFECTIVE EVALUATION MAY BE NEEDED TO HELP DECIDE THE APPROPRIATE ACTION NEEDED.

(C) WHERE THE HAZARD APPEARS ON THE OUTSIDE OF A ROADWAY CURVE, GOOD ENGINEERING JUDGEMENT MUST BE USED TO DETERMINE THE LIMITS OF GUARDRAIL NEEDED. REFER TO THE "ROADSIDE DESIGN GUIDE (2002)", SECTION 5.2 AND STANDARD DRAWING NO. RDOI-S-12 TO HELP DECIDE WHAT THE NECESSARY CLEAR ZONE REQUIREMENTS ARE AND THE TYPE AND LOCATION OF THE PROTECTIVE MEASURE NEEDED.

SPECIAL DITCH NOTE

THE CONTRACTOR IS TO ADD A RUBRAIL WHENEVER THE CLEARANCE FROM THE BOTTOM OF THE W-BEAM TO THE GROUND LINE EXCEEDS 18 INCHES.

DESIGN TRAFFIC VOLUME (ADT)

OPERATING SPEED (MPH)	OVER 6000 RUNOUT LENGTH L_R(FT)	2000-6000 RUNOUT LENGTH L_R(FT)	800-2000 RUNOUT LENGTH L_R(FT)	UNDER 800 RUNOUT LENGTH L_R(FT)	L_S SHY LINE OFFSET (FT)	FLARE RATE (a:b)
70	480	440	400	360	10.0	XX 15:1
60	400	360	330	300	8.0	XX 13:1
50	320	290	260	240	6.5	XX 11:1
40	240	220	200	180	5.0	XX 9:1
30	170	160	140	130	3.5	XX 7:1

XX = VALUES FOR YIELDING BARRIER (2' DYNAMIC DEFLECTION) FOR RIGID BARRIERS INCREASE NUMERATOR BY $0.1\left(\frac{V}{10}\right)^2$

V = OPERATING SPEED (MPH)

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE DEPARTMENT OF TRANSPORTATION

LENGTH OF NEED * AND TERMINAL REQUIREMENTS IN FILLS

S-GR-21

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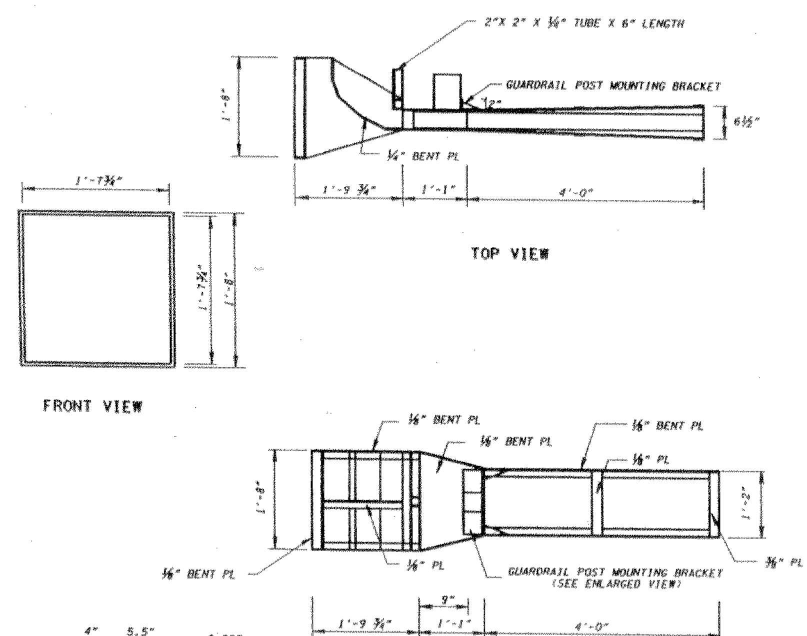
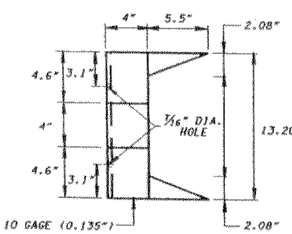
REV. 2-1-99: MADE GENERAL REVISION.

REV. 10-10-01: MODIFIED GUARDRAIL IMPACT HEAD DETAILS AND DETAIL FOR GUARDRAIL POST MOUNTING BRACKET.

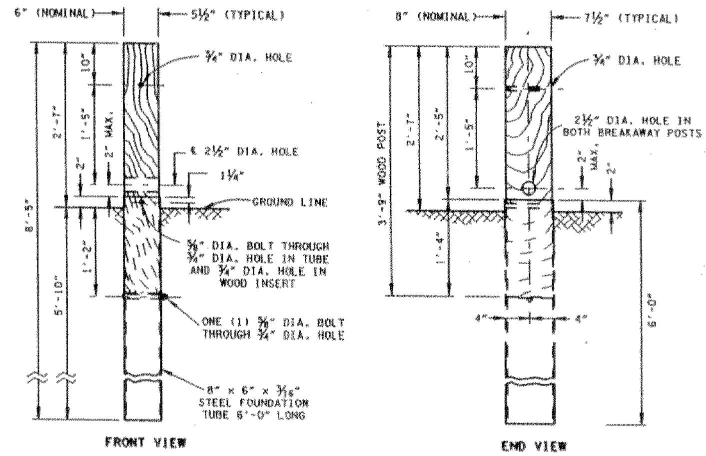
REV. 5-5-05: MODIFIED TOP VIEW.



GUARDRAIL IMPACT HEAD DETAILS



GUARDRAIL POST MOUNTING BRACKET



6" (NOMINAL)
5½" (TYPICAL)
¾" DIA. HOLE
℄ 2½" DIA. HOLE
GROUND LINE
⅝" DIA. BOLT THROUGH ¾" DIA. HOLE IN TUBE AND ¾" DIA. HOLE IN WOOD INSERT
ONE (1) ⅝" DIA. BOLT THROUGH ¾" DIA. HOLE
8" × 6" × 3⁄16" STEEL FOUNDATION TUBE 6'-0" LONG
FRONT VIEW
8" (NOMINAL)
7½" (TYPICAL)
2½" DIA. HOLE IN BOTH BREAKAWAY POSTS
3'-9" WOOD POST
END VIEW

NO. 1 & 2 BREAKAWAY POSTS WITH 6'-0" TUBE SLEEVE

GENERAL NOTES

(A) THE NO. 1 AND NO. 2 BREAKAWAY POSTS WILL HAVE A 6" × 8" (NOMINAL) CROSS-SECTION AREA AND WILL HAVE A 2½" DIAMETER HOLE CENTERED 2'-3" BELOW THE TOP OF THE POST ON THE 8" SIDE AS SHOWN. ALL POSTS SHALL BE ERECTED SO THAT THE GUARDRAIL WILL HAVE A TOP-OF-RAIL HEIGHT OF 2'-3".

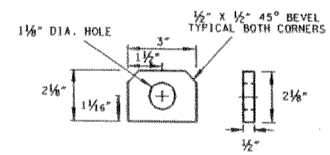
(B) ALL HOLES IN WOOD POSTS ARE TO BE DRILLED BEFORE PRESERVATIVE TREATMENT.

(C) ALL CUTTING, DRILLING, AND WELDING OF STEEL COMPONENTS SHALL BE DONE BEFORE GALVANIZING.

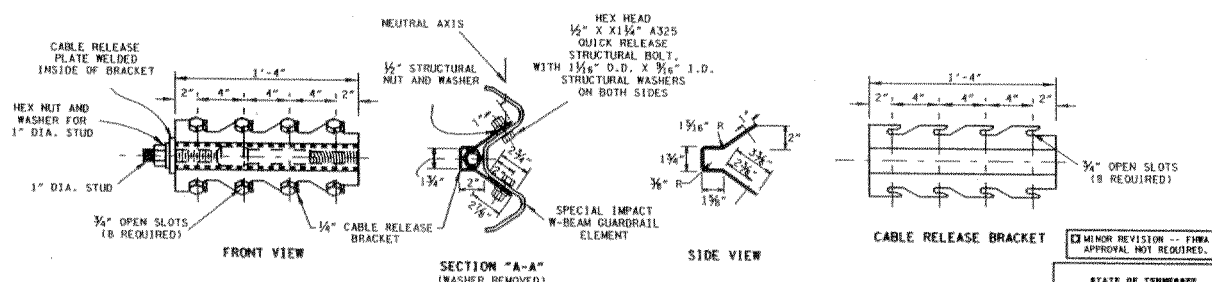
(D) THE FINISHED CABLE ASSEMBLY WILL NOT BE ACCEPTABLE UNLESS IT IS IN TENSION WITH NO SAG.

(E) SEE STANDARD DRAWING NOS. S-GR-35 AND S-GR-36 FOR ADDITIONAL DETAILS AND GENERAL NOTES.

(F) THE STEEL TUBES ARE TO BE DRIVEN INTO GROUND BEFORE THE WOODEN POSTS ARE INSERTED.



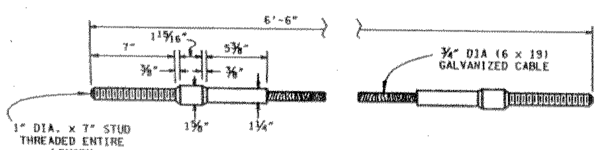
CABLE RELEASE PLATE



CABLE RELEASE PLATE WELDED INSIDE OF BRACKET
HEX NUT AND WASHER FOR 1" DIA. STUD
1" DIA. STUD
¾" OPEN SLOTS (8 REQUIRED)
¼" CABLE RELEASE BRACKET
FRONT VIEW
NEUTRAL AXIS
½" STRUCTURAL NUT AND WASHER
HEX HEAD ½" X 1¼" A325 QUICK RELEASE STRUCTURAL BOLT, WITH 1 1⁄16" O.D. X 9⁄16" I.D. STRUCTURAL WASHERS ON BOTH SIDES
SPECIAL IMPACT W-BEAM GUARDRAIL ELEMENT
SECTION "A-A" (WASHER REMOVED)
SIDE VIEW
CABLE RELEASE BRACKET

CABLE RELEASE ANCHOR PLATE ASSEMBLY DETAILS

SEE DRAWING NO. S-GR-35 FOR RELATION OF SECTION "A-A" TO FRONT ELEVATION VIEW OF GUARDRAIL ANCHORS



STANDARD SWAGE FITTING AND STUD

NOTE: CABLE TO BE SWAGE-CONNECTED

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE DEPARTMENT OF TRANSPORTATION

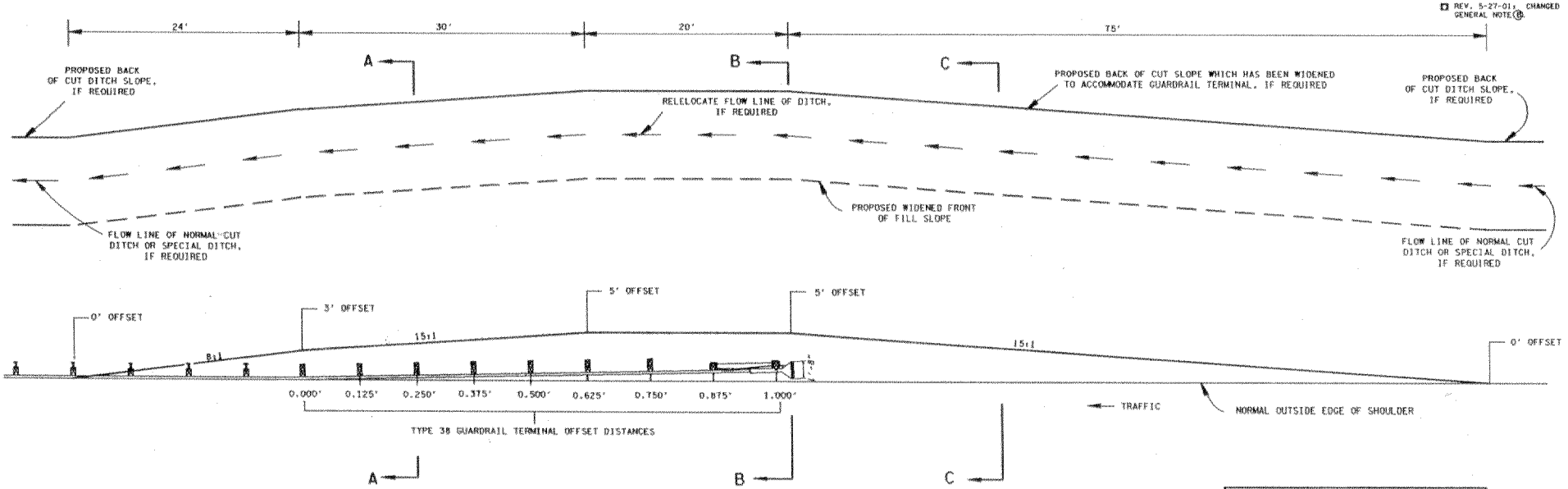
SKT-350 (2 TUBE) POST AND ASSEMBLY DETAILS

7-29-98 | S-GR-37

REV. 5-5-05: ADDED NEW GENERAL NOTE (F)

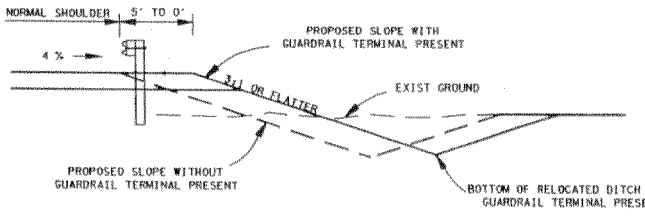
REV. 12-18-98: CHANGED DRAWING NAME AND MODIFIED GENERAL NOTE (C).

REV. 5-27-01: CHANGED GENERAL NOTE (B).

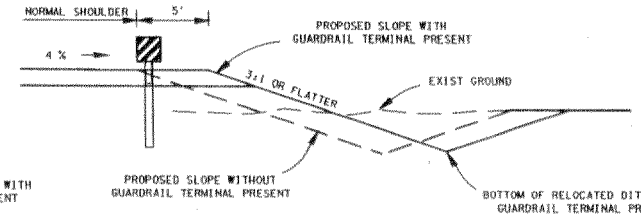


ALL OFFSET DISTANCE TAKEN FROM OUTSIDE EDGE OF SHOULDER

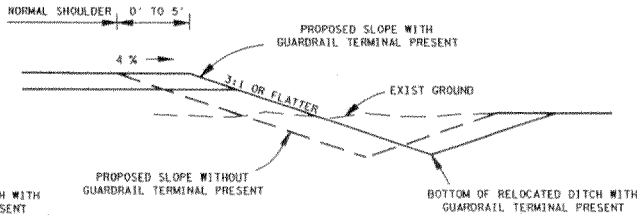
PLAN VIEW OF PROPOSED CONSTRUCTION OF EARTH PAD FOR TYPE 38 GUARDRAIL TERMINAL



SECTION "A-A"



SECTION "B-B"



SECTION "C-C"

GENERAL NOTES

(A) FOR DETAILS NOT SHOWN SEE OTHER GUARDRAIL STANDARD DRAWINGS.

(B) THE DESIGNER SHALL INCOPORATE THIS EARTH PAD IN CONJUNCTION WITH ALL TYPE 38 GUARDRAIL TERMINALS IN THE RIGHT-OF-WAY AND CONSTRUCTION PLANS AS WELL AS THE ROADWAY CROSS-SECTION SHEETS.

(C) THE CONTRACTOR SHALL CONSTRUCT THIS EARTH PAD AS PART OF THE INITIAL GRADING OPERATIONS AS SHOWN ON THIS STANDARD DRAWING AFTER FIELD VERIFICATION OF HAZARD LOCATION AND ENGINEERS APPROVAL.

(D) ON ALL NEW GRADE AND DRAIN PROJECTS THE EARTH PAD SHALL BE BUILT AS SHOWN ON THIS STANDARD DRAWING WITHOUT EXCEPTION.

(E) ON ALL OTHER TYPE OF PROJECTS (SUCH AS 4R, BRIDGE REPLACEMENT, ETC.) WHERE THIS TERMINAL IS USED, THE DESIGNER SHALL INCORPORATE THIS PAD IN THE CONSTRUCTION PLANS.

(F) REFER TO STANDARD DRAWING S-GR-21 FOR LENGTH OF NEED REQUIREMENTS AND CLEAR AREAS AT GUARDRAIL TERMINALS.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

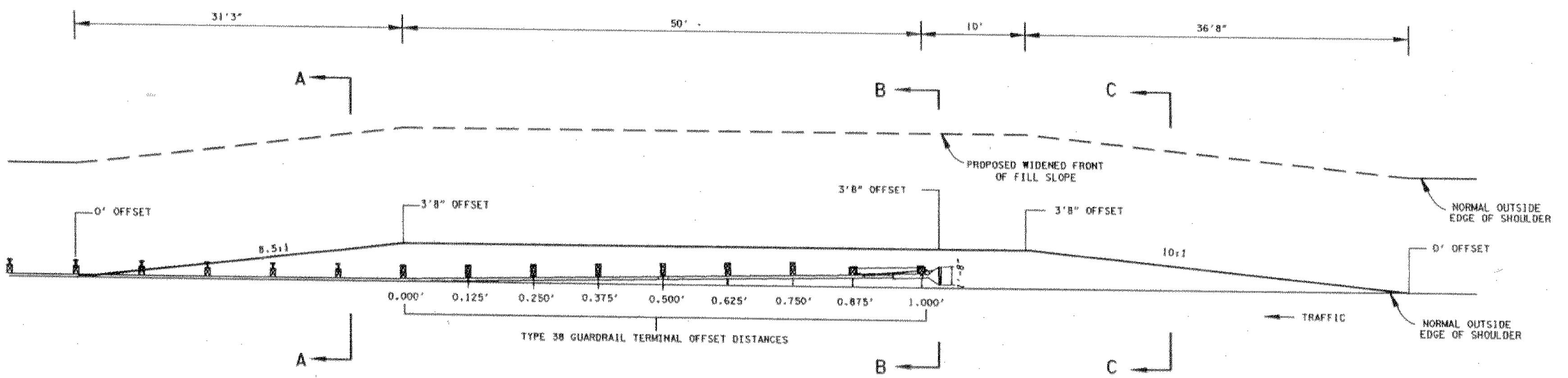
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

DETAILS FOR CONSTRUCTION OF EARTH PAD FOR TYPE 38 GUARDRAIL END TERMINALS

7-29-98 | S-GR-38

09-JAN-2008 15:26
D:\civil on 1\RECON\WORKSTD\englishv\sgr38.dgn

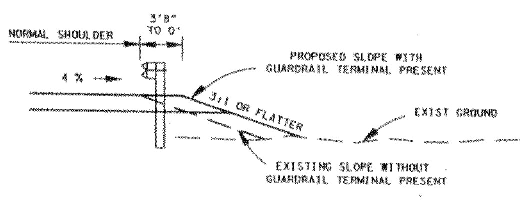
THIS DRAWING IS TO BE USED FOR RESURFACING, MAINTENANCE AND BRIDGE REPAIR PROJECTS ONLY.
THIS DRAWING IS NOT INTENDED TO BE USED FOR NEW CONSTRUCTION OR RECONSTRUCTION PROJECTS.



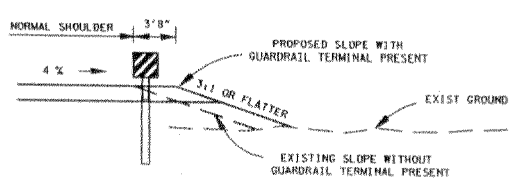
31'3"
50'
10'
36'8"
A
B
C
PROPOSED WIDENED FRONT OF FILL SLOPE
0' OFFSET
3'8" OFFSET
3'8" OFFSET
3'8" OFFSET
0' OFFSET
8.5:1
10:1
NORMAL OUTSIDE EDGE OF SHOULDER
NORMAL OUTSIDE EDGE OF SHOULDER
0.000' 0.125' 0.250' 0.375' 0.500' 0.625' 0.750' 0.875' 1.000'
TYPE 38 GUARDRAIL TERMINAL OFFSET DISTANCES
TRAFFIC

ALL OFFSET DISTANCES TAKEN FROM OUTSIDE EDGE OF SHOULDER

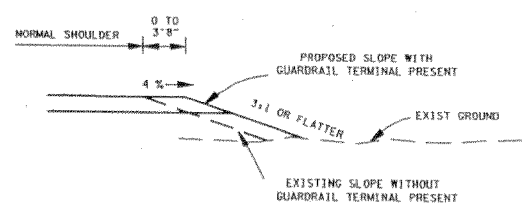
PLAN VIEW OF PROPOSED CONSTRUCTION OF EARTH PAD FOR TYPE 38 GUARDRAIL TERMINAL



SECTION "A-A"



SECTION "B-B"



SECTION "C-C"

GENERAL NOTES

(A) THIS STANDARD DRAWING IS AN ALTERNATE TO THE PREFERRED STANDARD DRAWING S-GR-38 FOR MAINTENANCE, RESURFACING AND BRIDGE REPAIR PROJECTS. THIS STANDARD DRAWING IS FOR USE WHEN RIGHT-OF-WAY OR OTHER LIMITATIONS MAKES THE USE OF STANDARD DRAWING S-GR-38 IMPRACTICAL.

(B) FOR DETAILS NOT SHOWN SEE OTHER GUARDRAIL STANDARD DRAWINGS.

(C) WHEN TYPE 38 GUARDRAIL TERMINALS ARE USED, THE FORESLOPE MUST BE A 3:1 OR FLATTER. WHEN THE SLOPE IS STEEPER THAN 3:1 OR DRAINAGE DITCHES EXIST THAT DO NOT ALLOW THE USE OF THIS PAD DETAIL, THE GUARDRAIL MAY BE EXTENDED BEYOND THE MINIMUM LENGTH OF NEED AS SHOWN ON STANDARD DRAWING S-GR-21.

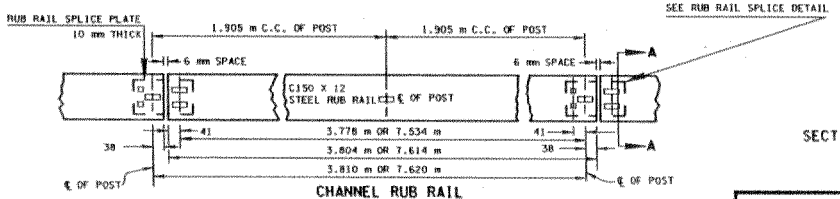
(D) REFER TO STANDARD DRAWING S-GR-21 FOR LENGTH OF NEED REQUIREMENTS AND CLEAR AREAS AT GUARDRAIL TERMINALS.

☐ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

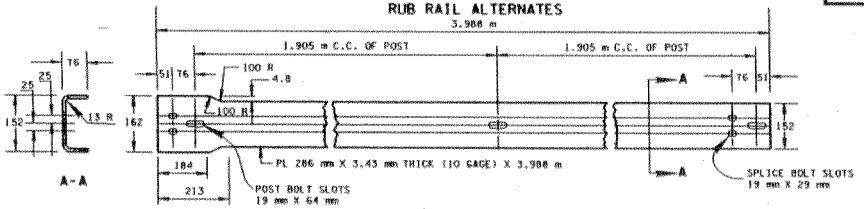
DETAILS FOR CONSTRUCTION OF ALTERNATE EARTH PAD FOR TYPE 38 GUARDRAIL END TERMINALS

5-5-05 | S-GR-38A

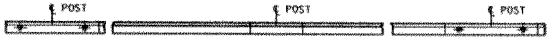


CHANNEL RUB RAIL

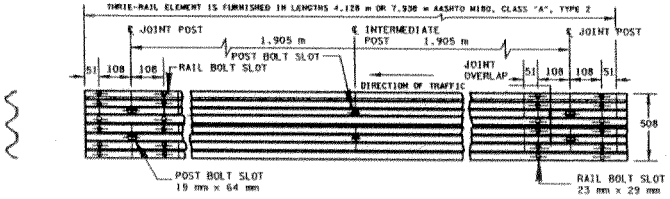
RAIL SPLICES PERMITTED ONLY AT POST



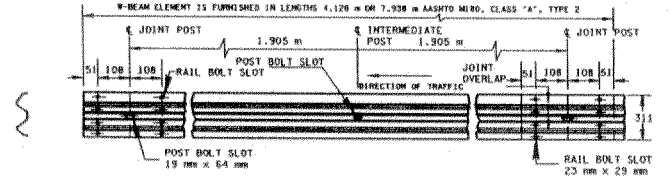
BENT PLATE RUB RAIL



PLANS VIEW
W-BEAM OR THRIE RAIL



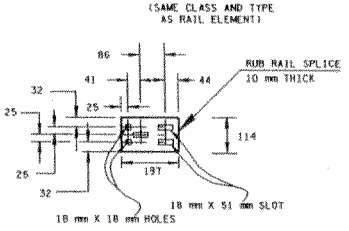
FRONT ELEVATION "THRIE" RAIL



FRONT ELEVATION "W"-BEAM

SECTION A-A

NOTE: HOLES IN RUB-RAIL SAME AS IN SPLICE PLATE



NOTE: HOLES IN RUB-RAIL SAME AS IN SPICE PLATE

RUB RAIL SPLICE DETAIL

- REV. 11-1-95: CHANGED TO METRIC.
  REV. 7-29-98: MODIFIED GENERAL NOTE (F).
  REV. 9-5-98: MODIFIED GENERAL NOTE (F).
- REV. 10-26-99: DELETED BACK UP PLATE DETAILS.
- REV. 9-5-00: IN GENERAL NOTES CORRECTED NOTE (F).
- REV. 5-27-01: IN GENERAL NOTE (E) CHANGED ITEM NUMBERS OF GUARDRAIL TO CONCUR WITH NEW PAY ITEM SYSTEM.
- REV. 9-5-01: CORRECTED DESCRIPTION FOR ITEM NO. 705M04.07.
- REV. 9-11-02: DELETED ITEM NO. 705M01.02.
- REV. 9-5-03: CHANGED GENERAL NOTE (A). DELETED GENERAL NOTE (B). RENUMBERED REMAINING GENERAL NOTES.
- REV. 2-22-05: CHANGED GENERAL NOTES (D), (E), AND (F).

GENERAL NOTES

(A) CORRUGATED SHEET STEEL BEAMS SHALL CONFORM TO THE CURRENT REQUIREMENTS OF AASHTO M180, CLASS A, TYPE 2 . RAIL MATERIAL SHALL HAVE A YIELD STRENGTH OF 345 MEGAPASCALS AND A TENSILE STRENGTH OF 483 MEGAPASCALS.

(B) RUB RAILS AND RUB RAIL SPLICE PLATES SHALL CONFORM TO ASTM A36M AND SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A123.

(C) WHERE GUARDRAIL IS TO BE PLACED ON A CURVE WITH A RADIUS LESS THAN 45 m, THE RAIL SECTION SHALL BE SHOP-FORMED TO THE REQUIRED RADIUS.

(D) SEE THE "RDM01-TS" STANDARD SERIES FOR GUARDRAIL PLACEMENT.

(E) ITEM NUMBERS FOR PAYMENT AS DETAILED ON THESE "SM-GR" SERIES OF DRAWINGS ARE AS FOLLOWS:

ITEM NO.	DESCRIPTION	ON DWG NO.
705M01.01	GUARDRAIL AT BRIDGE ENDS	SM-GR-17 & SM-GR-23
705M01.04	METAL BEAM GUARD FENCE	SM-GR-22 & STDM-15-6
705M02.01	SINGLE GUARDRAIL WITH RUB-RAIL (TYPE 2)	SM-GR-13 & SM-GR-18
705M02.02	SINGLE GUARDRAIL (TYPE 2)	SM-GR-13 & SM-GR-18
705M03.01	MEDIAN DIVIDER GUARDRAIL W/RUB-RAIL (TYPE 2)	SM-GR-13 & SM-GR-18
705M03.02	MEDIAN DIVIDER GUARDRAIL (TYPE 2)	SM-GR-13 & SM-GR-18
705M03.03	MEDIAN DIVIDER GUARDRAIL (TYPE 2)(675 mm MT. HT.)	SM-GR-13 & SM-GR-18
705M03.04	MEDIAN DIVIDER GUARDRAIL AT CONCRETE BARRIER	SM-GR-20
705M04.02	GUARDRAIL TERMINAL (TYPE 12)	SM-GR-19
705M04.03	GUARDRAIL TERMINAL (TYPE 13)	SM-GR-19
705M04.04	GUARDRAIL TERMINAL (TYPE 21)	SM-GR-26
705M04.05	GUARDRAIL TERMINAL (TYPE IN-LINE)	SM-GR-18
705M04.07	TANGENT EMERGY ABSORBING TERMINAL (NCHRP 350 - TL3)	SM-GR-32, SM-GR-35 & SM-GR-40

(F) TYPE 1: 0.953 mm SPACING
TYPE 2: 1.905 m SPACING

ALL UNITS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.

MINOR REVISION — FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

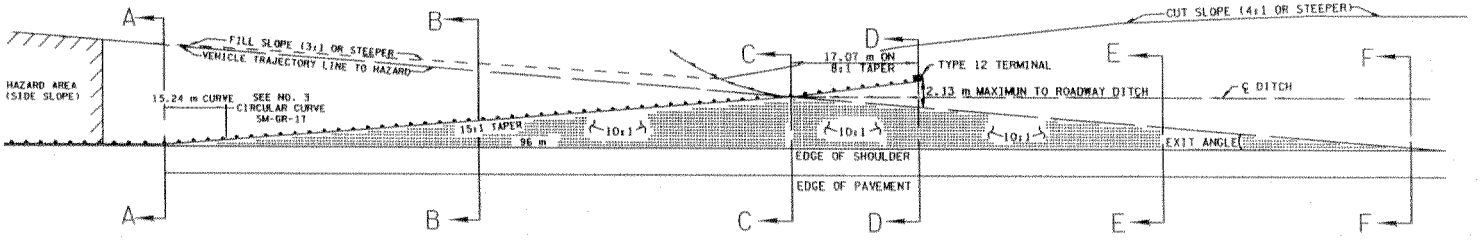
W-BEAM & THRIE BEAM BARRIER RAIL AND RUB RAIL ALTERNATES

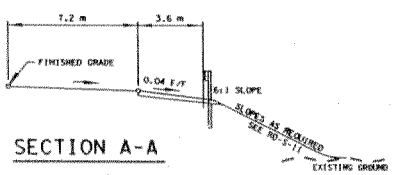
11-1-95 SM-GR-11

01-JAN-2006 15:42

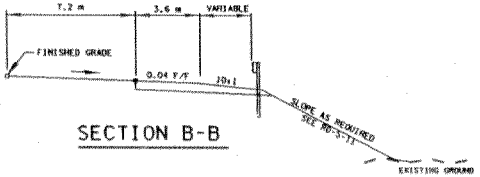
REV. 5-27-04: PRODUCED AN ENLARGED MORE DETAILED VIEW FOR CONSTRUCTION OF TYPE 12 GUARDRAIL TERMINAL. SEE STANDARD DRAWING SM-GR-21 FOR FURTHER DETAILS.

REV. 3-10-05: ELIMINATED REFERENCE TO 15 DEGREE EXIT ANGLE AND CHANGED GENERAL NOTE Ⓐ.

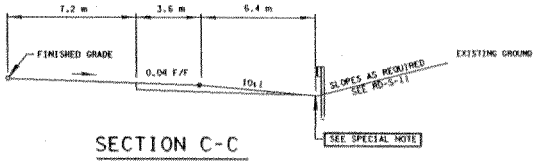




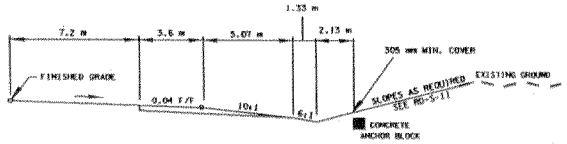
SECTION A-A



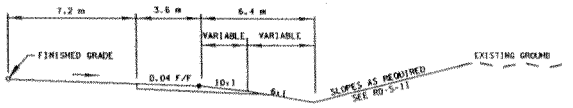
SECTION B-B



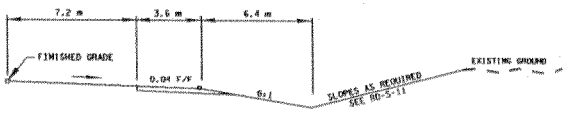
SECTION C-C



SECTION D-D



SECTION E-E



SECTION F-F

TYPICAL SKETCHES SHOWING TERMINATION OF GUARDRAIL ON FILLS

SKETCH SHOWING FLARE FOR TERMINAL ANCHOR TYPE 12

(THE INTENT IS TO TERMINATE THE GUARDRAIL IN THE CUT SLOPE SURFACE WHILE MAINTAINING THE GUARDRAIL PROFILE ON ITS GIVEN GRADE).

GENERAL NOTES

Ⓐ FOR DETAILS NOT SHOWN SEE GUARDRAIL STANDARD DRAWING NOS. SM-GR-19 AND SM-GR-21.

Ⓑ THE DESIGNER SHALL INCOPORATE THE DETAILS SHOWN ON THIS DRAWING IN THE RIGHT-OF-WAY AND CONSTRUCTION PLANS AS WELL AS THE ROADWAY CROSS-SECTION SHEETS.

Ⓒ THE CONTRACTOR SHALL CONSTRUCT THESE 10:1 SLOPES AS PART OF THE INITIAL GRADING OPERATIONS AS SHOWN ON THIS STANDARD DRAWING AFTER FIELD VERIFICATION OF HAZARD LOCATION AND ENGINEERS APPROVAL.

Ⓓ ON ALL NEW GRADE AND DRAIN PROJECTS THE 10:1 SLOPES SHALL BE BUILT AS SHOWN ON THIS STANDARD DRAWING WITHOUT EXCEPTION.

SPECIAL DITCH NOTE

THE CONTRACTOR IS TO ADD A RUBRAIL WHENEVER THE CLEARANCE FROM THE BOTTOM OF THE W-BEAM TO THE GROUND LINE EXCEEDS 457 mm.

ALL UNITS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

DETAILS FOR CONSTRUCTION OF TYPE 12 GUARDRAIL TERMINAL

5-27-04 | SM-GR-19A

REV. 11-1-95: CHANGED TO METRIC.

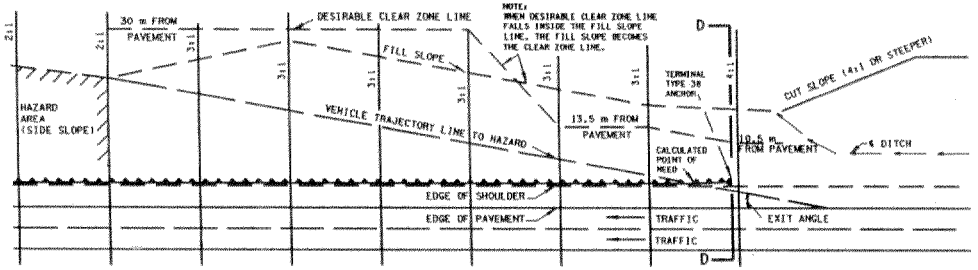
REV. 7-29-98: REMOVED REFERENCE TO TYPE 11, 16, AND 20 GUARDRAIL TERMINALS. ADDED TYPE 38 GUARDRAIL TERMINAL.

REV. 5-27-01: MODIFIED REFERENCE REGARDING GUARDRAIL TERMINALS.

REV. 9-11-03: MADE GENERAL CHANGES TO TYPE 12 GUARDRAIL TERMINAL.

REV. 4-18-04: CHANGED CASE I EQUATION AND REFERENCES TO ROADSIDE DESIGN GUIDE.

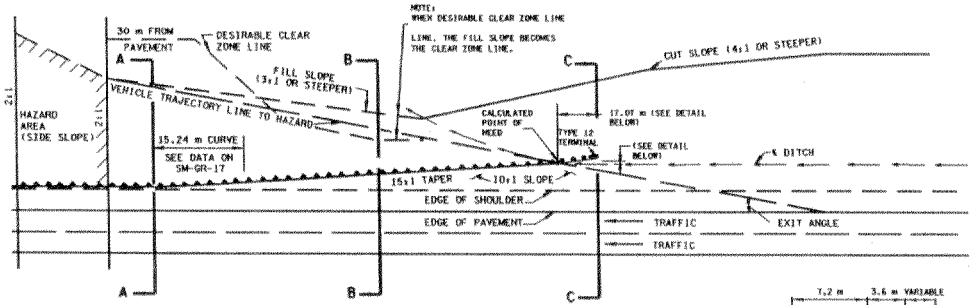
REV. 3-10-05: ELIMINATED REFERENCE TO 15 DEGREE EXIT ANGLE ON THIS DRAWING.



TYPICAL LAYOUT-CASE I
AVERAGE TERRAIN-DIVIDED HIGHWAY

POINT OF THEORETICAL NEED FOR EMBANKMENT GUARDRAIL

THE POINT OF NEED SHALL BE CONSIDERED THAT POINT WHERE, TO ONE SIDE OF THE POINT, IT WOULD BE SAFER FOR THE VEHICLE TO CONTACT AND BE DIRECTED BY THE GUARDRAIL INSTEAD OF GOING OVER THE SLOPE. TO THE OTHER SIDE OF THE POINT, IT WOULD BE SAFER FOR THE VEHICLE TO GO OVER THE SLOPE. AN EXIT ANGLE FROM THE ROADWAY AS DETERMINED BY THE CASE I EQUATION ON THIS DRAWING SHOULD BE UTILIZED FOR DETERMINING THE POINT OF THEORETICAL NEED. WHERE FEASIBLE CONSIDERATION SHOULD BE GIVEN TO FLATTENING OR FURTHER WARPING OF THE SLOPE IN ORDER TO "MOVE BACK" THE POINT OF NEED AND THEREBY REDUCE THE LENGTH OF NEEDED GUARDRAIL.



TYPICAL LAYOUT-CASE II
STEEPER TERRAIN-DIVIDED HIGHWAY

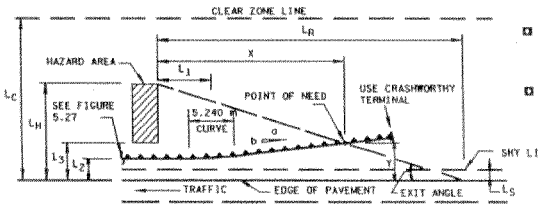


FIGURE 5.24 APPROACH BARRIER LAYOUT VARIABLES

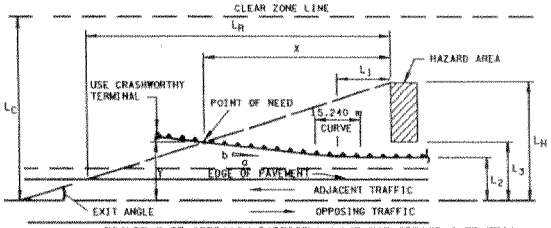


FIGURE 5.27 APPROACH BARRIER LAYOUT FOR OPPOSING TRAFFIC

DETAILS AND EQUATIONS COME FROM "ROADSIDE DESIGN GUIDE (2002)", CHAPTER 5. THE FOLLOWING EQUATIONS ARE TO BE USED TO CALCULATE THE "POINT OF NEED".

EQUATION NOTES

CASE I
WHEN b/a=0, THE POINT OF NEED WILL BE LOCATED AT POST NO. 3 OF THE TYPE 38 ANCHOR USING THE FOLLOWING EQUATIONS: (SEE DRAWING NOS. SM-GR-32, SM-GR-35, AND SM-GR-40)

$$X = \frac{L_H - L_2 - 0.23}{L_H - L_R} \qquad Y = L_2 + 0.23$$

CASE II
WHEN b/a HAS A VALUE, THE POINT OF NEED WILL BE LOCATED AS SHOWN AT LEFT AND GUARDRAIL SHALL PASS THROUGH IT USING THE FOLLOWING EQUATIONS: (SEE DRAWING NOS. SM-GR-19 AND SM-GR-19A)

$$X = \frac{L_H - \left(\frac{b}{a}(L_1) - L_2\right)}{\left(\frac{b}{a}\right)\left(\frac{L_R}{L_H}\right)} \qquad Y = L_H - \left(\frac{L_R}{L_H}\right)X$$

EQUATION VARIABLE LEGEND

L_C = THE CLEAR DISTANCE

L_H = DISTANCE FROM EDGE OF TRAVELED WAY (EDGE OF PAVEMENT) TO THE LATERAL EXTENT OF HAZARD. NOTE THAT L_H SHOULD NEVER EXCEED THE "CLEAR DISTANCE" (L_C).

b/a = SLOPE OF FLARE

L_1 = LENGTH OF TANGENT SECTION OF BARRIER FROM HAZARD. TENNESSEE DEPARTMENT OF TRANSPORTATION WILL USE THIS POINT AS THE P.I. FOR A 15.240 m CIRCULAR CURVE.

L_2 = DISTANCE FROM EDGE OF PAVEMENT TO TANGENT SECTION OF BARRIER.

L_R = RUNOUT LENGTH (SEE TABLE BELOW FOR VALUE).

L_3 = DISTANCE FROM EDGE OF PAVEMENT TO NEAR FACE OF HAZARD.

L_3-L_2 = SHOULD BE GREATER THAN 1.2 m.

NOTES

CASE I

(1) IF ANY OBSTACLE (HAZARD) APPEARS IN THE DESIRABLE CLEAR ZONE AREA, IT MUST BE REMOVED. IF IT CANNOT BE REMOVED, THEN A NEW "POINT OF NEED" MUST BE COMPUTED USING THE OBSTACLE AS THE HAZARD AND NOT THE STEEP SIDE SLOPE WHICH WAS FIRST CONSIDERED AS THE HAZARD.

CASE II

(1) THE ROADWAY EMBANKMENT IS SHOWN GOING FROM A CUT SECTION INTO A STEEP FILL SECTION VERY CLOSE TO THE CUT TO FILL GRADE POINT. HERE THE "POINT OF NEED" FOR PROTECTION FROM THE STEEP SIDE SLOPE FALLS WITHIN THE CUT SLOPE AREA. THEREFORE, THE GUARDRAIL SHALL BE ANCHORED INTO THE CUT SECTION BACKSLOPE USING A STATIONARY GUARDRAIL TERMINAL ANCHOR TYPE 12.

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.

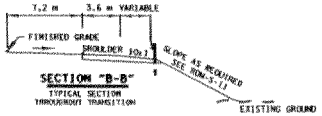
(B) R.O.W. FENCES WILL NOT BE CONSIDERED A HAZARD, BUT HAZARDS WHICH ARE OUTSIDE THE R.O.W. LINE BUT INSIDE THE DESIRABLE CLEAR ZONE SHOULD BE CONSIDERED AND APPROPRIATE ACTION TAKEN FOR VEHICLE PROTECTION. COST EFFECTIVE EVALUATION MAY BE NEEDED TO HELP DECIDE THE APPROPRIATE ACTION NEEDED.

(C) WHERE THE HAZARD APPEARS ON THE OUTSIDE OF A ROADWAY CURVE, GOOD ENGINEERING JUDGEMENT MUST BE USED TO DETERMINE THE LIMITS OF GUARDRAIL NEEDED. REFER TO THE "ROADSIDE DESIGN GUIDE (2002)", SECTION 5.2 AND STANDARD DRAWING NO. RDWD1-S-12 TO HELP DECIDE WHAT THE NECESSARY CLEAR ZONE REQUIREMENTS ARE AND THE TYPE AND LOCATION OF THE PROTECTIVE MEASURE NEEDED.

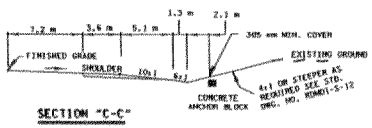
SPECIAL DITCH NOTE

THE CONTRACTOR IS TO ADD A RUBRAIL WHENEVER THE CLEARANCE FROM THE BOTTOM OF THE W-BEAM TO THE GROUND LINE EXCEEDS 450 MILLIMETERS.

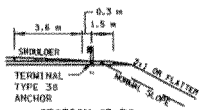
SECTION "A-A"



SECTION "B-B"
TYPICAL SECTION THROUGHOUT TRANSITION



SECTION "C-C"



SECTION "D-D"

TYPICAL SKETCHES SHOWING TERMINATION OF GUARDRAIL ON FILLS

SKETCH SHOWING FLARE FOR TERMINAL ANCHOR TYPE 12

(THE INTENT IS TO TERMINATE THE GUARDRAIL IN THE CUT SLOPE SURFACE WHILE MAINTAINING THE GUARDRAIL PROFILE ON ITS GIVEN GRADE).

DESIGN TRAFFIC VOLUME (ADT)

OPERATING SPEED (km/h)	OVER 6000 RUNOUT LENGTH L_R(m)	2000-6000 RUNOUT LENGTH L_R(m)	800-2000 RUNOUT LENGTH L_R(m)	UNDER 800 RUNOUT LENGTH L_R(m)	L_S SHY LINE OFFSET (m)	FLARE RATE (a:b)
110	145	135	120	110	2.8	XX 15:1
100	130	120	105	100	2.4	XX 14:1
80	100	90	80	75	2.0	XX 11:1
60	70	60	55	50	1.4	XX 8:1
50	50	50	45	40	1.1	XX 7:1

XX = VALUES FOR YIELDING BARRIER (0.6 m DYNAMIC DEFLECTION) FOR RIGID BARRIERS INCREASE NUMERATOR BY 0.1 $\left[\frac{V}{16}\right]^2$

V = OPERATING SPEED (km/h)

METRIC

ALL UNITS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.

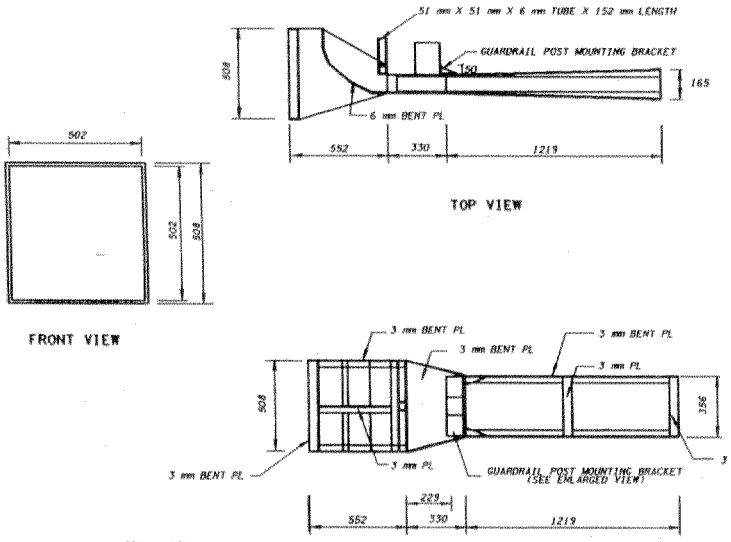
MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

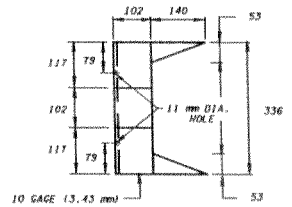
LENGTH OF NEED AND TERMINAL REQUIREMENTS IN FILLS

11-1-95 | SM-GR-21

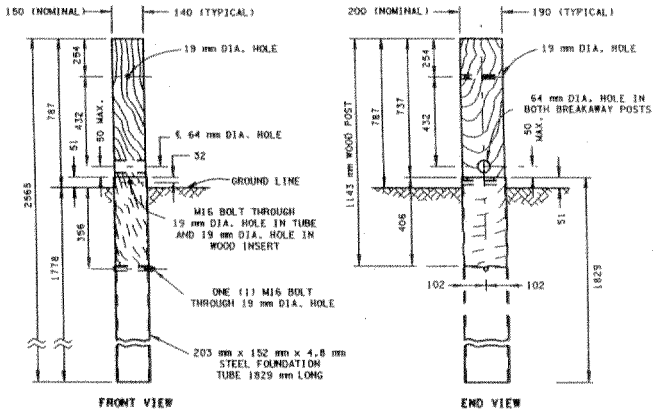
- REV. 2-1-99: MADE GENERAL REVISION.
- REV. 10-10-01: MODIFIED GUARDRAIL IMPACT HEAD DETAILS AND ADDED DETAIL FOR GUARDRAIL POST MOUNTING BRACKET.
- REV. 5-5-05: MODIFIED TOP VIEW.



GUARDRAIL IMPACT HEAD DETAILS



GUARDRAIL POST MOUNTING BRACKET



NO. 1 & 2 BREAKAWAY POSTS WITH 1829 mm TUBE SLEEVE

GENERAL NOTES

(A) THE NO. 1 AND NO. 2 BREAKAWAY POSTS WILL HAVE A 150 mm x 200 mm (NOMINAL) CROSS-SECTION AREA AND WILL HAVE A 64 mm DIAMETER HOLE CENTERED 686 mm BELOW THE TOP OF THE POST ON THE 200 mm SIDE AS SHOWN. ALL POSTS SHALL BE ERECTED SO THAT THE GUARDRAIL WILL HAVE A TOP-OF-RAIL HEIGHT OF 686 mm.

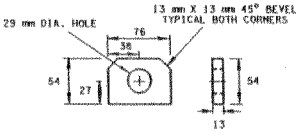
(B) ALL HOLES IN WOOD POSTS ARE TO BE DRILLED BEFORE PRESERVATIVE TREATMENT.

(C) ALL CUTTING, DRILLING, AND WELDING OF STEEL COMPONENTS SHALL BE DONE BEFORE GALVANIZING.

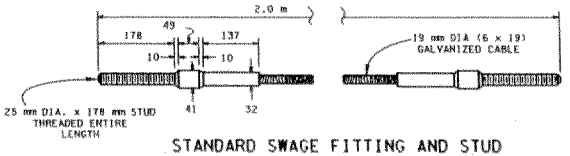
(D) THE FINISHED CABLE ASSEMBLY WILL NOT BE ACCEPTABLE UNLESS IT IS IN TENSION WITH NO SAG.

(E) SEE STANDARD DRAWING NOS. SM-GR-35 AND SM-GR-36 FOR ADDITIONAL DETAILS AND GENERAL NOTES.

(F) THE STEEL TUBES ARE TO BE DRIVEN INTO GROUND BEFORE THE WOODEN POSTS ARE INSERTED.

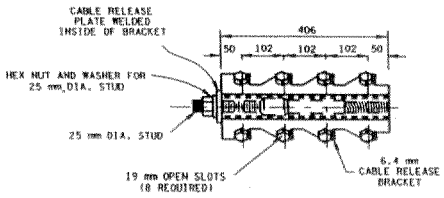


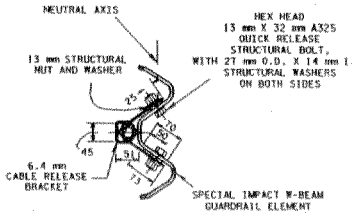
CABLE RELEASE PLATE

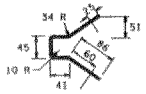


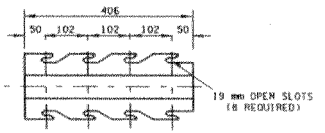
STANDARD SWAGE FITTING AND STUD

NOTE: CABLE TO BE SWAGE-CONNECTED









CABLE RELEASE ANCHOR PLATE ASSEMBLY DETAILS

SEE DRAWING NO. SM-GR-35 FOR RELATION OF SECTION "A-A" TO FRONT ELEVATION VIEW OF GUARDRAIL ANCHORS

ALL UNITS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

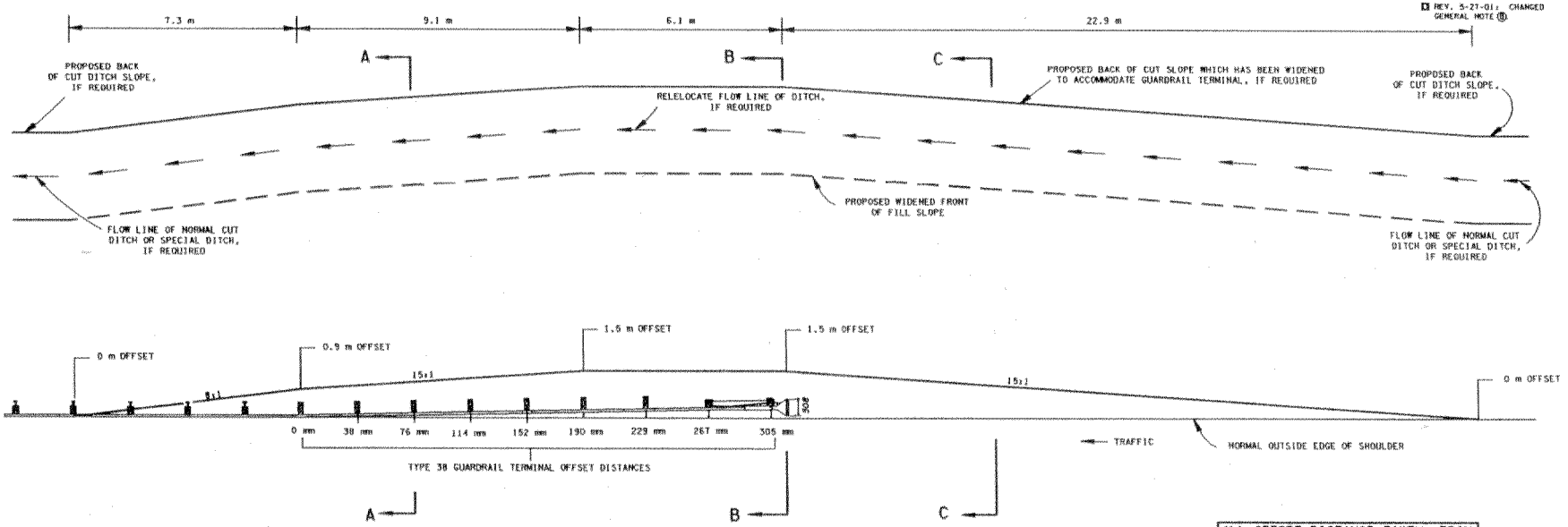
SKT-350
(2 TUBE)
POST AND
ASSEMBLY DETAILS

7-29-98 | SM-GR-37

REV. 5-5-05: ADDED NEW GENERAL NOTE (F)

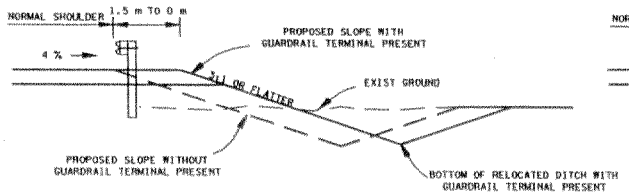
REV. 12-18-98: CHANGED DRAWING NAME AND MODIFIED GENERAL NOTE (C)

REV. 5-27-01: CHANGED GENERAL NOTE (B)

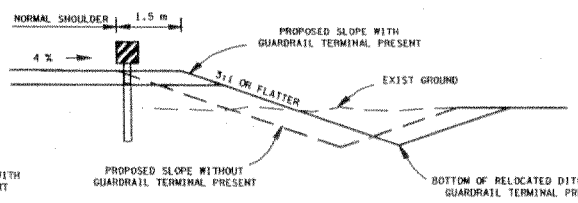


ALL OFFSET DISTANCE TAKEN FROM OUTSIDE EDGE OF SHOULDER

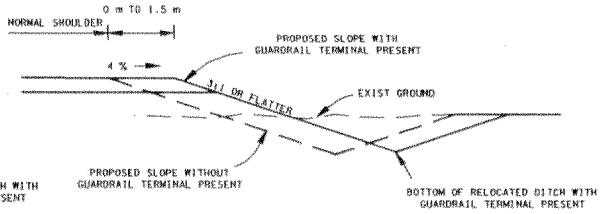
PLAN VIEW OF PROPOSED CONSTRUCTION OF EARTH PAD FOR TYPE 38 GUARDRAIL TERMINAL



SECTION "A-A"



SECTION "B-B"



SECTION "C-C"

GENERAL NOTES

(A) FOR DETAILS NOT SHOWN SEE OTHER GUARDRAIL STANDARD DRAWINGS.

(B) THE DESIGNER SHALL INCOPORATE THIS EARTH PAD IN CONJUNCTION WITH ALL TYPE 38 GUARDRAIL TERMINALS IN THE RIGHT-OF-WAY AND CONSTRUCTION PLANS AS WELL AS THE ROADWAY CROSS-SECTION SHEETS.

(C) THE CONTRACTOR SHALL CONSTRUCT THIS EARTH PAD AS PART OF THE INITIAL GRADING OPERATIONS AS SHOWN ON THIS STANDARD DRAWING AFTER FIELD VERIFICATION OF HAZARD LOCATION AND ENGINEERS APPROVAL.

(D) ON ALL NEW GRADE AND DRAIN PROJECTS THE EARTH PAD SHALL BE BUILT AS SHOWN ON THIS STANDARD DRAWING WITHOUT EXCEPTION.

(E) ON ALL OTHER TYPE OF PROJECTS (SUCH AS 4R, BRIDGE REPLACEMENT, ETC.) WHERE THIS TERMINAL IS USED, THE DESIGNER SHALL INCORPORATE THIS PAD IN THE CONSTRUCTION PLANS.

(F) REFER TO STANDARD DRAWING SM-GR-21 FOR LENGTH OF NEED REQUIREMENTS AND CLEAR AREAS AT GUARDRAIL TERMINALS.

METRIC

ALL UNITS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.

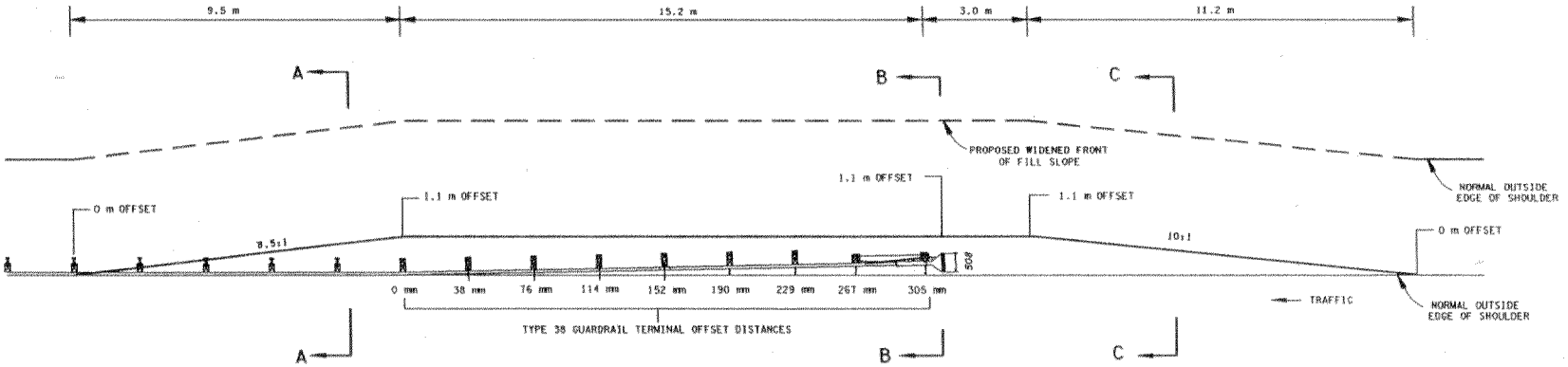
MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

DETAILS FOR CONSTRUCTION OF EARTH PAD FOR TYPE 38 GUARDRAIL END TERMINALS

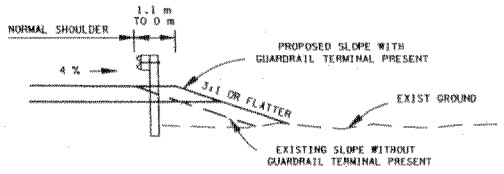
7-29-98 | SM-GR-38

THIS DRAWING IS TO BE USED FOR RESURFACING, MAINTENANCE AND BRIDGE REPAIR PROJECTS ONLY.
THIS DRAWING IS NOT INTENDED TO BE USED FOR NEW CONSTRUCTION OR RECONSTRUCTION PROJECTS.

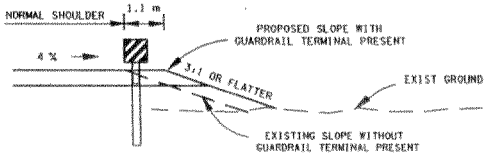


ALL OFFSET DISTANCES TAKEN FROM OUTSIDE EDGE OF SHOULDER

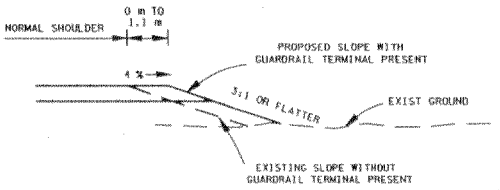
PLAN VIEW OF PROPOSED CONSTRUCTION OF EARTH PAD FOR TYPE 38 GUARDRAIL TERMINAL



SECTION "A-A"



SECTION "B-B"



SECTION "C-C"

GENERAL NOTES

(A) THIS STANDARD DRAWING IS AN ALTERNATE TO THE PREFERRED STANDARD DRAWING SM-GR-38 FOR MAINTENANCE, RESURFACING AND BRIDGE REPAIR PROJECTS. THIS STANDARD DRAWING IS FOR USE WHEN RIGHT-OF-WAY OR OTHER LIMITATIONS MAKES THE USE OF STANDARD DRAWING SM-GR-38 IMPRACTICAL.

(B) FOR DETAILS NOT SHOWN SEE OTHER GUARDRAIL STANDARD DRAWINGS.

(C) WHEN TYPE 38 GUARDRAIL TERMINALS ARE USED, THE FORESLOPE MUST BE A 3:1 OR FLATTER. WHEN THE SLOPE IS STEEPER THAN 3:1 OR DRAINAGE DITCHES EXIST THAT DO NOT ALLOW THE USE OF THIS PAD DETAIL, THE GUARDRAIL MAY BE EXTENDED BEYOND THE MINIMUM LENGTH OF NEED AS SHOWN ON STANDARD DRAWING SM-GR-21.

(D) REFER TO STANDARD DRAWING SM-GR-21 FOR LENGTH OF NEED REQUIREMENTS AND CLEAR AREAS AT GUARDRAIL TERMINALS.

APPROVED METRIC 2001

ALL UNITS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.

☐ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

DETAILS FOR CONSTRUCTION OF #ALTERNATE EARTH PAD FOR TYPE 38 GUARDRAIL END TERMINALS

5-5-05 | SM-GR-38A