STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
ROADWAY DESIGN DIVISION
SUITE 1200 JAMES K. POLK BUILDING
505 DEADERICK STREET
NASHVILLE, TENNESSEE 37243-3848
(615) 741-2221

CLAY BRIGHT
COMMISSIONER

BILL LEE
GOVERNOR

INSTRUCTIONAL BULLETIN NO. 20-21

Regarding Various Revised and New Standard Drawings

Effective May 7, 2021 letting (February 24, 2021 Turn-in), the following Standard Drawings have been revised and are new. The revised and new standard drawings have been revised in the Roadway Design Guidelines, Chapter 10, Index of Standard Drawings and are available online.

New Standard Drawings:

10-105.00 MULTIMODAL

10-105.03 SAFETY RAIL

DRAWING NUMBER	REVISION DATE	DESCRIPTION
MM-VPR-1		VEHICLE AND PEDESTRIAN SAFETY RAIL

10-106.00 SAFETY DESIGN AND GUARDRAILS

10-106.06 GUARDRAIL (SPECIAL CASES)

DRAWING NUMBER	REVISION DATE	DESCRIPTION
S-GRS-5		SPECIAL CASE WEAK-POST GUARDRAIL ATTACHMENT TO CULVERT
S-GRS-5A		WEAK-POST GUARDRAIL ASSEMBLY DETAILS FOR TYPE 1 & 2
S-GRS-5B		WEAK-POST GUARDRAIL ASSEMBLY DETAILS FOR TYPE 3 & 4

10-107.00 DESIGN – TRAFFIC CONTROL

10-107.02 WORK ZONES

DRAWING NUMBER	REVISION DATE	DESCRIPTION
T-WZ-PCB1		10 FOOT PORTABLE CONCRETE BARRIER RAIL
T-WZ-PCB2		20 FOOT PORTABLE CONCRETE BARRIER RAIL
T-WZ-PCB2A		20 FOOT PORTABLE CONCRETE BARRIER RAIL STIFFENER TUBE
T-WZ-PCB3		PORTABLE CONCRETE BARRIER RAIL DETAILS
T-WZ-PCB4		PORTABLE CONCRETE BARRIER RAIL ANCHOR PIN DETAILS

Revised Standard Drawings:

10-101.00 PIPE CULVERTS AND ENDWALLS

10-101.03 SAFETY SIDE DRAIN ENDWALLS

DRAWING NUMBER	REVISION DATE	DESCRIPTION
D-SEW-1A	10-16-20	TYPE “SAFETY” SIDE DRAIN ENDWALL WITH STEEL PIPE GRATE, FOR 15” THRU 48” PIPES, 6:1 SLOPE
D-SEW-12D	10-16-20	TYPE “SAFETY” SIDE DRAIN ENDWALL WITH STEEL PIPE GRATE, FOR 18” PIPE, 12:1 SLOPE

10-104.00 ROADWAY, PAVEMENT APPURTENANCES, AND FENCES

10-104.02 INTERSECTIONS

DRAWING NUMBER	REVISION DATE	DESCRIPTION
RP-D-15	10-16-20	DETAILS OF STANDARD CONCRETE DRIVEWAYS
RP-D-16	10-16-20	DETAILS OF LOWERED STANDARD CONCRETE DRIVEWAYS
RP-R-1	10-16-20	STANDARD RAMP DETAILS FOR ROADWAYS AND DRIVEWAYS

10-105.00 MULTIMODAL

10-105.03 SAFETY RAIL

DRAWING NUMBER	REVISION DATE	DESCRIPTION
MM-BPR-1	10-16-20	BIKE AND PEDESTRIAN SAFETY RAIL
MM-BPR-2	10-16-20	BIKE AND PEDESTRIAN MEDIAN BARRIER RAIL

10-106.00 SAFETY DESIGN AND GUARDRAILS

10-106.05 GUARDRAIL CONNECTIONS

DRAWING NUMBER	REVISION DATE	DESCRIPTION
S-GRC-4	10-16-20	GUARDRAIL CONNECTION TO BRIDGE RAILING CONCRETE PARAPET
S-GRC-6	10-16-20	GUARDRAIL CONNECTION TO BRIDGE ENDS FOR LOW SPEED ROADWAYS

10-106.07 GUARDRAIL TERMINALS

S-GRT-2P	10-16-20	EARTH PAD FOR TYPE 38 AND 21 TERMINAL

These standard drawings are located on the web site and in Chapter 10 of the Design Guidelines and can be found in the following links.

Standard Drawings:
https://www.tn.gov/content/tn/tdot/roadway-design/standard-drawings-library/standard-roadway-drawings.html

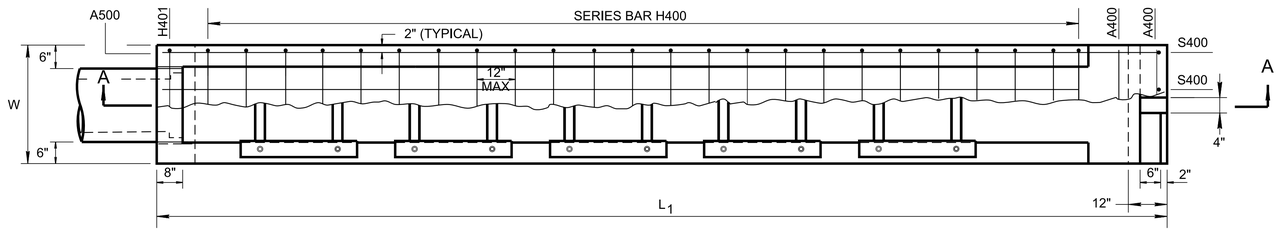
Chapter 10 - Index of Standard Drawings is available online at this location:

https://www.tn.gov/content/dam/tn/tdot/roadway-design/documents/design_guidelines/DG-C10.pdf

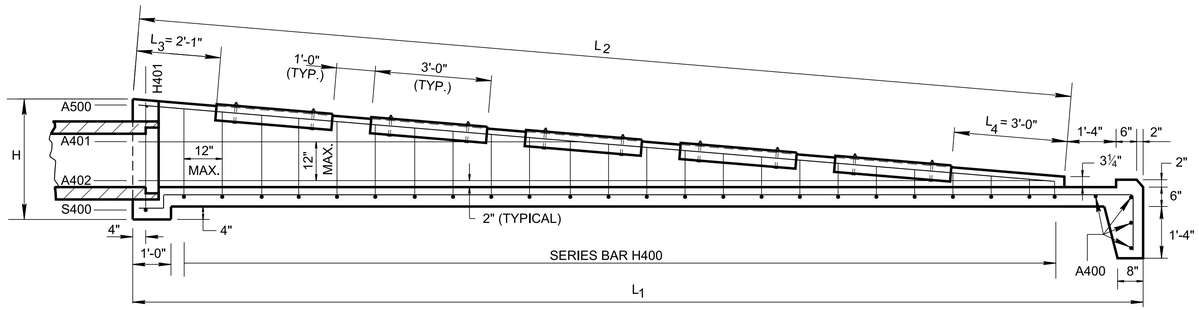
Jennifer Lloyd

Jennifer Lloyd, PE
Civil Engineering Director
Roadway Design Division

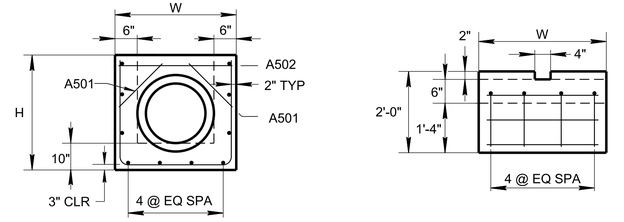
KJL:ARH:RBB:TD
November 13, 2020



PLAN



SECTION A-A



HEADWALL ELEVATION

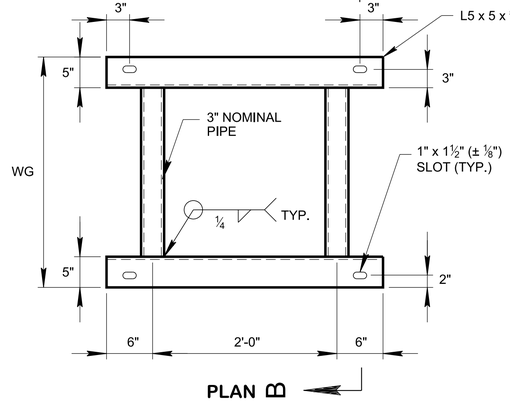
TOEWALL ELEVATION

DIMENSIONS AND QUANTITIES FOR ONE ENDWALL

PIPE CULV. DIA.	CONCRETE ENDWALL DIMENSIONS						STRUCTURAL STEEL GRATE DIMENSION AND QUANTITY		ESTIMATED QUANTITIES		
	H	L_1	L_2	L_3	L_4	W	WG	NO. REQ'D	CLASS "A" CONCRETE CU. YD.	STEEL BAR REINF. LB.	STRUCT. STEEL LB.
18"	3'-1¼"	26'-0"	24'-1"	2'-1"	3'-0"	3'-1"	2'-10"	5	2.84	256	480

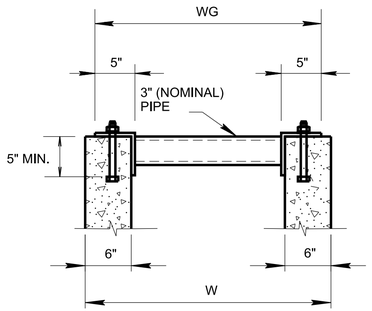
ALTERNATE ANCHORS FOR STRUCTURAL STEEL GRATES

CERTIFICATION: DRILLED-IN EPOXY ANCHORS OR CAST-IN THREADED INSERTS MAY BE UTILIZED IN LIEU OF CAST-IN HEADED ANCHOR BOLTS PROVIDED THAT THE CONTRACTOR FURNISHES CERTIFIED ANCHOR PULL OUT DATA FROM AN INDEPENDENT TESTING LABORATORY USING CLASS "A" CONCRETE AS PRESCRIBED BY TENNESSEE HIGHWAY SPECIFICATIONS. THE REQUIRED ULTIMATE LOAD FOR ⅝" DIAMETER ANCHORS IS 10,000 POUNDS.

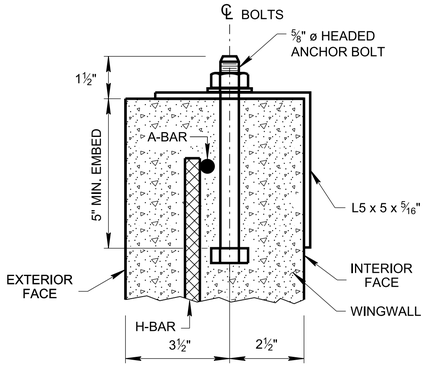


PLAN B

PLAN



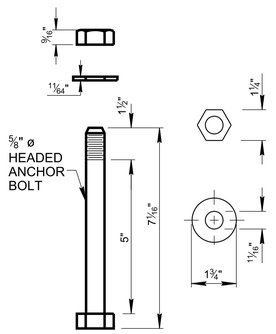
SECTION B-B
SHOWING ANCHOR BOLTS AND PARTIAL WINGWALLS



ANCHOR BOLT ASSEMBLY

STEEL PIPE GRATE

NOTE:
BOLTS SHALL NOT EXTEND MORE THAN ½" ABOVE TOP OF NUTS.



ANCHOR BOLT DETAIL

GENERAL NOTES

(A) CONCRETE ENDWALL SHALL BE CONSTRUCTED IN ACCORDANCE WITH STANDARD SPECIFICATIONS, SECTION 611 AND/OR SPECIAL PROVISIONS.

(B) THE MATERIALS, WELDING AND PAINTING FOR STRUCTURAL STEEL GRATE SHALL CONFORM TO THE FOLLOWING SPECIFICATIONS:

1. ANGLES ASTM A36
2. STEEL PIPE ASTM A53, TYPE E, GRADE B, STANDARD WEIGHT (SW)
3. WELDING AASHTO/AWS D1.5M/D1.5 BRIDGE WELDING CODE (LATEST EDITION)
4. ALL STEEL GRATES SHALL BE GALVANIZED.

(C) THE MATERIAL AND GALVANIZING FOR BOLTS, NUTS AND WASHERS SHALL CONFORM TO THE FOLLOWING SPECIFICATIONS:

1. BOLTS, NUTS AND WASHERS ASTM F1554 GRADE 36
2. GALVANIZING ASTM A153

(D) THE COST OF FURNISHING BOLTS, NUTS AND WASHERS, INCLUDING ALL MATERIALS, LABOR AND INCIDENTALS NECESSARY TO COMPLETE THE INSTALLATION, SHALL BE INCLUDED IN THE PRICE BID FOR PIPE ENDWALL.

(E) PIPE OPENINGS FOR HEADWALLS ARE BASED ON REINFORCED CONCRETE PIPE WITH TYPE "B" WALL THICKNESS (AASHTO M1701). SEE STD. DWG. NOS. D-PE-9, 9A & 9B FOR DETAILS.

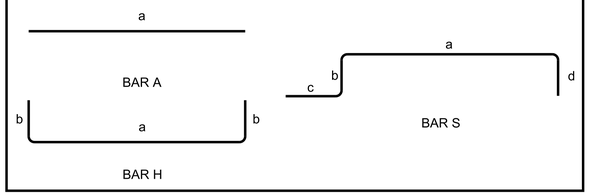
(F) PAYMENT WILL BE MADE UNDER:

611-07.73 18IN ENDWALL (MEDIAN DRAIN) EACH.

(G) THE CONTRACTOR MAY ELECT TO SUBSTITUTE AN APPROVED ALTERNATIVE DESIGN.

(H) DIMENSIONAL AND REINFORCING TOLERANCES WILL BE AS SHOWN IN STANDARD OPERATING PROCEDURE (SOP) 5-3.

REINFORCING STEEL LEGEND



REINFORCING STEEL CODE

TYPE	SIZE	SERIES
A	5	06

DIMENSIONS SHOWN ON THIS SHEET ARE OUTSIDE TO OUTSIDE OF BAR.

STANDARD C.R.S.I. HOOK DETAILS SHALL APPLY, EXCEPT AS NOTED.

BILL OF STEEL

BAR TYPE	LOCATION	18" PIPE BENDING DIMENSIONS a	b	c	d	NO. REQD	LENGTH
A400	TOEWALL	2'-9"	——	——	——	4	2'-9"
A401	WINGWALLS	10'-0½"	——	——	——	2	10'-0½"
A402	WINGWALLS	23'-6"	——	——	——	2	23'-6"
A500	WINGWALLS	23'-8"	——	——	——	2	23'-8"
A501	HEADWALL	1'-8⅝"	——	——	——	2	1'-8⅝"
A502	HEADWALL	2'-9"	——	——	——	1	2'-9"
H400	BOTTOM SLAB AND WINGWALL	2'-9"	*	——	——	1	102'-11"
		* DIMENSION "b" VARIES FROM 2'-2 ⅞" TO 0'-4 ⅞" IN INCREMENTS OF 0'-1" (23 BARS)					
H401	BOTTOM SLAB AND HEADWALL	2'-9"	2'-7⅞"	——	——	1	8'-0¾"
S400	BOTTOM SLAB AND TOEWALL	25'-2"	0'-4½"	0'-6"	1'-4"	4	27'-4½"

NOT TO SCALE

LLP

- REV. 7-28-84: CHANGED MATERIAL SPECIFICATIONS FOR STRUCTURAL STEEL PIPES AND PAINT SPECIFICATIONS.

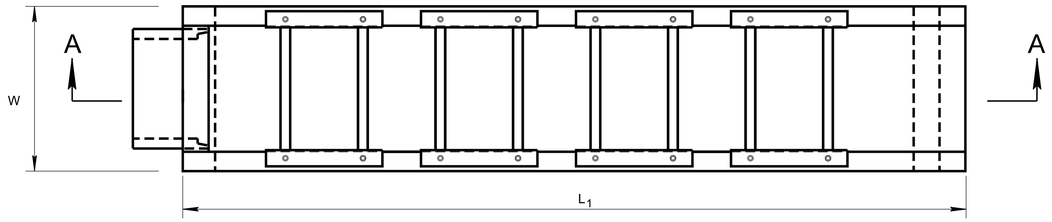
  REV. 3-20-86: CHANGED FEDERAL PAINT SPECIFICATION.
- REV. 7-29-92: REDREW, RENAMED AND REORGANIZED SHEET, CHANGED SHEET NUMBER FROM D-PE-12 TO D-SEW-12D. CHANGED ENDWALL FROM TYPE "U" TO TYPE "SD". UPDATED SPECIFICATIONS IN THE GENERAL NOTES. CORRECTED DIMENSIONS AND ESTIMATED QUANTITIES IN THE DIMENSION AND QUANTITY BLOCK. CORRECTED DIMENSIONS IN BILL OF STEEL.
- REV. 10-26-95: IN GENERAL NOTE (B) CHANGED MINIMUM WALL THICKNESS FROM 0.25" TO 0.216".
- REV. 1-19-97: CHANGED WEIGHT OF STRUCTURAL STEEL GRATES.
- REV. 5-27-99: CHANGED PAINT SPECIFICATION TO TT-E-489J.
- REV. 4-15-00: MODIFIED TOE WALL AND CLASS "A" CONCRETE QUANTITIES.
- REV. 5-27-01: CHANGED DESCRIPTION FOR ITEM NO. 611-07.03.
- REV. 6-1-09: ADDED GENERAL NOTE (F).
- REV. 7-19-10: DELETED GENERAL NOTE (F).
- REV. 3-1-12: REVISED REINFORCING STEEL, BILL OF STEEL, REINFORCING STEEL LEGEND, STEEL GRATE, ANCHOR BOLT DETAIL, ESTIMATED QUANTITIES FOR CLASS "A" CONCRETE, STEEL BAR REINF. & STRUCTURAL STEEL. REVISED GENERAL NOTES AND NOTE FOR ALTERNATE DRILLED IN ANCHORS.
- REV. 6-14-13: REVISED GENERAL NOTE (F) ADDED NOTES (G) AND (H)
- REV. 06-28-19: RENAMED AND REDREW SHEET.
- REV. 10-16-20: REMOVED 15" PIPE INFORMATION, REVISED SLOT DIMENSION, ADJUSTED (L4) AND (L3) DIMENSIONS, CHANGED NUMBER OF GRATES ON PLAN AND ADDED ANCHOR BOLT DETAIL.

- MINOR REVISION -- FHWA APPROVAL NOT REQUIRED

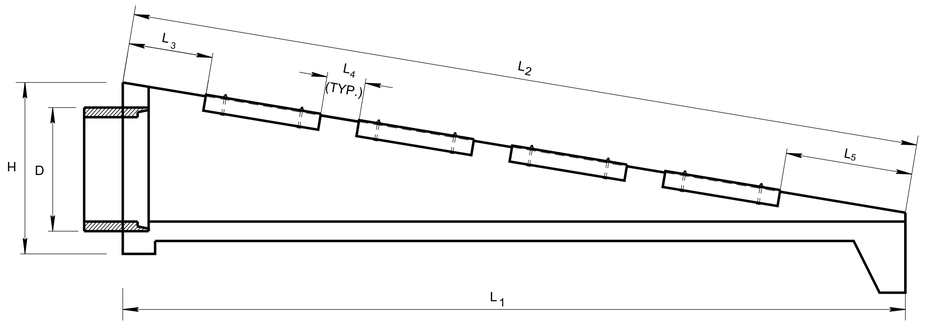
STATE OF TENNESSEE
STANDARD DRAWING
DEPARTMENT OF TRANSPORTATION

TYPE "SAFETY" SIDE DRAIN ENDWALL WITH STEEL PIPE GRATE, FOR 18" PIPE, 12:1 SLOPE

D-SEW-12D



PLAN



SECTION A-A

SIDE DRAIN DIA. (D)	DIMENSIONS AND QUANTITIES FOR ONE ENDWALL									
	CONCRETE ENDWALL DIMENSIONS				GRATE PLACEMENT DIMENSIONS			STRUCTURAL STEEL GRATE DIMENSIONS AND QUANTITY		STRUCT. STEEL
	H	W	L_1	L_2	L_3	L_4	L_5	WG	NO. REQ'D.	LB.
15"	SEE STD. DWG. D-PE-15A				2'-2"	1'-0"	2'-1 7/8"	2'-5"	2	172
18"	SEE STD. DWG. D-PE-18A				10 1/8"	1'-0"	1'-0"	2'-8"	3	269
24"	SEE STD. DWG. D-PE-24A				2'-2"	1'-0"	3'-2 5/8"	3'-3"	3	296
30"	SEE STD. DWG. D-PE-30A				2'-2"	1'-0"	3'-3 3/8"	3'-10"	4	694
36"	SEE STD. DWG. D-PE-36A				2'-2"	1'-0"	2'-9 7/8"	4'-5"	5	975
42"	SEE STD. DWG. D-PE-42A				2'-2"	1'-0"	1'-10 3/8"	5'-0"	6	1,300
48"	SEE STD. DWG. D-PE-48A				2'-2"	1'-0"	1'-5"	5'-7"	7	1,669

NOTE:
BOLTS SHALL NOT EXTEND MORE THAN ½" ABOVE TOP OF NUTS.

GENERAL NOTES

(A) DRAWING TO BE USED FOR ALL 15" THRU 48" SIDE DRAIN CONCRETE ENDWALLS. FOR ENDWALL CONSTRUCTION DIMENSIONS AND QUANTITIES, EXCEPT STEEL PIPE GRATES, SEE THE FOLLOWING STANDARD DRAWINGS:

15" ENDWALL - SEE D-PE-15A & D-PE-15B WITH 6:1 WINGWALL SLOPE
18" ENDWALL - SEE D-PE-18A & D-PE-18B WITH 6:1 WINGWALL SLOPE
24" ENDWALL - SEE D-PE-24A & D-PE-24B WITH 6:1 WINGWALL SLOPE
30" ENDWALL - SEE D-PE-30A & D-PE-30B WITH 6:1 WINGWALL SLOPE
36" ENDWALL - SEE D-PE-36A & D-PE-36B WITH 6:1 WINGWALL SLOPE
42" ENDWALL - SEE D-PE-42A & D-PE-42B WITH 6:1 WINGWALL SLOPE
48" ENDWALL - SEE D-PE-48A & D-PE-48B WITH 6:1 WINGWALL SLOPE

(B) NOTE: 15" THRU 48" SIDE DRAIN CONCRETE ENDWALL REQUIRES STEEL PIPE GRATES SHOWN ON THIS DRAWING. THE CONTRACTOR SHALL OMIT THE CONCRETE BLOCKOUTS AS SHOWN ON THE ABOVE DRAWINGS AND SUBSTITUTE THE FOLLOWING REINFORCING BARS:

30" ENDWALL - SUBSTITUTE A465 & A466 BY EXTENDING A464 TO 19'-5"
36" ENDWALL - SUBSTITUTE A464 & A465 BY EXTENDING A463 TO 23'-0"
42" ENDWALL - SUBSTITUTE A465 (2 BARS), A466 & A467 BY EXTENDING A464 TO 26'-0"
48" ENDWALL - SUBSTITUTE A465 (2 BARS), A466 & A467 BY EXTENDING A464 TO 29'-7"

(C) THE MATERIALS, WELDING AND PAINTING FOR STRUCTURAL STEEL GRATE SHALL CONFORM TO THE FOLLOWING SPECIFICATIONS:

1. ANGLES: ASTM A36
2. STEEL PIPE: ASTM A53, TYPE E, GRADE B, STANDARD WEIGHT (SW) FOR 15" THRU 24" DIAMETER PIPE CULVERT (STEEL GRATE IS OPTIONAL FOR 15" THRU 24" DIAMETER PIPE CULVERT). ASTM A53, TYPE E, GRADE B, DOUBLE EXTRA STRONG WEIGHT (XXS) - FOR 30" THRU 48" DIAMETER PIPE CULVERT.
3. WELDING: AASHTO/AWS D1.5M/D1.5 BRIDGE WELDING CODE (LATEST EDITION)
4. ALL STEEL GRATES SHALL BE GALVANIZED.

THE MATERIAL AND GALVANIZING FOR BOLTS, NUTS AND WASHERS SHALL CONFORM TO THE FOLLOWING SPECIFICATIONS:

1. BOLTS, NUTS AND WASHERS: ASTM F1554 GRADE 36
2. GALVANIZING: ASTM A153

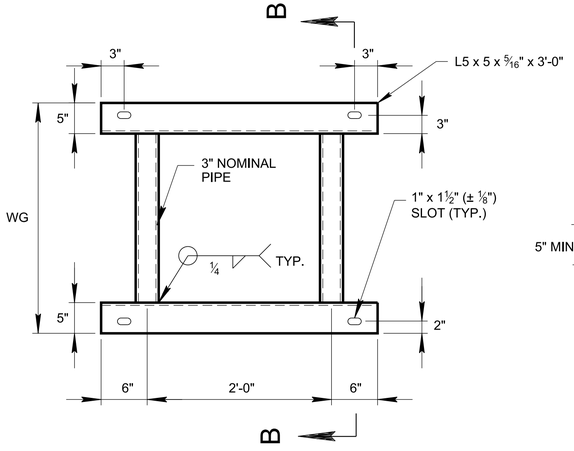
(D) THE COST OF FURNISHING BOLTS, NUTS AND WASHERS, INCLUDING ALL MATERIALS, LABOR AND INCIDENTALS NECESSARY TO COMPLETE THE INSTALLATION, SHALL BE INCLUDED IN THE PRICE BID FOR STRUCTURAL STEEL.

(E) PAYMENT WILL BE MADE UNDER ITEM NUMBERS:

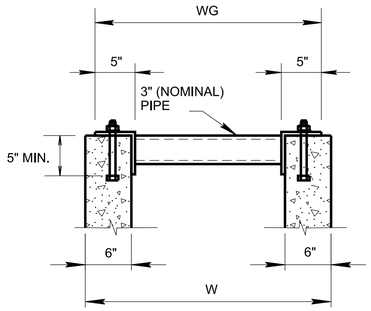
611-07.30	15IN ENDWALL (SIDE DRAIN)	EACH
611-07.31	18IN ENDWALL (SIDE DRAIN)	EACH
611-07.32	24IN ENDWALL (SIDE DRAIN)	EACH
611-07.33	30IN ENDWALL (SIDE DRAIN)	EACH
611-07.34	36IN ENDWALL (SIDE DRAIN)	EACH
611-07.35	42IN ENDWALL (SIDE DRAIN)	EACH
611-07.36	48IN ENDWALL (SIDE DRAIN)	EACH

(F) THE CONTRACTOR MAY ELECT TO SUBSTITUTE AN APPROVED ALTERNATIVE DESIGN

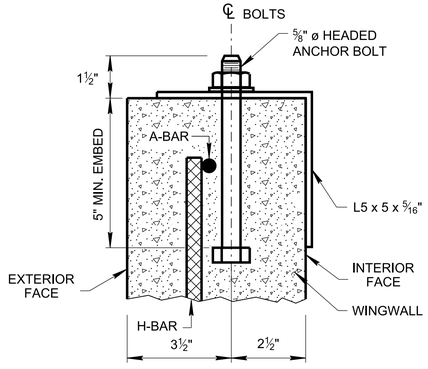
(G) DIMENSIONAL AND REINFORCING TOLERANCES WILL BE AS SHOWN IN STANDARD OPERATING PROCEDURE (SOP) 5-3.



PLAN

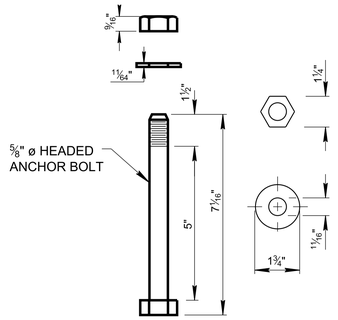


SECTION B-B
SHOWING ANCHOR BOLTS AND PARTIAL WINGWALLS



ANCHOR BOLT ASSEMBLY

STEEL PIPE GRATE



ANCHOR BOLT DETAIL

ALTERNATE ANCHORS FOR STRUCTURAL STEEL GRATES

CERTIFICATION:
DRILLED-IN EPOXY ANCHORS OR CAST-IN THREADED INSERTS MAY BE UTILIZED IN LIEU OF CAST-IN HEADED ANCHOR BOLTS PROVIDED THAT THE CONTRACTOR FURNISHES CERTIFIED ANCHOR PULL OUT DATA FROM AN INDEPENDENT TESTING LABORATORY USING CLASS "A" CONCRETE AS PRESCRIBED BY TENNESSEE HIGHWAY SPECIFICATIONS. THE REQUIRED ULTIMATE LOAD FOR ⅝" DIAMETER ANCHORS IS 10,000 POUNDS.

- REV. 7-10-12: REVISED ALTERNATE ANCHORS FOR STRUCTURAL STEEL GRATES NOTE.
- REV. 1-10-13: CHANGED REQUIREMENT FOR GRATE ON ALL ENDWALLS.
- REV. 6-14-13: REVISED NOTE (E), ADDED NOTES (F) AND (G).
- REV. 3-16-17: REVISED GENERAL NOTES. ADDED FOOTNOTE TO TABLE.
- REV. 06-28-19: RENAMED AND REDREW SHEET.
- REV. 10-16-20: REVISED SLOT DIMENSION, ADDED ANCHOR BOLT DETAIL AND REVISED 18" PIPE GRATE PLACEMENT DIMENSIONS.

- MINOR REVISION -- FHWA APPROVAL NOT REQUIRED

STATE OF TENNESSEE
STANDARD DRAWING
DEPARTMENT OF TRANSPORTATION

TYPE "SAFETY" SIDE DRAIN ENDWALL WITH STEEL PIPE GRATE, FOR 15" THRU 48" PIPES, 6:1 SLOPE

03-01-2012 | D-SEW-1A

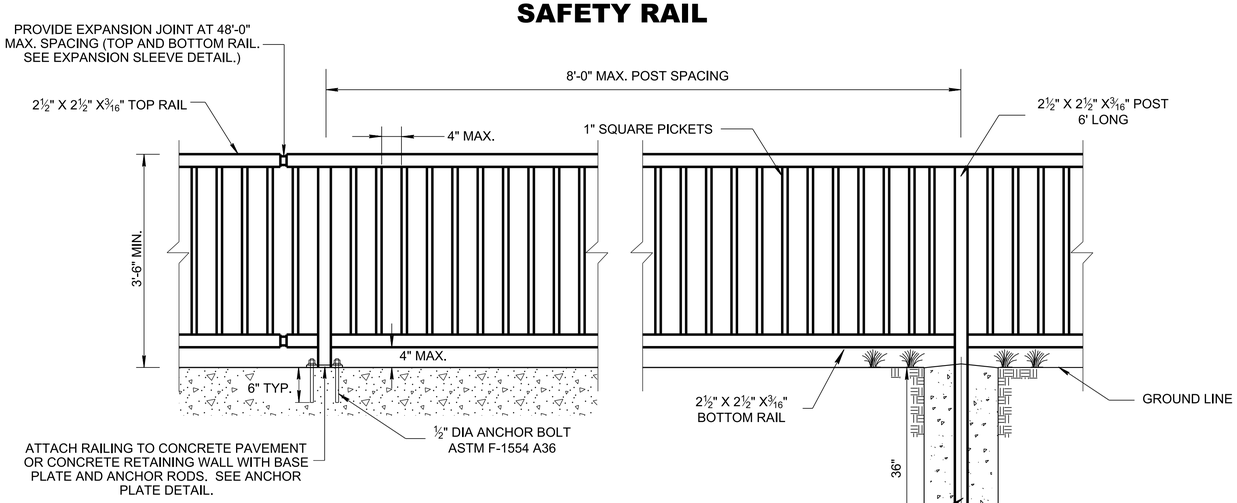
NOT TO SCALE

LLP

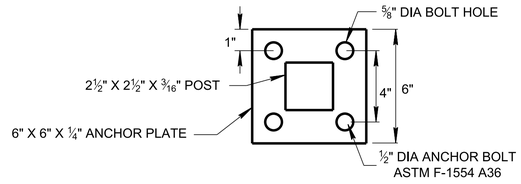
10/16/2020 10:44:41 AM
P:\StandDraw\DESIGN STANDARDS\Standards Drawings Library\Standard Roadway Drawings - CURRENT\In Progress\10-101.00 Pipe Culverts and Endwalls IP\101.03 Safety Side Drain Endwalls IP\DSEW1A-2019

REV. 10-16-20: REVISED ANCHOR BOLTS SIZE. UPDATED GENERAL NOTE (D).

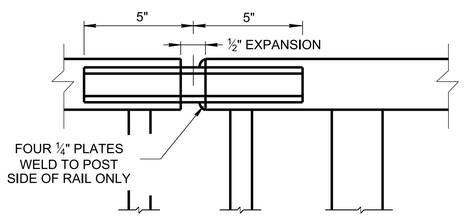
SAFETY RAIL



POST BOLTED TO CONCRETE

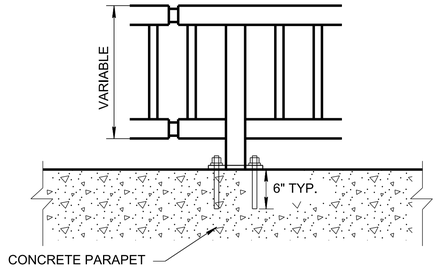


ANCHOR PLATE DETAIL



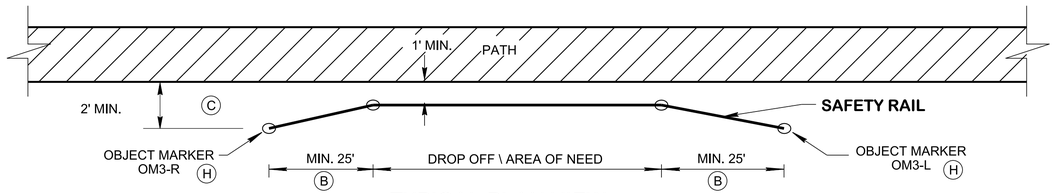
EXPANSION SLEEVE DETAIL (F)

POST SET IN GROUND

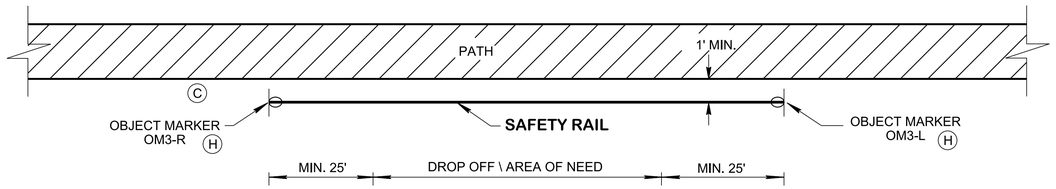


ALTERNATE INSTALLATION

RETROFITING EXISTING CONCRETE BARRIER TO MEET MIN 42" HIGH PED/BIKE SAFE RAIL



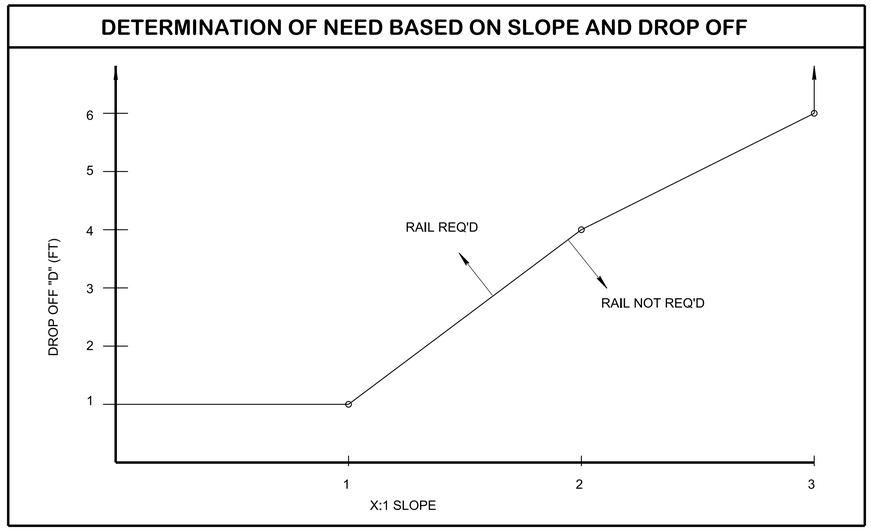
TYPICAL PLAN VIEW SIDEWALK OR SHARED USED PATH

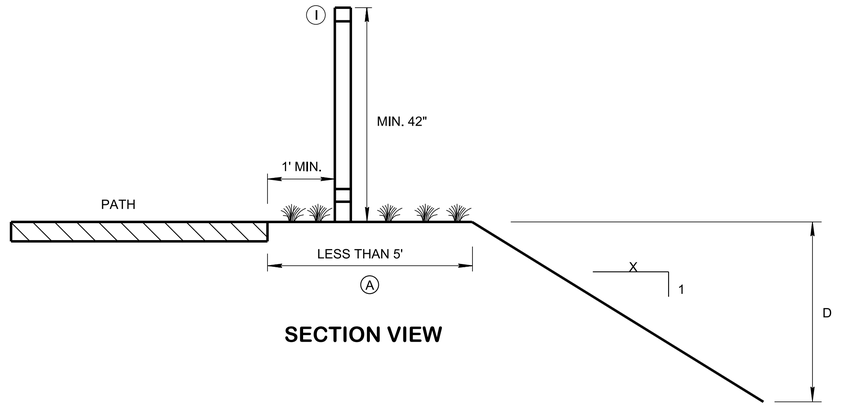


ALTERNATE PLAN VIEW

FIGURE 1

DETERMINATION OF NEED BASED ON SLOPE AND DROP OFF





SECTION VIEW

GENERAL NOTES

(A) TO DETERMINE IF SAFETY RAIL IS REQUIRED, REFER TO FIGURE 1 WHEN SHARED USE PATH OR SIDEWALK EDGE DROP OFF IS WITHIN 5'. INFORMATION IS PROVIDED FOR GUIDANCE ONLY, SOME SITES MAY REQUIRE A RAIL PER ENGINEERING JUDGEMENT. IF SIDEWALK IS ALONG A ROADWAY, SEE STANDARD DRAWING S-PL-6 FOR SAFETY HARDWARE PLACEMENT.

(B) SAFETY RAIL SHALL BEGIN 25' BEFORE AND EXTEND 25' BEYOND AREA OF NEED.

(C) SAFETY RAIL ENDS SHALL BE FLARED TO BEYOND 2' OF THE EDGE OF THE PATH OR MARKED WITH OBJECT MARKERS.

(D) STEEL (INCLUDING ANCHOR BLOLTS) SHALL CONFORM TO ASTM A36. WELD ALL COMPONENTS USE 3/16" FILLET WELDS. GRIND WELDS AND CONNECTIONS AS REQUIRED TO PROVIDE A SMOOTH SURFACE, FREE OF BURRS.

(E) FIELD PAINT SAFETY RAIL AFTER INSTALLATION AS SPECIFIED IN THE CONTRACT DOCUMENTS.

(F) DETAIL SHOWN IS FOR TOP RAIL. EXPANSION JOINT FOR BOTTOM RAIL IS SIMILAR.

(G) SYSTEM REPLACEMENTS MAY BE ALLOWED PROVIDING THAT THE HEIGHT AND SPACING LIMITATIONS SHOWN ON THIS DRAWING ARE MET.

(H) ALL COST ASSOCIATED WITH THE SAFETY RAIL, FURNISHING, INSTALLING AND PAINTING ALONG WITH THE OBJECT MARKERS WILL BE INCLUDES IN ITEM NO. 604-01.20, BOX TUBE SAFETY RAIL, PER LINEAR FOOT.

(I) STANDARD RIGHT-OF-WAY CHAIN LINK FENCE, 4' HEIGHT MAY BE USED AS AN ALTERNATIVE TO THE BOX TUBE SAFETY RAIL. SEE STANDARD DRAWING S-F-10B FOR CHAIN LINK FENCE DETAILS. ALL COST OF THE OBJECT MARKERS WILL BE INCLUDES IN ITEM NO. 707-01.01. CHAIN LINK FENCE IS TO BE PAID FOR UNDER ITEM NUMBERS:

707-01.01	CHAIN-LINK FENCE (4-FOOT)	PER L.F.
707-01.02	END & CORNER POST ASSEMBLY(CHAIN-LINK FENCE 4')	PER EACH
707-01-04	GATE - CHAIN-LINK FENCE-4 FOOT (DESCRIPTION)	PER EACH

(Replaced Std Dwg S-BPR-1)

STATE OF TENNESSEE
STANDARD DRAWING
DEPARTMENT OF TRANSPORTATION

BIKE AND PEDESTRIAN SAFETY RAIL

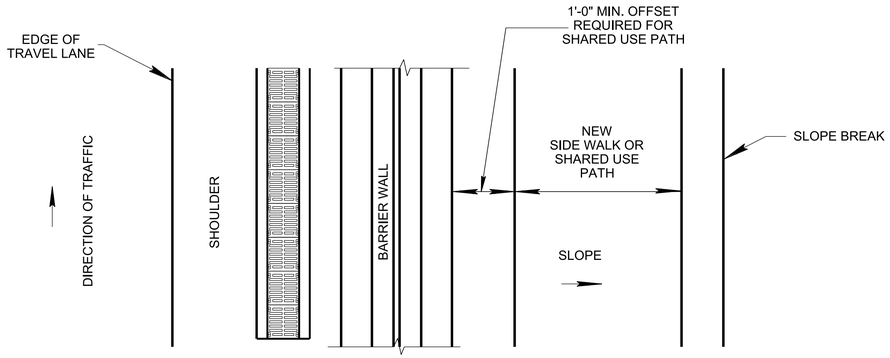
01-07-2019

MM-BPR-1

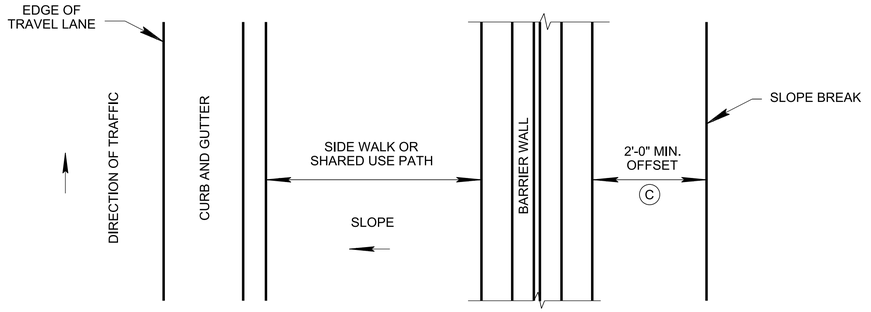
NOT TO SCALE

LLP

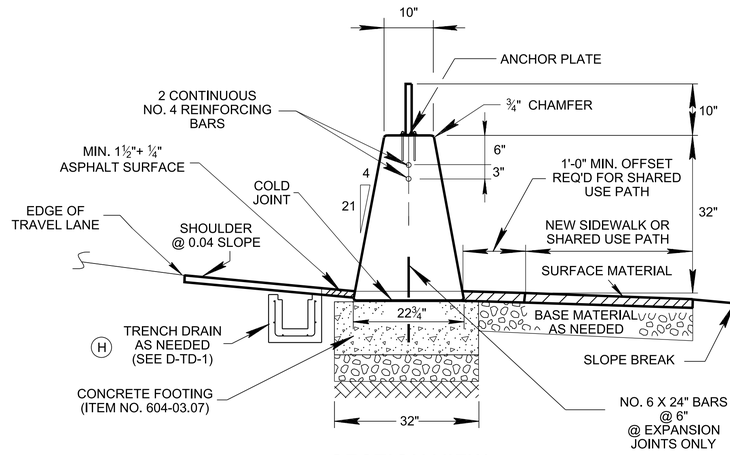
REV. 10-16-20: REVISED ANCHOR BOLT AND HOLE SIZES.



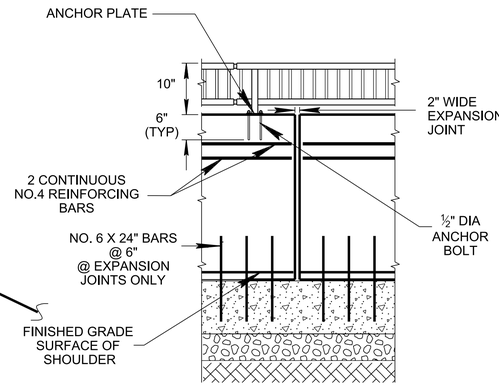
PLAN VIEW



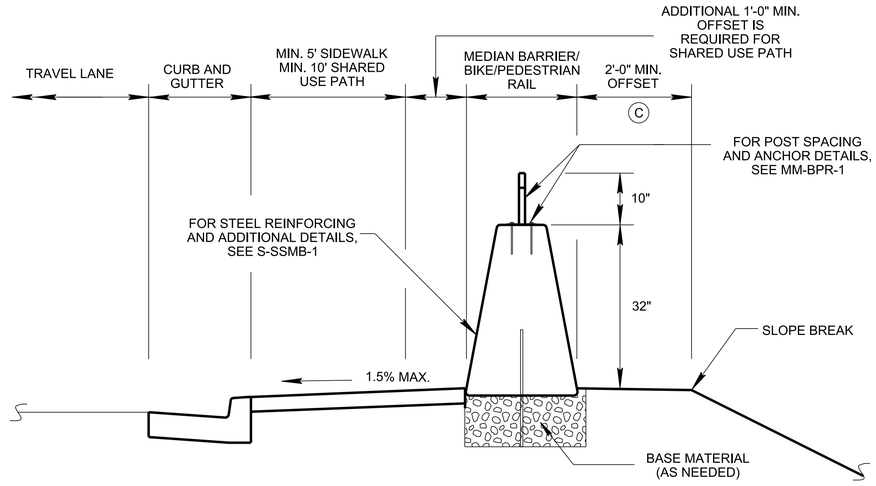
PLAN VIEW



SECTION VIEW



ELEVATION VIEW



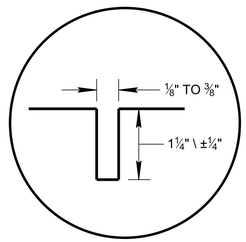
SECTION VIEW

TYPICAL CROSS-SECTION Ⓔ
HIGH SPEED TRAVEL LANE (SPEED > 45 MPH)

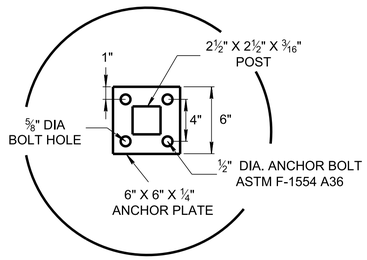
BARRIER PLACEMENT TO PROTECT
NON-MOTORIZED USERS

TYPICAL CROSS-SECTION Ⓓ
LOW SPEED TRAVEL LANE

BARRIER PLACEMENT TO PROTECT
MOTORIZED AND NON-MOTORIZED USERS



CONTRACTION JOINT DETAIL



ANCHOR PLATE DETAIL

GENERAL NOTES

Ⓐ REFER TO STD. DWG. MM-TS-3 FOR ADDITIONAL DETAILS.

Ⓑ REFER TO STD. DWG. RD11-TS-SERIES FOR MINIMUM SHOULDER WIDTH REQUIREMENTS DURING REHABILITATION PROJECTS.

Ⓒ IF CONCRETE BARRIER IS INSTALLED WITH FOUNDATION SHOWN IN SECTION A-A ON S-PL-4, MINIMUM OFFSET MAY BE REDUCED TO 0'.

Ⓓ THIS DETAIL SHOULD BE USED AT LOCATIONS WHERE DROP-OFF WOULD WARRANT GUARDRAIL.

Ⓔ THE INTENT OF THIS PLACEMENT IS TO PROVIDE POSITIVE PROTECTION FOR NON-MOTORIZED USERS.

Ⓕ THE BLUNT END OF THE BARRIER RAIL SHALL BE PROTECTED BY A CRASH CUSHION (SEE S-CC-1), OR BY AN END TERMINAL IF LOCATED WITHIN THE CLEAR ZONE.

Ⓖ PAYMENT FOR BARRIER MEDIAN RAIL WILL BE UNDER ITEM NO'S:

604-01.20	BOX TUBE SAFETY RAIL	PER LINEAR FOOT
711-05.70	32 IN SINGLE SLOPE CONCRETE BARRIER WALL	PER LINEAR FOOT

Ⓗ REHABILITATION PROJECTS MAY REQUIRE DRAINAGE STRUCTURE LOCATIONS WHERE STORM DRAINAGE IS NOT EXISTING.

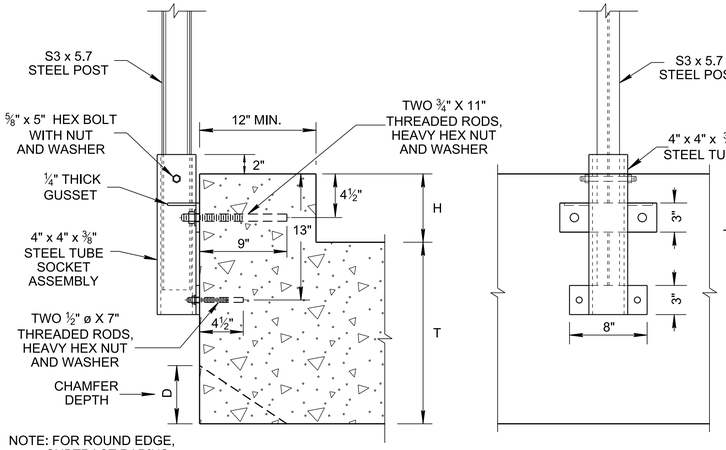
NOT TO SCALE

(Replaced Std Dwg S-BPR-2)

STATE OF TENNESSEE
STANDARD DRAWING
DEPARTMENT OF TRANSPORTATION

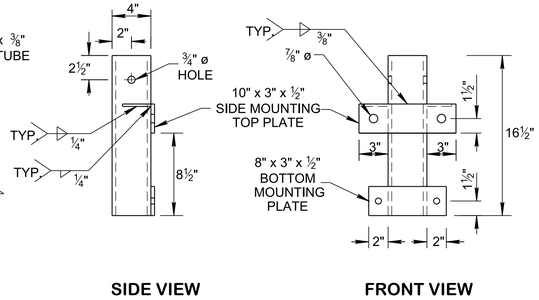
BIKE AND PEDESTRIAN MEDIAN BARRIER RAIL

01-07-2019 | MM-BPR-2



CROSS SECTION

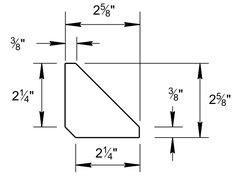
ELEVATION



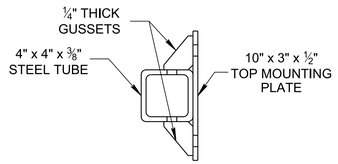
SIDE VIEW

FRONT VIEW

SOCKET ASSEMBLY VIEWS

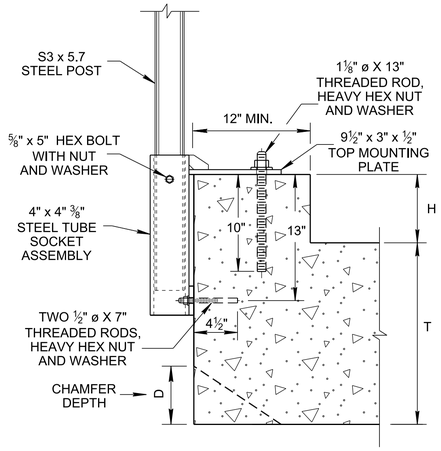


¼" THICK GUSSET

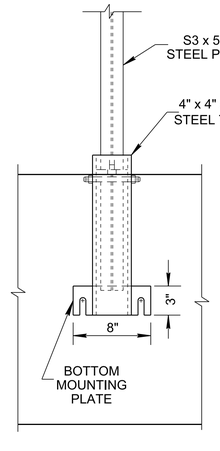


TOP VIEW

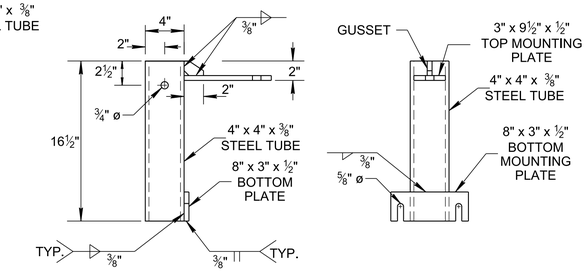
SIDE MOUNT - TYPE 3
FOR (H + T - D) ≥ 18"



CROSS SECTION



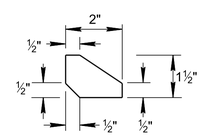
ELEVATION



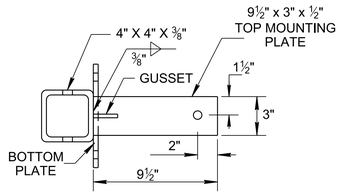
SIDE VIEW

FRONT VIEW

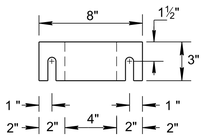
SOCKET ASSEMBLY VIEWS



½" THICK GUSSET



TOP PLATE VIEW



BOTTOM PLATE

TOP AND SIDE MOUNT - TYPE 4
FOR (H + T- D) ≥ 18"

GENERAL NOTES

(A) INSTALL THREADED ROD USING EPOXY ADHESIVE MATERIAL FROM QUALIFIED PRODUCT LIST.

(B) ALL THREADED RODS AND BOLTS SHALL BE INSTALLED WITH HEAVY HEX NUTS AND STANDARD WASHERS AND SHALL BE GALVANIZED.
THREADED ROAD SHALL BE CONFORM TO ASTM A307/ ASTM F1554 GRADE 36, HEAVY HEX NUTS SHALL BE ASTM A563A AND ⅝" HEAVY HEX BOLT SHALL BE ASTM A325.

(C) THE SQUARE TUBE SHALL BE ASTM A500 GRADE B GALVANIZED STEEL.

(D) THE TOP AND BOTTOM MOUNTED PLATES AND GUSSET PLATE SHALL BE ASTM A572 GRADE 50 GALVANIZED STEEL. ALL MOUNTING ASSEMBLY SHALL BE GALVANIZED AFTER WELDING.

(E) ALL WELDING SHALL BE PERFORMED BY A WELDER QUALIFIED IN ACCORDANCE WITH THE AASHTO/AWS D1.5M/D1.5 BRIDGE WELDING CODE (LATEST EDITION).

PAYMENT

(F) PAYMENT FOR ASSEMBLY ELEMENTS SUCH AS SQUARE TUBE, HARDWARE INCLUDING DRILLING AND INSTALLING THREADED ROADS, NUTS AND BOLTS, WASHERS AND ALL PLATES WILL BE INCLUDED IN THE WEAK-POST GUARDRAIL ITEM NUMBER.

STATE OF TENNESSEE
STANDARD DRAWING
DEPARTMENT OF TRANSPORTATION

WEAK- POST GUARDRAIL ASSEMBLY DETAILS FOR TYPE 3 & 4

10-16-2020 | S-GRS-5B

NOT TO SCALE

LLP

10/16/2020 11:34:41 AM
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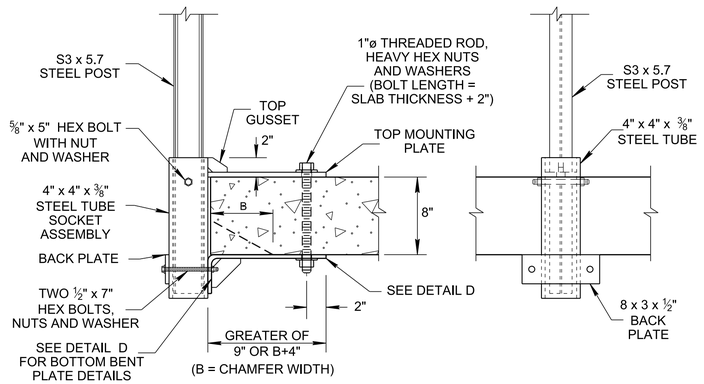
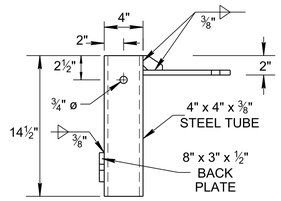
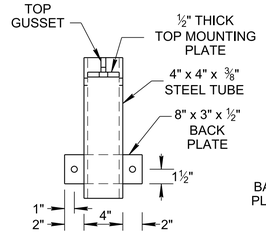


CROSS SECTION

ELEVATION

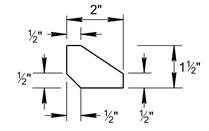


SIDE VIEW

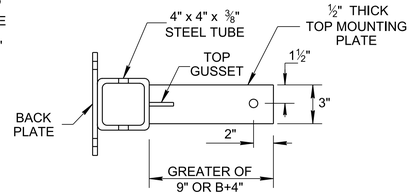


FRONT VIEW

SOCKET ASSEMBLY VIEWS



½" THICK TOP GUSSET

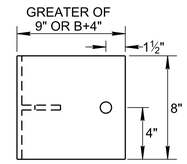


TOP PLATE VIEW

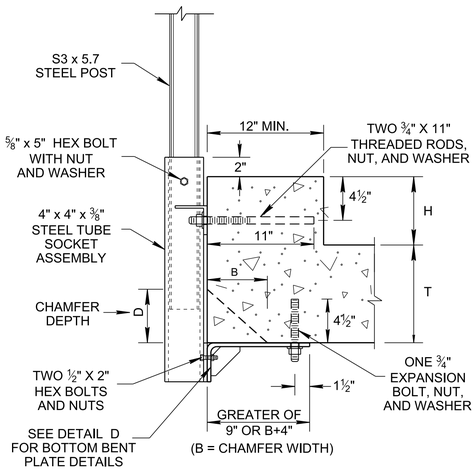
TOP AND BOTTOM MOUNT- SINGLE ANCHOR- TYPE 1 FOR SLAB THICKNESS < 18"

(8" SLAB IS SHOWN)

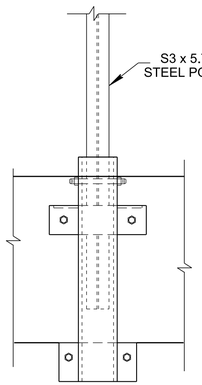
NOTE: HARDWARE DIMENSIONS NEED ADJUSTMENT FOR SLABS THICKER THAN 8".



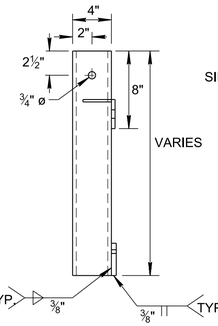
PLAN VIEW



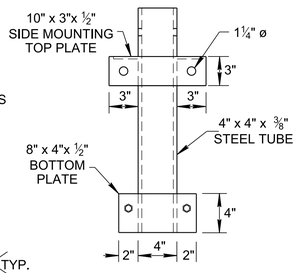
CROSS SECTION



ELEVATION

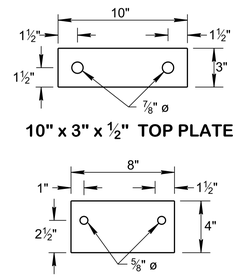


SIDE VIEW



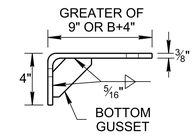
FRONT VIEW

SOCKET ASSEMBLY VIEWS

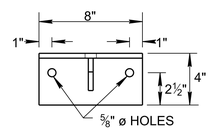


10" x 3" x ½" TOP PLATE

8" x 4" x ½" BOTTOM PLATE

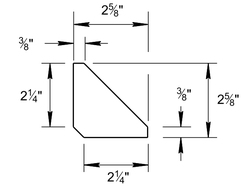


SIDE VIEW



ELEVATION VIEW

DETAIL D
FOR BOTTOM BENT PLATE



½" THICK BOTTOM GUSSET

GENERAL NOTES

(A) INSTALL THREADED ROD USING EPOXY ADHESIVE MATERIAL FROM QUALIFIED PRODUCT LIST.

(B) ALL THREADED RODS AND BOLTS SHALL BE INSTALLED WITH HEAVY HEX NUTS AND STANDARD WASHERS AND SHALL BE GALVANIZED.
THREADED ROAD SHALL BE CONFORM TO ASTM A307/ ASTM F1554 GRADE 36, HEAVY HEX NUTS SHALL BE ASTM A563A AND ⅝" HEAVY HEX BOLT SHALL BE ASTM A325.

(C) THE SQUARE TUBE SHALL BE ASTM A500 GRADE B GALVANIZED STEEL.

(D) THE TOP AND BOTTOM MOUNTED PLATES AND GUSSET PLATE SHALL BE ASTM A572 GRADE 50 GALVANIZED STEEL. ALL MOUNTING ASSEMBLY SHALL BE GALVANIZED AFTER WELDING.

(E) ALL WELDING SHALL BE PERFORMED BY A WELDER QUALIFIED IN ACCORDANCE WITH THE AASHTO/AWS D1.5M/D1.5 BRIDGE WELDING CODE (LATEST EDITION).

PAYMENT

(F) PAYMENT FOR ASSEMBLY ELEMENTS SUCH AS SQUARE TUBE, HARDWARE INCLUDING DRILLING AND INSTALLING THREADED ROADS, NUTS AND BOLTS, WASHERS AND ALL PLATES WILL BE INCLUDED IN THE WEAK-POST GUARDRAIL ITEM NUMBER.

SIDE AND BOTTOM MOUNT - TYPE 2 FOR (H + T - D) < 18"

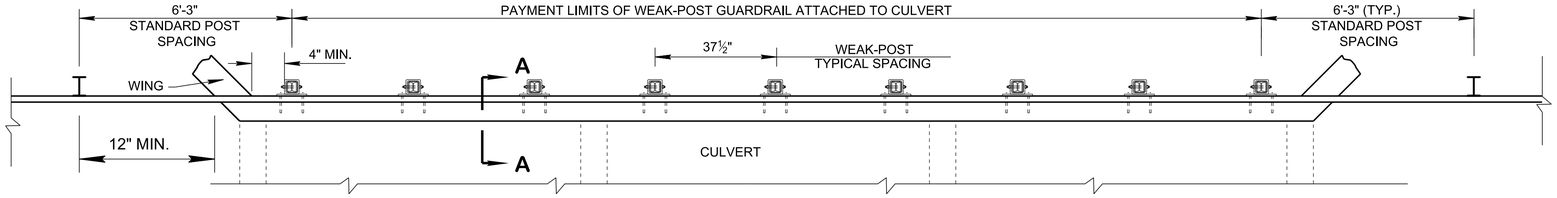
NOT TO SCALE

STATE OF TENNESSEE
STANDARD DRAWING
DEPARTMENT OF TRANSPORTATION

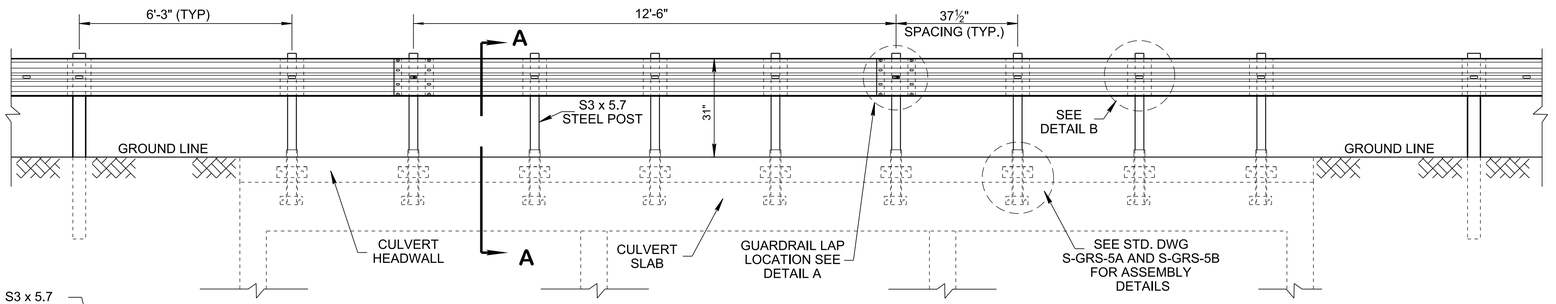
WEAK-POST GUARDRAIL ASSEMBLY DETAILS FOR TYPE 1 & 2

10-16-2020

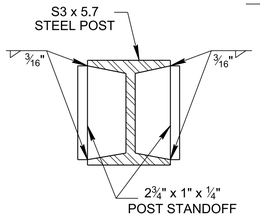
S-GRS-5A



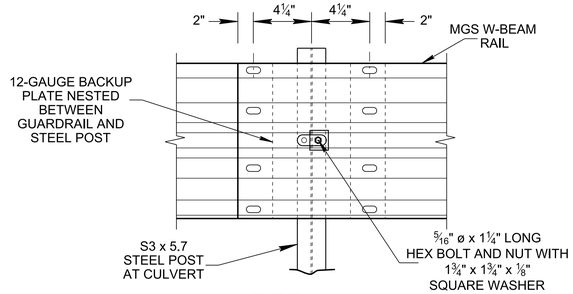
PLAN VIEW



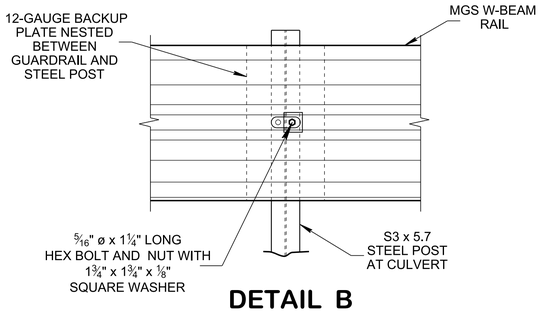
ELEVATION VIEW



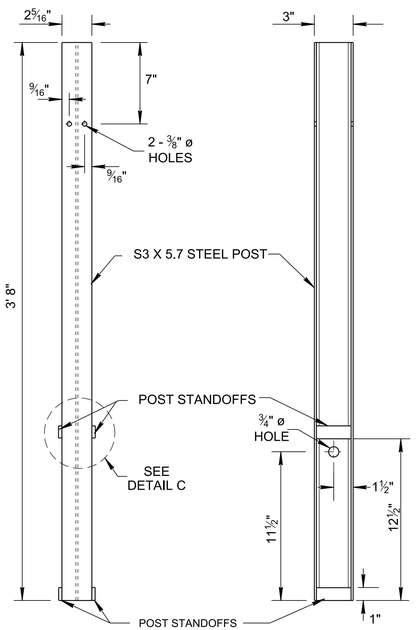
DETAIL C
PLAN VIEW



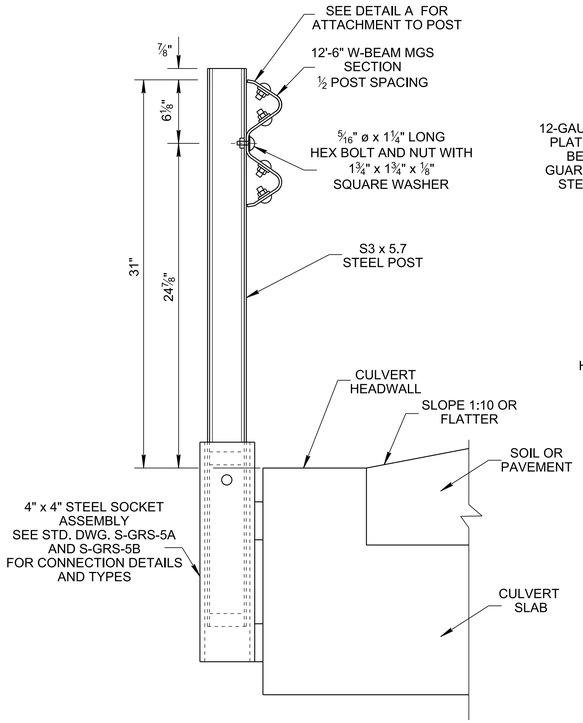
DETAIL A



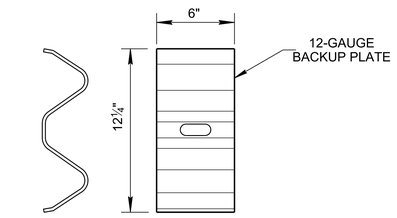
DETAIL B



STEEL POST



SECTION A - A



BACKUP PLATE

GENERAL NOTES

(A) THIS DRAWING TO BE USED FOR CONNECTING GUARDRAIL TO THE OUT SIDE FACE OF CULVERT HEADWALL AND SLAB. INSTALL WEAK-POST DURING MAINTENANCE AND BRIDGE REPAIR.

(B) THE WEAK-POST GUARDRAIL TO CULVERT ATTACHMENT TYPES ARE:

TYPE 1	TOP AND BOTTOM MOUNT FOR SLAB THICKNESS < 18".
TYPE 2	SIDE AND BOTTOM MOUNT FOR MOUNTING HEIGHT < 18".
TYPE 3	SIDE MOUNT FOR MOUNTING HEIGHT ≥ 18".
TYPE 4	TOP AND SIDE MOUNT FOR MOUNTING HEIGHT ≥ 18".

(C) SEE STANDARD DRAWINGS S-GRS-5A AND S-GRS-5B FOR MOUNTING DETAILS AND TYPES.

(D) ALL STEEL WEAK -POSTS SHALL BE S3X5.7 CONFORM TO ASTM A992 GRADE 50, BE GALVANIZED AND SPACED AT 37½" ON CENTERS ALONG THE CULVERT HEADWALL. BOLT HOLES SHALL BE APPROXIMATELY CENTERED BETWEEN WEB AND EDGE OF FLANGE.

(E) THE POST STANDOFF PLATE SHALL BE ASTM A36 STEEL GALVANIZED. ALL BOLTS, NUTS AND WASHERS TO BE GALVANIZED.

(F) WEAK-POST W-BEAM GUARDRAIL ATTACHED TO CULVERT HAS BEEN EVALUATED BY MIDWEST ROADSIDE SAFETY FACILITY AND MEET MASH TL-3 STANDARDS, AND THE EVALUATION HAS BEEN DOCUMENTED IN THE MIDWEST ROADSIDE MIDWEST STATES REGIONAL POOLED FUND PROGRAM RESEARCH REPORT No. TRP-03-277-14 DATED FEBRUARY 12, 2014.

(G) FOR NEW INSTALLATION, THE MINIMUM CULVERT HEADWALL REINFORCEMENT SHALL BE 4 -#4 LONGITUDINAL BARS AND #4 TRANSVERSE STIRRUPS SPACED ON 12 INCH CENTERS. THE MINIMUM CULVERT SLAB REINFORCEMENT SHALL BE #5 LONGITUDINAL BAR ON 12 INCH CENTERS AND #4 TRANSVERSE REINFORCEMENT ON 18 INCH CENTERS. SEE STANDARD STRUCTURES DRAWING STD-17-SERIES FOR CULVERT HEADWALL DIMENSIONS AND DETAILS.

(H) SEE STANDARD DRAWING S-GR31-1 SERIES FOR GUARDRAIL DETAILS FOR DETAILS NOT SHOWN IN THIS SHEET.

PAYMENT

(I) FURNISHING AND INSTALLING WEAK-POST W-BEAM GUARDRAIL ELEMENTS, POSTS, SQUARE TUBE, HARDWARE INCLUDING DRILLING AND INSTALLING THREADED ROADS, NUTS AND BOLTS, WASHERS AND ALL PLATES SHALL BE PAID UNDER.

705-06.09, WEAK-POST GR. ATTACHMENT TO CULVERT (MASH TL-3) (TYPE _) PER LF.

STATE OF TENNESSEE
STANDARD DRAWING
DEPARTMENT OF TRANSPORTATION

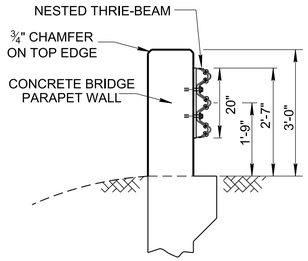
SPECIAL CASE WEAK-POST GUARDRAIL ATTACHMENT TO CULVERT

10-16-2020 | S-GRS-5

NOT TO SCALE

REV. 02-28-20: REVISED GENERAL NOTE Ⓐ.

REV. 10-16-20: RELOCATED SECTION C-C AND ADDED BLOCK-OUT NOTES ON PLAN VIEW. ADDED POST NUMBERS. ADJUSTED THE NUMBER OF POSTS ON ELEVATION VIEW. REVISED GENERAL NOTES Ⓓ, Ⓕ AND Ⓖ.

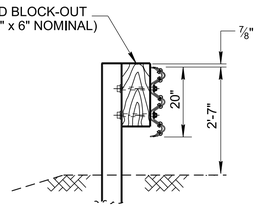


SECTION A-A

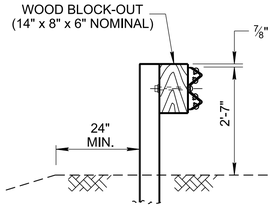
LEGEND

① 1⅛" POST OFFSET TO BOLT HOLE (TYPICAL)

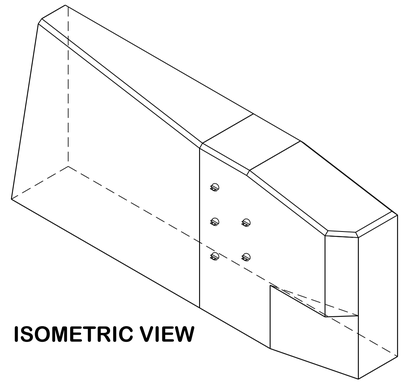
② FOR THE APPROACHING OPPOSITE SIDE OF THE ROADWAY THE DISTANCE IS 4' - 11 1/8" DUE TO POST BEING REVERSED AND BOLT HOLE OFFSET IS 2 1/4".



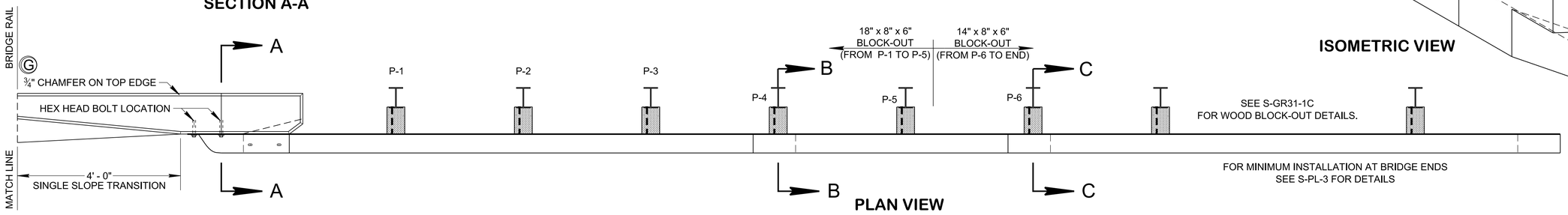
SECTION B-B



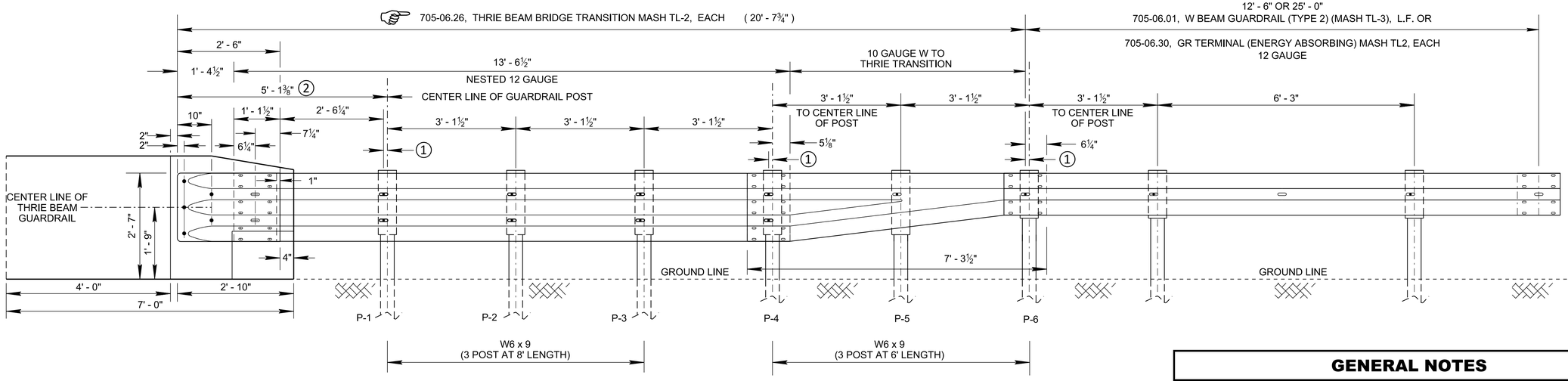
SECTION C-C



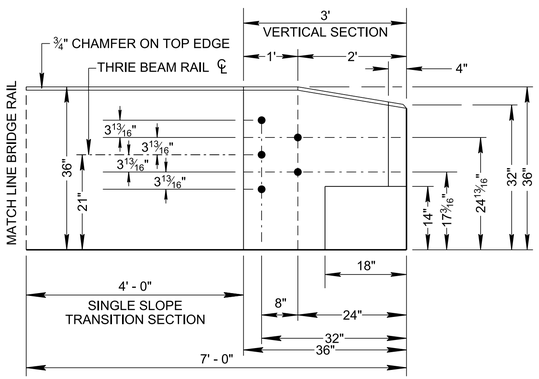
ISOMETRIC VIEW



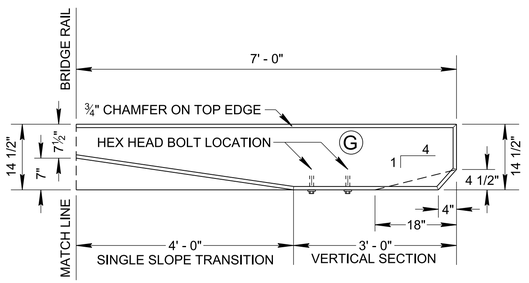
PLAN VIEW



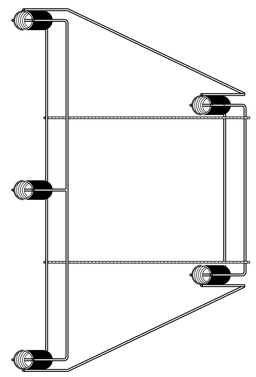
ELEVATION VIEW



WALL ELEVATION VIEW



PLAN VIEW



INSERT ASSEMBLY

CAST IN PLACE THREADED STEEL INSERT WITH 7/8" x 2" HEX HEAD GALVANIZED BOLTS (A307) HOT DIP ZINC COATING ASTM A153

CONCRETE BRIDGE PARAPET WALL DETAILS

GENERAL NOTES

Ⓐ THIS DRAWING IS TO BE USED AT ALL GUARDRAIL LEADING AND TRAILING TRANSITIONS TO BRIDGE RAIL WITH DESIGN SPEED OF = 45 M.P.H. (IF WARRANTED TO BE WITHIN THE CLEAR ZONE).

Ⓑ CONNECTION TO BRIDGE RAIL SHOWN; FOR CONNECTION TO CONCRETE MEDIAN BARRIER WALLS, SEE S-SSMB-6.

Ⓒ SEE STANDARD DRAWINGS STD-1 SERIES FOR BRIDGE RAILING DETAILS, S-GR31-1 SERIES FOR ALL OTHER GUARDRAIL DETAILS AND MATERIAL PROPERTIES NOT SHOWN AND S-PL-3 FOR MINIMUM LENGTH AND DELINEATOR REQUIREMENTS.

Ⓓ ALL COMPONENTS, AS SHOWN ON THIS DRAWING OR COMPONENTS NEEDED TO INSTALL THIS GUARDRAIL FROM THE END OF THE BRIDGE RAIL TO THE END OF THE THRIE BEAM TRANSITION (TOTAL LENGTH 20' - 7 3/4") SHALL BE INCLUDED UNDER ITEM 705-06.26, THRIE BEAM BRIDGE TRANSITION MASH TL-2, PER EACH. COMPONENTS INCLUDE BUT NOT LIMITED TO, THRIE BEAM TERMINAL CONNECTION, THRIE BEAM RAIL, THRIE BEAM TRANSITION PANEL, ALL COMPONENTS REQUIRED FOR ATTACHMENT OF THE THRIE BEAM RAILS TO THE BRIDGE RAIL AND POSTS.

Ⓔ BUTTON HEAD "POST" BOLTS (ASTM A307) SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT (ASTM A563) AND WASHER AND NOT MORE THAN 1" BEYOND IT. BUTTON HEAD "SPLICE" BOLTS (ASTM 307) ⅝" DIA. X 2" (AT TRIPLE RAIL SPLICES) WITH ⅝" DOUBLE RECESSED NUTS.

Ⓕ GALVANIZED WASHERS USED WITH THE 5/8" DIA. POST BOLTS SHALL BE TYPE A 1-3/4" O. D. WASHERS.

Ⓖ USE INSERT ASSEMBLY TO CONNECT THE THRIE BEAM GUARDRAIL TO THE BRIDGE RAIL USING 5 HEX HEAD BOLTS AT 7/8" Ø X 2" AND WASHERS.

Ⓗ SAFETY PERFORMANCE OF THIS DEVICE HAS BEEN EVALUATED PER TRB 2672(39) 41-51 DEVELOPMENT OF A STANDARDIZED BUTTRESS FOR APPROACH GUARDRAIL TRANSITIONS AND TTI REPORT 9-1002-8, FOR MASH TL-2.

☐ APPROVED BY FHWA
(ALL OTHERS APPROVED BY TDOT)

STATE OF TENNESSEE
STANDARD DRAWING
DEPARTMENT OF TRANSPORTATION

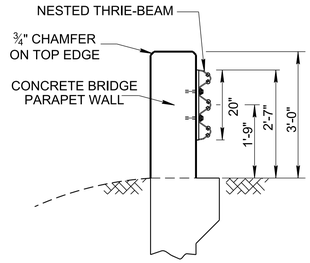
GUARDRAIL CONNECTION TO BRIDGE ENDS FOR LOW SPEED ROADWAYS

06-28-2019 | S-GRC-6

NOT TO SCALE

REV. 02-28-20: REVISED GENERAL NOTE Ⓐ.

REV. 10-16-20: RELOCATED SECTION C-C AND ADDED BLOCK-OUT NOTES ON PLAN VIEW. ADDED POST NUMBERS. ADJUSTED THE NUMBER OF POSTS ON ELEVATION VIEW. REVISED GENERAL NOTES Ⓓ Ⓕ AND Ⓖ.

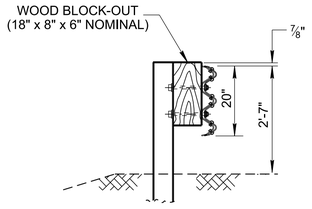


SECTION A-A

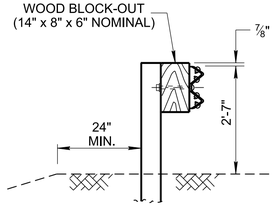
LEGEND

① 1⅛" POST OFFSET TO BOLT HOLE (TYPICAL)

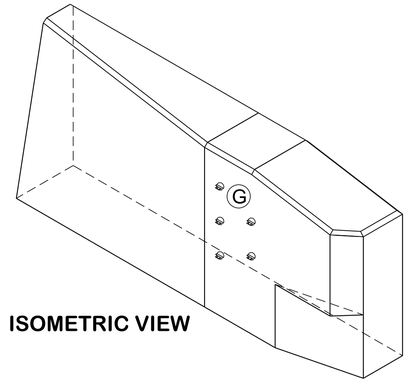
② FOR THE APPROACHING OPPOSITE SIDE OF THE ROADWAY THE DISTANCE IS 3' - 4 3/8" DUE TO POST BEING REVERSED AND BOLT HOLE OFFSET OF 2 1/4".



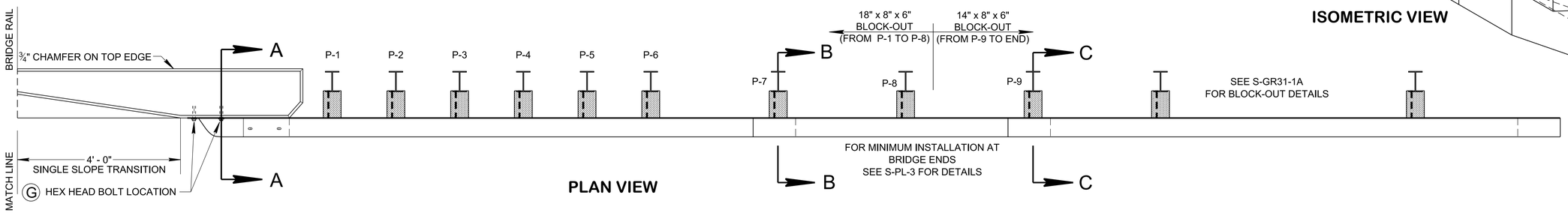
SECTION B-B



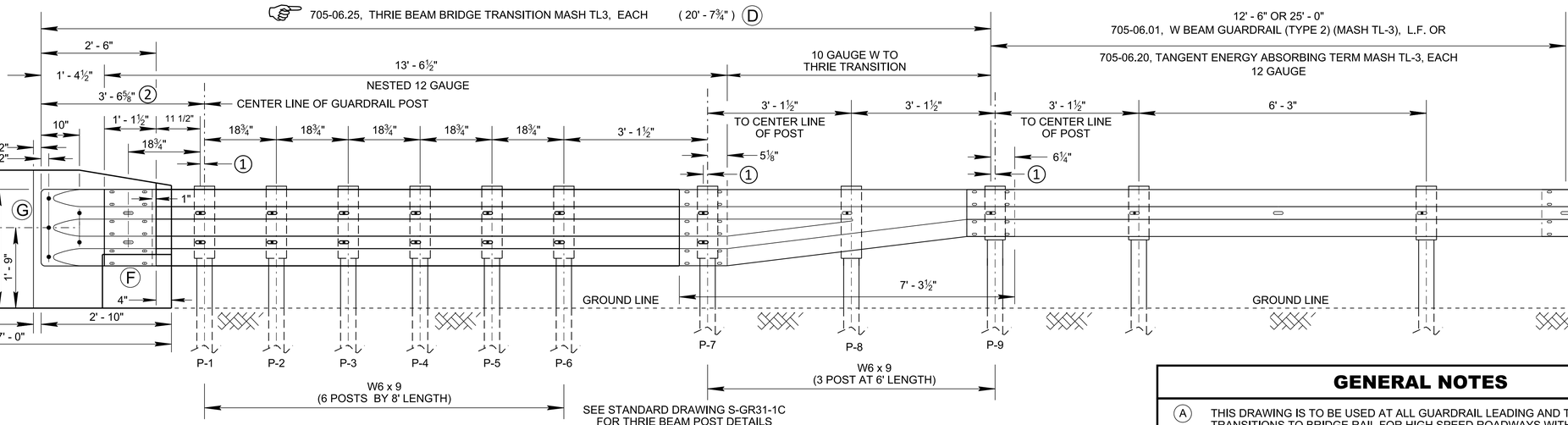
SECTION C-C



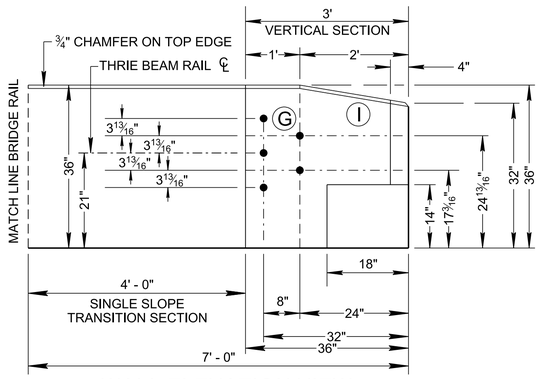
ISOMETRIC VIEW



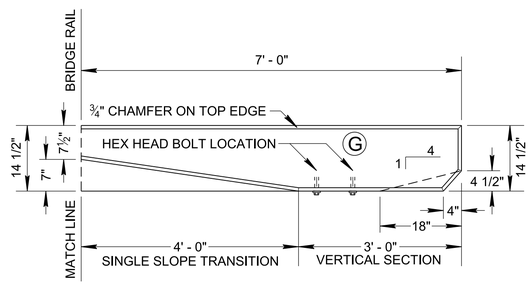
PLAN VIEW



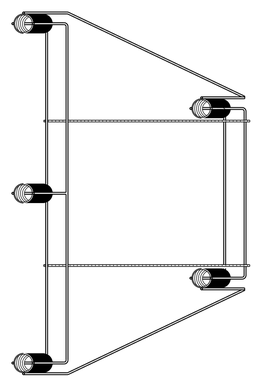
ELEVATION VIEW



WALL ELEVATION VIEW



PLAN VIEW



INSERT ASSEMBLY

CAST IN PLACE THREADED STEEL INSERT WITH 7/8" x 2" HEX HEAD GALVANIZED BOLTS (A307) HOT DIP ZINC COATING ASTM A153

CONCRETE BRIDGE PARAPET WALL DETAILS

GENERAL NOTES

Ⓐ THIS DRAWING IS TO BE USED AT ALL GUARDRAIL LEADING AND TRAILING ENDS TRANSITIONS TO BRIDGE RAIL FOR HIGH SPEED ROADWAYS WITH A DESIGN SPEED OF > 45 M.P.H. (IF WARRANTED TO BE WITHIN THE CLEAR ZONE).

Ⓑ CONNECTION TO BRIDGE RAIL SHOWN; FOR CONNECTION TO CONCRETE MEDIAN BARRIER WALLS, SEE STANDARD DRAWING S-SSMB-6F.

Ⓒ SEE STANDARD DRAWINGS STD-1 SERIES FOR BRIDGE RAILING DETAILS, S-GR31-1 SERIES FOR ALL OTHER GUARDRAIL DETAILS AND MATERIAL PROPERTIES NOT SHOWN AND S-PL-3 FOR MINIMUM LENGTH AND DELINEATOR REQUIREMENTS.

Ⓓ ALL COMPONENTS, AS SHOWN ON THIS DRAWING OR COMPONENTS NEEDED TO INSTALL THIS GUARDRAIL FROM THE END OF THE BRIDGE RAIL TO THE END OF THE THRIE BEAM TRANSITION (TOTAL LENGTH 20' - 7 3/4") SHALL BE INCLUDED UNDER ITEM 705-06.25, THRIE BEAM BRIDGE TRANSITION MASH TL-3, PER EACH. COMPONENTS INCLUDE BUT NOT LIMITED TO, THRIE BEAM TERMINAL CONNECTION, THRIE BEAM RAIL, THRIE BEAM TRANSITION PANEL, ALL COMPONENTS REQUIRED FOR ATTACHMENT OF THE THRIE BEAM RAILS TO THE BRIDGE RAIL AND POSTS.

Ⓔ BUTTON HEAD "POST" BOLTS (ASTM A307) SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT (ASTM A563) AND WASHER AND NOT MORE THAN 1" BEYOND IT. BUTTON HEAD "SPLICE" BOLTS (ASTM 307), ⅝" DIA. X 2" (AT THRIE-BEAM RAIL SPLICES) WITH ⅝" DOUBLE RECESSED NUTS.

Ⓕ GALVANIZED WASHERS USED WITH THE 5/8" DIA. POST BOLTS SHALL BE TYPE A 1- 3/4" O. D. WASHERS.

Ⓖ USE INSERT ASSEMBLY TO CONNECT THE THRIE BEAM GUARDRAIL TO THE BRIDGE RAIL USING 5 HEX HEAD BOLTS AT 7/8" Ø X 2" AND WASHERS.

Ⓗ SAFETY PERFORMANCE OF THIS DEVICE HAS BEEN EVALUATED PER TRB 2672(39) 41-51 DEVELOPMENT OF A STANDARDIZED BUTTRESS FOR APPROACH GUARDRAIL TRANSITIONS AND TTI REPORT 9-1002-12-3, FOR MASH TL-3.

Ⓘ TRANSITION TO 36" MAY BE ELIMINATED WHEN 32" PARAPET WALL DESIGN IS USED.

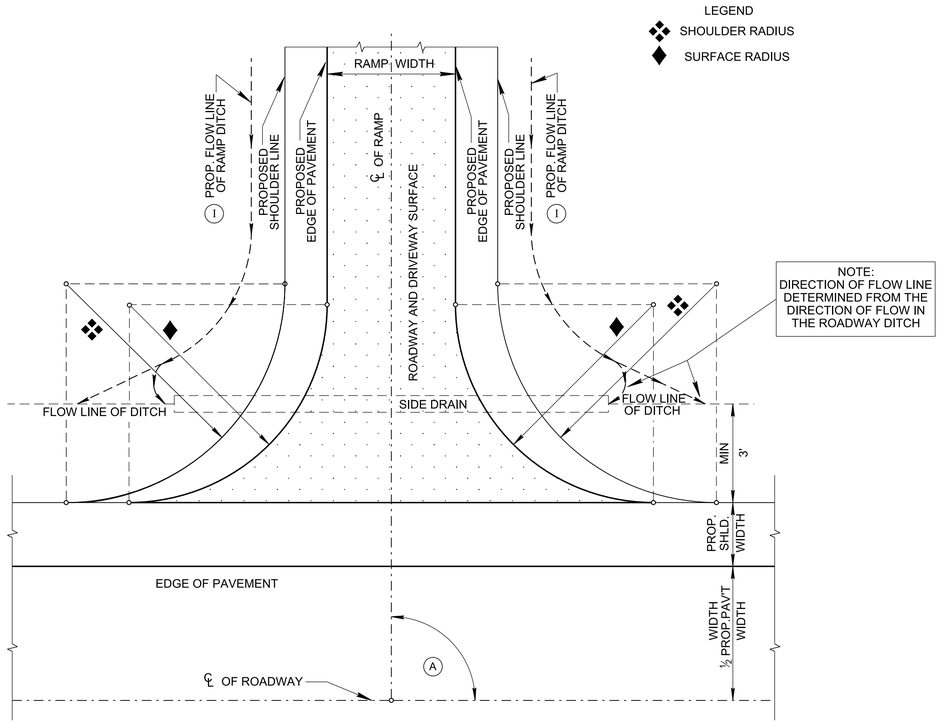
☐ APPROVED BY FHWA
(ALL OTHERS APPROVED BY TDOT)

STATE OF TENNESSEE
STANDARD DRAWING
DEPARTMENT OF TRANSPORTATION

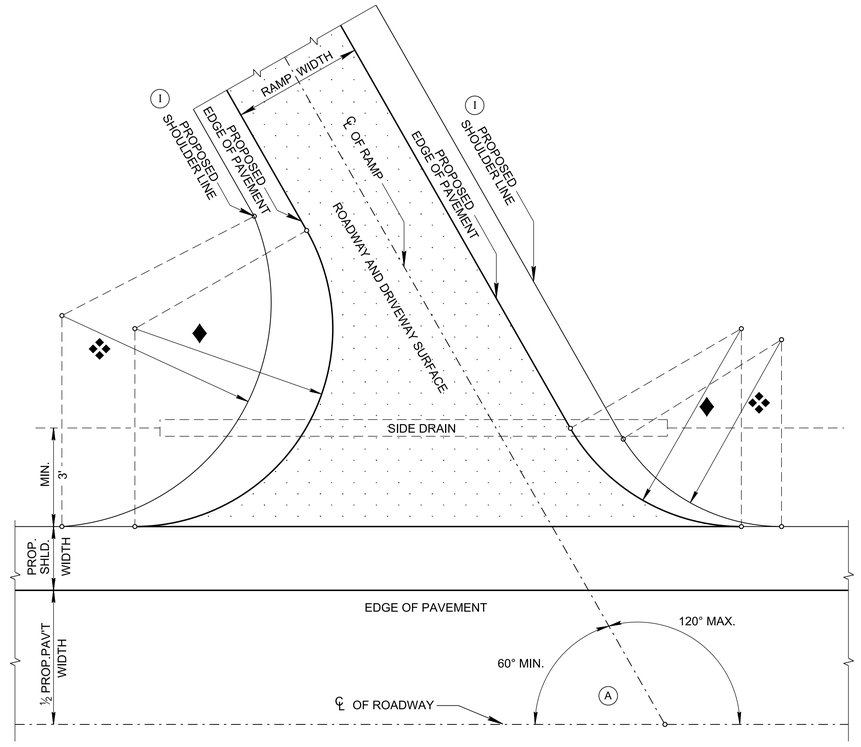
GUARDRAIL CONNECTION TO BRIDGE RAILING CONCRETE PARAPET

06-28-2019 | S-GRC-4

NOT TO SCALE

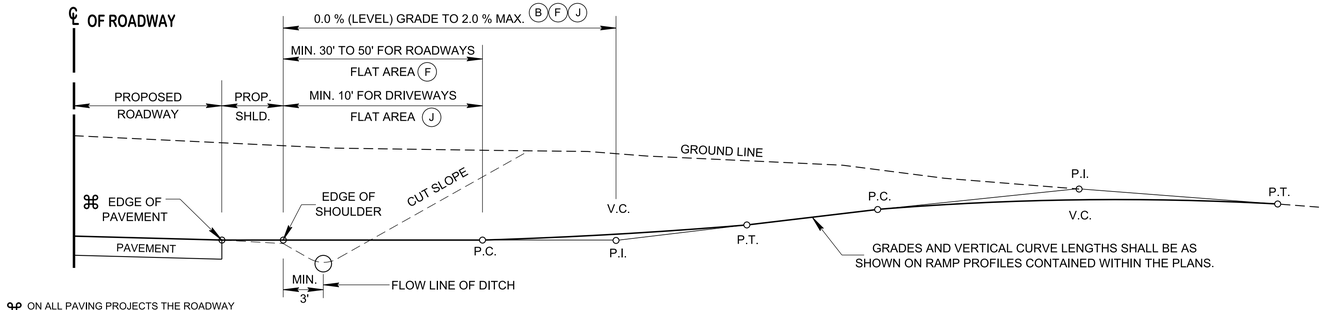


PLAN OF RAMP-90° WITH ℄ OF SURVEY



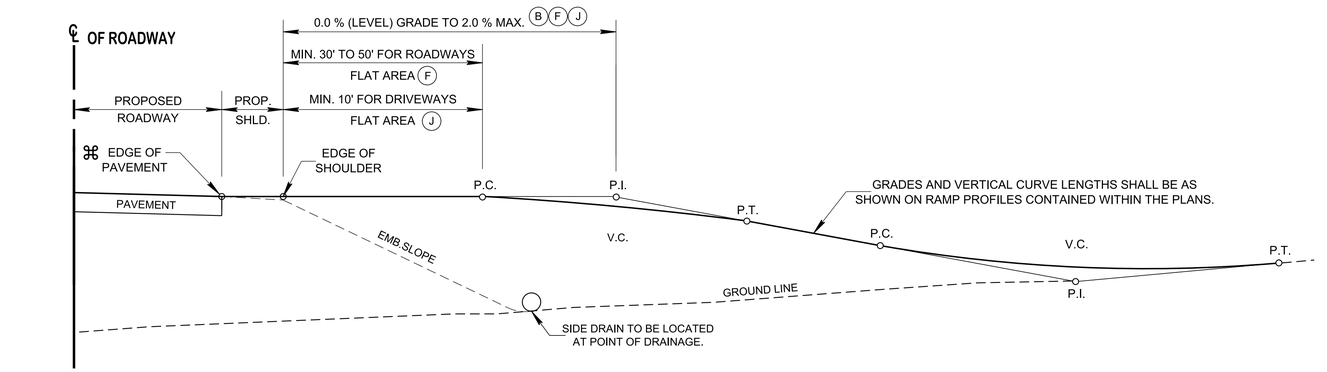
PLAN OF RAMP-SKEWED TO ℄ OF SURVEY

FLOW LINE ARE LEFT OUT FOR CLARITY



⌘ ON ALL PAVING PROJECTS THE ROADWAY AND DRIVEWAY SURFACE MATERIAL SHALL BE PLACED FLUSH WITH ADJACENT EDGE OF PAVEMENT.

℄ PROFILE OF RAMP IN EXCAVATION



℄ PROFILE OF RAMP IN EMBANKMENT

GENERAL NOTES

(A) ALIGNMENT OF INTERSECTING ROADWAYS AND PRIVATE DRIVES (RAMPS) SHALL BE MODIFIED SO AS TO ATTAIN ADEQUATE SIGHT DISTANCES AND DESIRABLE GRADES. DESIRABLE SKEW IS 90° AND MINIMUM IS 60°.

(B) SEE AASHTO CURRENT PUBLICATION "A POLICY ON GEOMETRIC DESIGN OF HIGHWAYS AND STREETS" AND TDOT "ROADWAY DESIGN GUIDELINES" FOR INTERSECTION & INTERCHANGE DESIGN REQUIREMENTS.

(C) WHERE EXISTING SHOULDER LINES AND EDGES OF EXISTING PAVEMENT ARE NOT THE SAME, PROPOSED SHOULDER LINES SHALL TIE INTO EXISTING SHOULDER LINES.

(D) PROFILE OF EMBANKMENT AND EXCAVATION RAMPS ARE THE SAME EXCEPT FOR LOCATION OF SIDE DRAIN AND DITCHES.

(E) ALL ROADWAYS AND PRIVATE DRIVES (RAMPS) THAT REQUIRE SIDE DRAINS SHALL USE STANDARD DRAWING NO. D-SEW-1A, UNLESS THE ENDWALL IS PROTECTED BY GUARDRAIL.

(F) ALL ROADWAYS AND RAMPS AT INTERSECTIONS AND INTERCHANGES SHALL HAVE A FLAT SPACE AT THE TIE IN POINT OF THE INTERSECTING ROADWAY OF 30' TO 50' IN LENGTH WITH A GRADE OF 0.00% DESIRABLE TO A 2.00% MAX. SEE ℄ PROFILE OF RAMP IN EXCAVATION AND EMBANKMENT DETAILS.

(G) ANY NECESSARY EXCAVATION FOR INSTALLING RAMPS OR ROADWAYS SHALL BE PAID FOR UNDER ITEM 203-01, ROAD & DRAINAGE EXCAVATION (UNCLASSIFIED), C.Y.

(H) DRIVEWAY VERTICAL CURVE LENGTHS SHALL BE BASED ON K VALUES OF: CREST, K = 1 AND SAG, K = 2.

$$K = \frac{\text{L (LENGTH OF VERTICAL CURVE)}}{\text{A (ALGEBRAIC DIFFERENCE OF GRADE)}} \quad \text{OR} \quad K \times A = L \text{ (VERTICAL CURVE LENGTH)}$$

(I) SHOULDERS NOT REQUIRED FOR DRIVEWAYS.

(J) DUE TO SAFETY CONCERNS, IT IS DESIRABLE FOR ALL PRIVATE DRIVES AND BUSINESS ENTRANCES TO HAVE A FLAT SPACE AT THE TIE IN POINT OF THE INTERSECTING ROADWAY OF 10' MINIMUM IN LENGTH WITH A GRADE OF 0.00% DESIRABLE TO A 2.00% MAX. SEE ℄ PROFILE OF RAMP IN EXCAVATION AND EMBANKMENT DETAILS. FOR ADDITIONAL TDOT DRIVEWAY REQUIREMENTS SEE "MANUAL FOR CONSTRUCTING DRIVEWAY ENTRANCES ON STATE HIGHWAYS".

REV. 10-23-69: RETRACED DRAWING.

REV. 07-01-72: CHANGED DEPARTMENT NAME.

REV. 01-01-76: CHANGED DWG. NO. FROM D-R-2(68) TO RP-R-1.

REV. 03-15-76: DELETED REFERENCE TO OLD DWG. NO. AND SUBSTITUTED NEW DWG. NO.

REV. 06-06-80: REVISED GUIDE TABLE FOR RAMP DESIGN AND NUMBERED GENERAL NOTES.

☐ REV. 05-27-96: REDREW DRAWING. MADE MINOR REVISIONS AS NEEDED.

☐ REV. 05-27-01: CHANGED PAY ITEM 203-01 DESCRIPTION.

REV. 06-28-19: REMOVED GUIDE TABLE FOR RAMPS. REVISED ALL GENERAL NOTES. FOR ROADWAYS & DRIVEWAYS: ADDED REQUIREMENTS FOR A FLAT AREA AND PROPOSED APPROACH GRADES TO THE ℄ PROFILE OF RAMP IN EXCAVATION AND EMBANKMENT DETAILS. RENAMED AND REDREW SHEET.

REV. 10-16-20: THE START OF THE 10' OF 0% WAS MOVED FROM EDGE OF SHOULDER TO THE EDGE OF PAVEMENT ON PLANS AND PROFILES. REVISED GENERAL NOTE (J).

☐ APPROVED BY FHWA
(ALL OTHERS APPROVED BY TDOT)

STATE OF TENNESSEE
STANDARD DRAWING
DEPARTMENT OF TRANSPORTATION

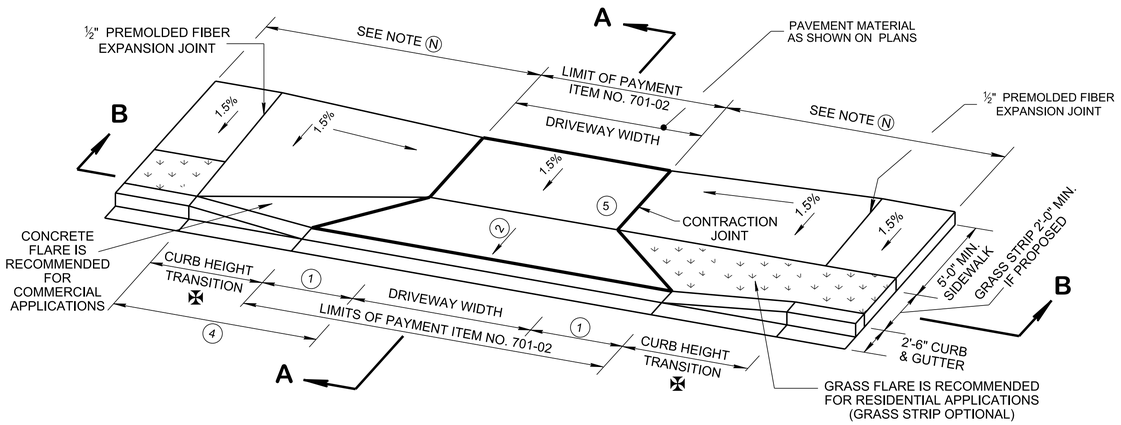
STANDARD RAMP DETAILS FOR ROADWAYS AND DRIVEWAYS

RP-R-1

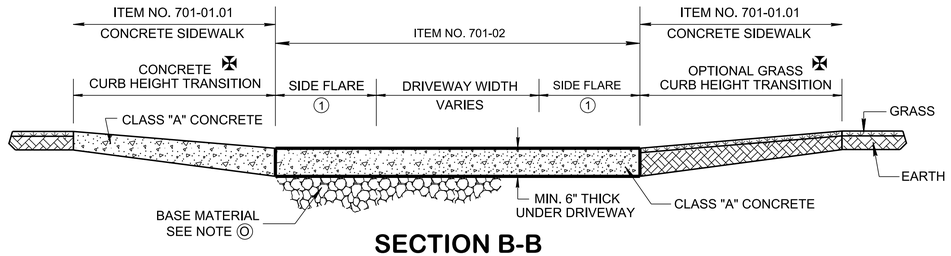
NOT TO SCALE

LLP

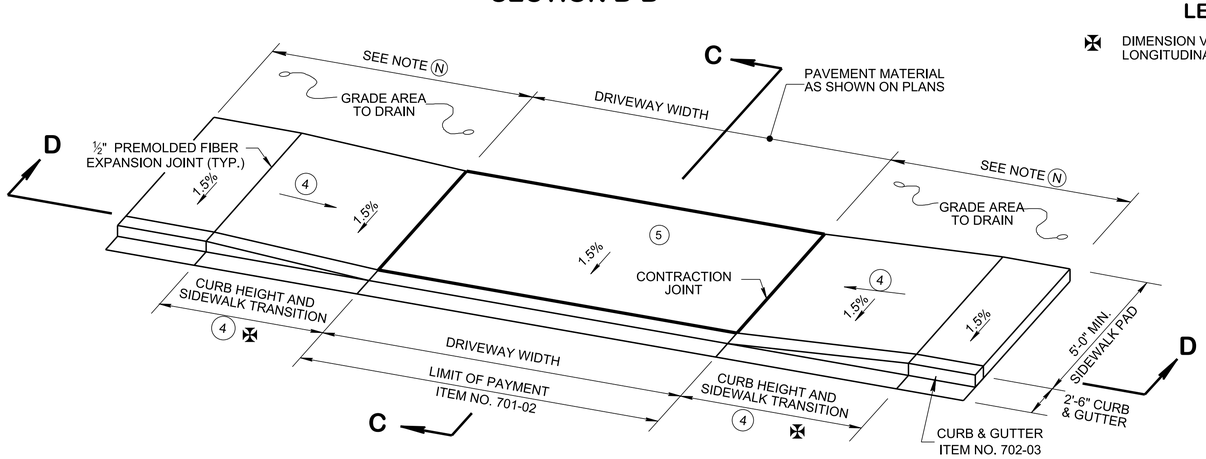
10/16/2020 12:09:41 PM
P:\StandDraw\DESIGN STANDARDS\Standards Drawings Library\Standard Roadway Drawings - CURRENT\In Progress\10-104.00 Roadway, Pavement Appurtenances and Fence IP\104.02 Intersections IP\RPRI-20



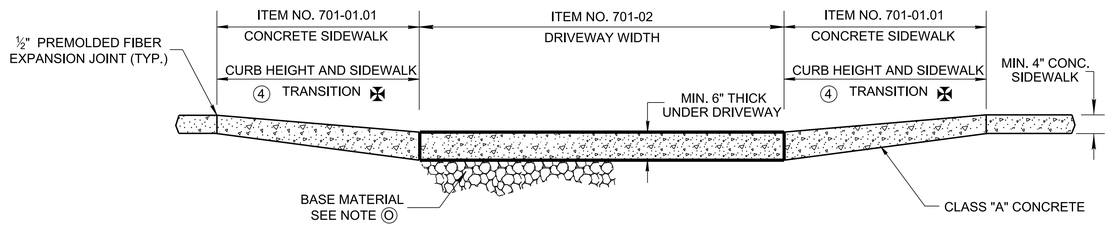
TYPE "B" DRIVEWAY ACROSS LOWERED SIDEWALK (WITH GRASS STRIP)



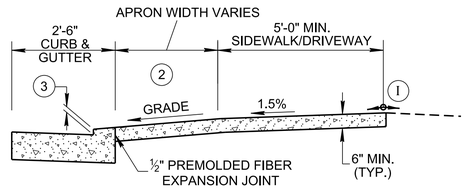
SECTION B-B



TYPE "C" DRIVEWAY ACROSS LOWERED SIDEWALK



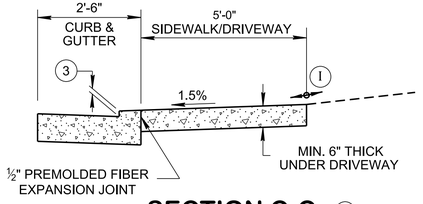
SECTION D-D



SECTION A-A (6)

FOOTNOTES

1. SIDE FLARE WIDTH SHOULD BE A MINIMUM 7'-0" FOR COMMERCIAL DRIVEWAYS. SIDE FLARE WIDTH SHOULD BE A MINIMUM 3'-6" FOR RESIDENTIAL DRIVEWAYS.
2. DRIVEWAY RAMP GRADE VARIES, 15% MAX. (10% RECOMMENDED) APRON GRADE FOR RESIDENTIAL DRIVEWAYS. 8% MAX. (5% RECOMMENDED) APRON GRADE FOR COMMERCIAL DRIVEWAYS.
3. HEIGHT OF LOWERED CURB SHALL BE 2.25 INCHES. SEE STD DWG RP-VC-10 & RP-VC-11.
4. THE SLOPE OF THE SIDEWALK AND/OR CURB HEIGHT TRANSITION VARIES TO A MAXIMUM OF 8.33% LENGTH OF TRANSITION IS RELATIVE TO THE LONGITUDINAL ROADWAY GRADE.
5. COMMERCIAL DRIVEWAY ENTRANCE TYPICALLY (MAX. 40' WIDE) MAY REQUIRE DETECTABLE WARNING SURFACES IF ENTRANCE SERVES MORE THAN 400 VEHICLES PER DAY. SEE STD. DWG. NOS. MM-CR- SERIES FOR DETAILS.
6. 3R PROJECTS MAY REQUIRE SLOPE CORRECTION, PARALLEL CROSS-WALK MARKINGS (ESPECIALLY AT TWO WAY DRIVEWAY ENTRANCES), AND DETECTABLE DOME SURFACE TO MAINTAIN CONTINUITY AT COMMERCIAL DRIVE ENTRANCES. ADDITIONAL SIGNS (WATCH FOR PED) MAY BE ADDED AT DRIVEWAYS BY THE DIRECTION OF AN ENGINEER IF NEEDED.



SECTION C-C (6)

LEGEND

DIMENSION VARIES RELATIVE TO LONGITUDINAL ROADWAY GRADE.

GENERAL NOTES

- (A) DUE TO THE ELEVATION CHANGE FOR PEDESTRIANS ON THE SIDEWALK, THIS APPLICATION IS UNDESIRABLE AND IS TO BE USED IN LIMITED APPLICATIONS. SEE RP-D-15 FOR THE PREFERRED DRIVEWAY TYPE.
- (B) 5'-0" MINIMUM SIDEWALK WITH A MAXIMUM CROSS SLOPE OF 1.5% THROUGH DRIVEWAYS.
- (C) DESIGNER TO CHECK GUTTER FLOW DEPTH AT DRIVEWAY LOCATIONS TO ASSURE THAT THE DESIGN FLOW DOES NOT OVERTOP THE SIDEWALK AREA. IF OVERTOPPING OCCURS, PLACE AN INLET AT THE UPSTREAM SIDE OF THE DRIVEWAY OR PERFORM OTHER DESIGN MITIGATION
- (D) THE SLOPE OF THE LANDING AREA SHALL NOT EXCEED 1.5% IN THE SIDEWALK AREA.
- (E) DRIVEWAYS TO BE BUILT COMPLETE OR IN PART AS INDICATED ON THE PLANS OR AS DIRECTED BY THE ENGINEER.
- (F) ALL CONCRETE DRIVEWAYS TO BE 6" UNIFORM THICKNESS, UNLESS OTHERWISE SHOWN ON PLANS.
- (G) EXPANSION JOINTS TO BE PLACED AS INDICATED ON THE PLANS EXCEPT JOINT AT BACK OF DRIVEWAY WHICH WILL BE PLACED WHEN DRIVEWAY ABUTS A RIGID DRIVEWAY OR BUILDING.
- (H) THE ROADWAY DESIGNER SHALL CONSIDER THE USE OF A CATCH BASIN ON EITHER SIDE OF DRIVEWAY. CAREFUL CONSIDERATION TO THE PLACEMENT OF CATCH BASINS SHALL BE TAKEN IF THE DRIVEWAY IS IN A VERTICAL SAG CURVE.
- (I) ALGEBRAIC DIFFERENCE NOT TO EXCEED 10.0%.
- (J) PAY ITEMS:

ITEM NO:	303-01,	MINERAL AGGREGATE, TYPE A BASE, GRADING D,	PER TON.,
ITEM NO:	701-01.01,	CONCRETE SIDEWALK (4"),	S.F.,
ITEM NO:	701-02,	CONCRETE DRIVERWAY,	S.F.,
ITEM NO:	702-03,	CONCRETE COMBINED CURB & GUTTER,	C.Y.

- (K) WHEN MORE THAN 2 DRIVEWAYS ARE PROPOSED, USE TYPE "A" DRIVEWAY AS SHOWN ON STANDARD DRAWING RP-D-15 TO REDUCE ROLLER COASTER EFFECT FOR PEDESTRIANS.
- (L) TYPICAL DRIVEWAY WIDTHS ARE 12' (14' TWO WAY) FOR RESIDENTIAL AND 24' (40' MAX.) FOR COMMERCIAL.
- (M) REFER TO SECTION 5.1.3. IN THE MANUAL FOR CONSTRUCTING DRIVEWAY ENTRANCES ON STATE HIGHWAYS (2015) FOR RADIUS OF CURVATURE GUIDANCE.
- (N) ALL SIDEWALKS SHALL HAVE A MINIMUM CONCRETE THICKNESS OF 4".
- (O) 4 INCH AGGREGATE BASE MATERIAL SHALL BE INSTALLED UNDER NEW CONCRETE DRIVEWAYS.

REV. 7-15-08: UPDATED SIDEWALK DIMENSIONS.

☐ REV. 4-8-16: ADDED ITEM NUMBERS. UPDATED SLOPES AND DIMENSIONS. UPDATED NOTES.

☐ REV. 07-16-18: ADDED NOTES TO CONC. FLARE AND GRASS FLARE IN ISOMETRIC VIEW. ADDED GENERAL NOTE (M) & (N).

REV. 01-07-19: ADDED LIMITS FOR ITEM NO. 701-02. ADJUSTED LOCATION OF GENERAL NOTE NO'S. (J) & (N) ON DETAILS. REDREW SHEET.

REV. 10-16-20: ADDED GENERAL NOTE (O) MINERAL AGGREGATE ITEM NUMBER AND BASE MATERIAL ON SECTIONS B-B AND D-D.

☐ APPROVED BY FHWA
(ALL OTHERS APPROVED BY TDOT)

STATE OF TENNESSEE
STANDARD DRAWING
DEPARTMENT OF TRANSPORTATION

DETAILS OF LOWERED STANDARD CONCRETE DRIVEWAYS

02-15-2007 | RP-D-16

NOT TO SCALE

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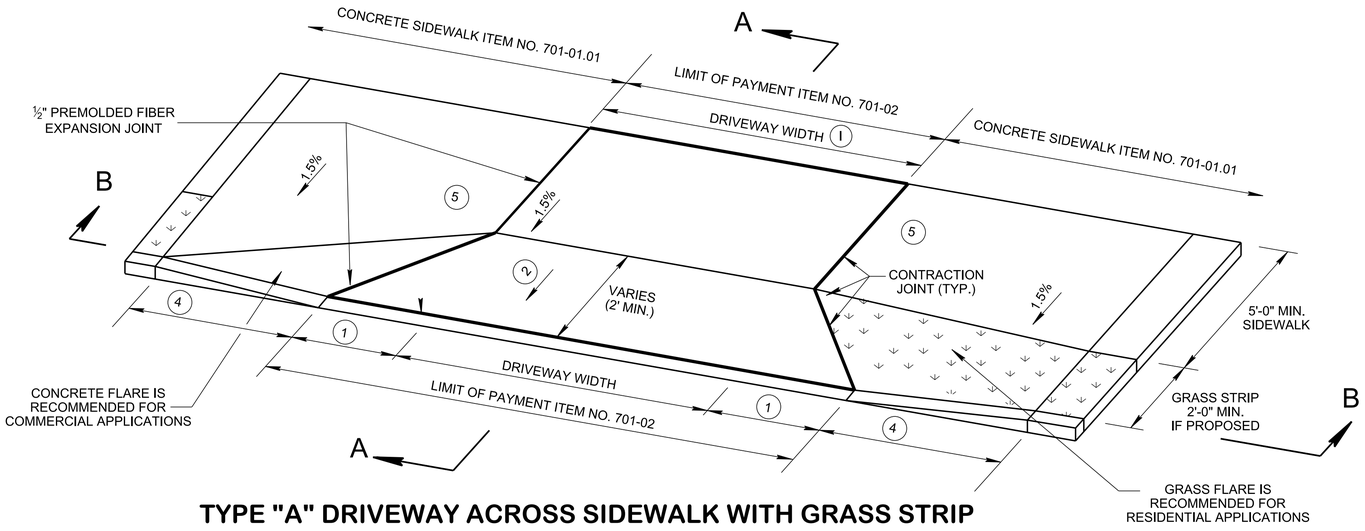
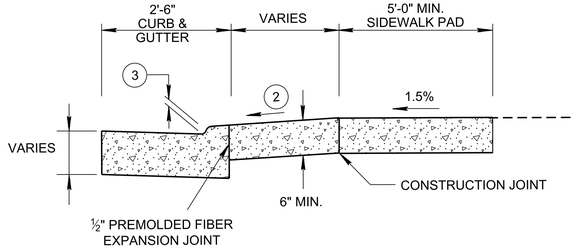


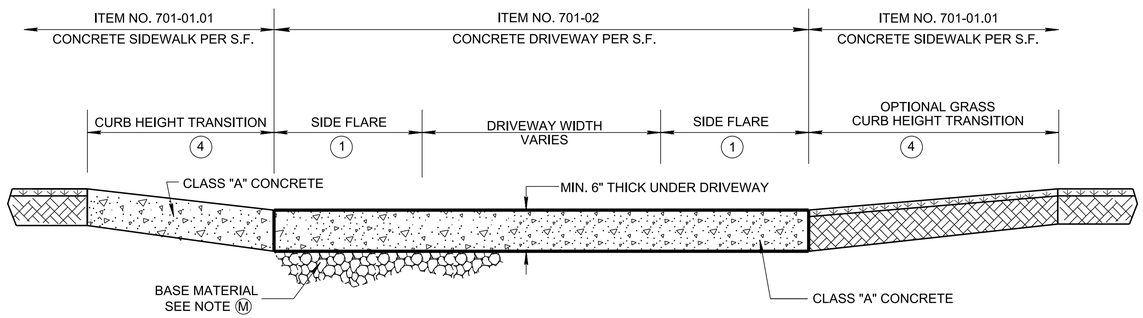
TYPE "A" DRIVEWAY ACROSS SIDEWALK WITH GRASS STRIP

LEGEND

✠ DIMENSION VARIES RELATIVE TO LONGITUDINAL ROADWAY GRADE.



SECTION A-A



SECTION B-B

FOOTNOTES

(1) SIDE FLARE WIDTH SHOULD BE A MINIMUM 7'-0" FOR COMMERCIAL DRIVEWAYS. SIDE FLARE WIDTH SHOULD BE A MINIMUM 3'-6" FOR RESIDENTIAL DRIVEWAYS.

(2) DRIVEWAY RAMP GRADE VARIES, 15% MAX. (10% RECOMMENDED) APRON GRADE FOR RESIDENTIAL DRIVEWAYS. 8% MAX. (5% RECOMMENDED) APRON GRADE FOR COMMERCIAL DRIVEWAYS.

(3) HEIGHT OF LOWERED CURB SHALL BE 2.25 INCHES. SEE STD DWG RP-VC-10 & RP-VC-11.

(4) THE SLOPE OF THE SIDEWALK AND/OR CURB HEIGHT TRANSITION VARIES TO A MAXIMUM OF 8.33% LENGTH OF TRANSITION IS RELATIVE TO THE LONGITUDINAL ROADWAY GRADE.

(5) COMMERCIAL DRIVEWAY ENTRANCE TYPICALLY (MAX. 40' WIDE) MAY REQUIRE DETECTABLE WARNING SURFACES IF ENTRANCE SERVES MORE THAN 400 VEHICLES PER DAY. SEE STD. DWG. NOS. MM-CR- SERIES FOR DETAILS.

(6) 3R PROJECTS MAY REQUIRE SLOPE CORRECTION, PARALLEL CROSS-WALK MARKINGS (ESPECIALLY AT TWO WAY DRIVEWAY ENTRANCES), AND DETECTABLE DOME SURFACE TO MAINTAIN CONTINUITY AT COMMERCIAL DRIVE ENTRANCES. ADDITIONAL SIGNS (WATCH FOR PED) MAY BE ADDED AT DRIVEWAYS BY THE DIRECTION OF AN ENGINEER IF NEEDED.

GENERAL NOTES

(A) THIS TYPE OF DRIVEWAY IS PREFERED OVER THE LOWERED TYPE AS SHOWN ON RP-D-16 BECAUSE THE ELEVATION OF THE SIDEWALK REMAINS A CONSTANT FOR PEDESTRIANS.

(B) 5'-0" MINIMUM SIDEWALK WITH A MAXIMUM CROSS SLOPE OF 1.5% THROUGH DRIVEWAYS.

(C) DESIGNER TO CHECK GUTTER FLOW DEPTH AT DRIVEWAY LOCATIONS TO ASSURE THAT THE DESIGN FLOW DOES NOT OVERTOP THE SIDEWALK AREA. IF OVERTOPPING OCCURS, PLACE AN INLET AT THE UPSTREAM SIDE OF THE DRIVEWAY OR PERFORM OTHER DESIGN MITIGATION.

(D) THE SLOPE OF THE LANDING AREA SHALL NOT EXCEED 1.5% IN THE SIDEWALK AREA.

(E) DRIVEWAYS TO BE BUILT COMPLETE OR IN PART AS INDICATED ON THE PLANS OR AS DIRECTED BY THE ENGINEER.

(F) ALL DRIVEWAYS TO BE 6" UNIFORM THICKNESS, UNLESS OTHERWISE SHOWN ON PLANS.

(G) EXPANSION JOINTS TO BE PLACED AS INDICATED ON THE PLANS EXCEPT JOINT AT BACK OF DRIVEWAY WHICH WILL BE PLACED WHEN DRIVEWAY ABUTS A RIGID DRIVEWAY OR BUILDING.

(H) THE ROADWAY DESIGNER SHALL CONSIDER THE USE OF A CATCH BASIN ON EITHER SIDE OF THE DRIVEWAY. CAREFUL CONSIDERATION TO THE PLACEMENT OF CATCH BASINS SHALL BE TAKEN IF THE DRIVEWAY IS IN A VERTICAL SAG CURVE.

(I) PAY ITEMS:

ITEM NO:	303-01,	MINERAL AGGREGATE, TYPE A BASE, GRADING D,	PER TON.,
ITEM NO:	701-02,	CONCRETE DRIVEWAY,	PER SF.

(J) TYPICAL DRIVEWAY WIDTHS ARE 12' (14" TWO WAY) FOR RESIDENTIAL AND 24' (40' MAX.) FOR COMMERCIAL.

(K) REFER TO SECTION 5.1.3. IN THE RULES AND REGULATIONS FOR CONSTRUCTING DRIVEWAY ENTRANCES ON STATE HIGHWAY RIGHTS-OF-WAY (2015) FOR RADIUS OF CURVATURE GUIDANCE.

(L) ALL SIDEWALKS SHALL BE A MINIMUM THICKNESS OF 4" CONCRETE.

(M) 4 INCH AGGREGATE BASE MATERIAL SHALL BE INSTALLED UNDER NEW CONCRETE DRIVEWAYS.

REV. 7-15-08: UPDATED SIDEWALK DIMENSIONS.

☐ REV. 4-8-16: ADDED ITEM NUMBERS. UPDATED SLOPES AND DIMENSIONS. UPDATED NOTES.

☐ REV. 07-16-18: ADDED NOTES TO CONC. FLARE AND GRASS FLARE IN ISOMETRIC VIEW. ADDED GENERAL NOTE (K), CHANGED REFERENCED STD. DWG. FROM RP-NMC-10 TO RP-VC-10. ADDED NOTE (A) AND RENUMBERED THE REST. ADDED SPECIAL NOTE. REDREW SHEET.

☐ REV. 01-07-19: CORRECTED SPELLING. REDREW SHEET.

☐ REV. 10-16-20: ADDED GENERAL NOTE (M) ADDED MINERAL AGGREGATE ITEM NUMBER AND REFERENCE NOTE ON SECTION B-B.

☐ APPROVED BY FHWA
(ALL OTHERS APPROVED BY TDOT)

STATE OF TENNESSEE
STANDARD DRAWING
DEPARTMENT OF TRANSPORTATION

DETAILS OF STANDARD CONCRETE DRIVEWAYS

02-15-2007 | RP-D-15

NOT TO SCALE

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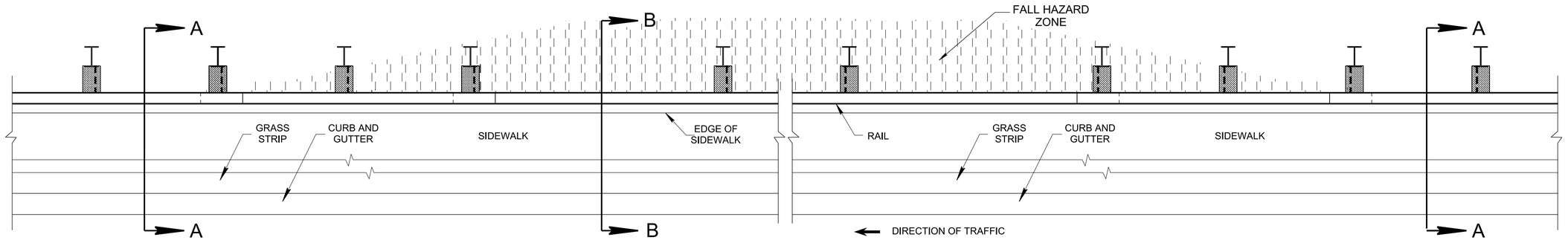
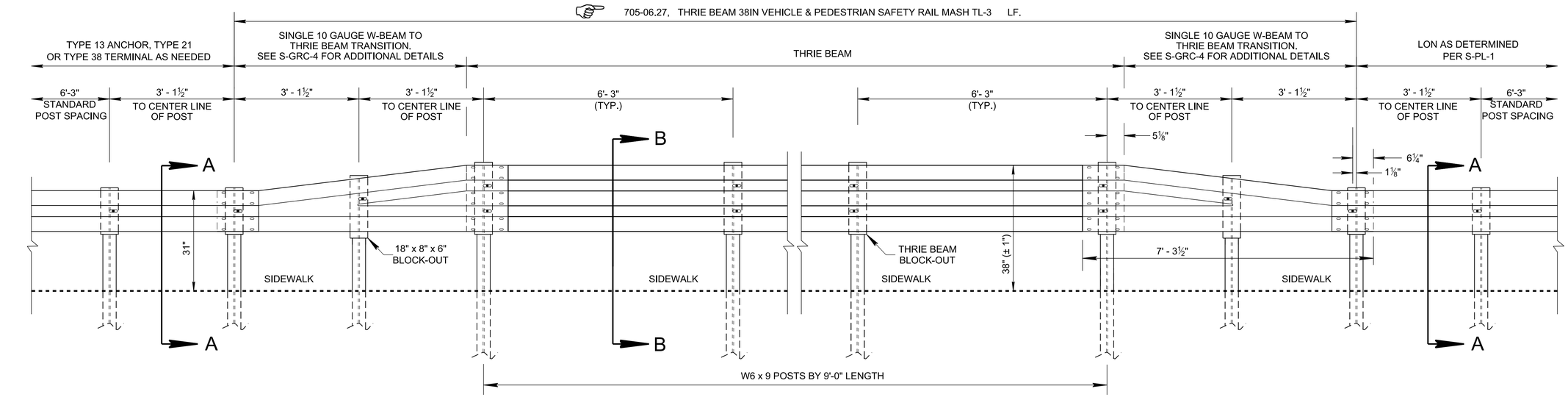
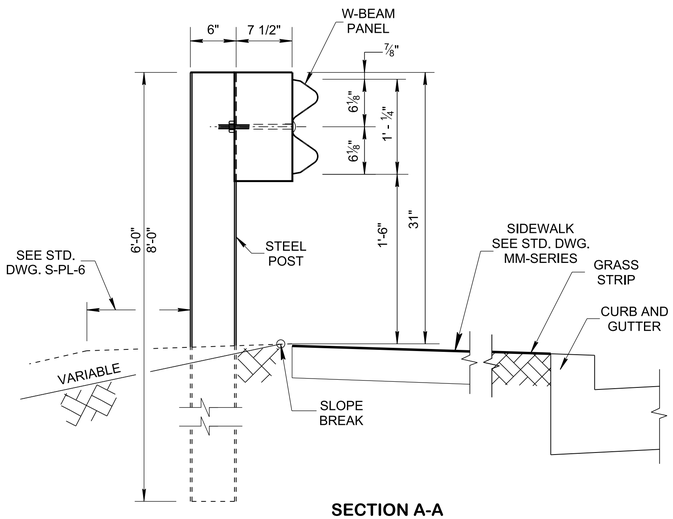


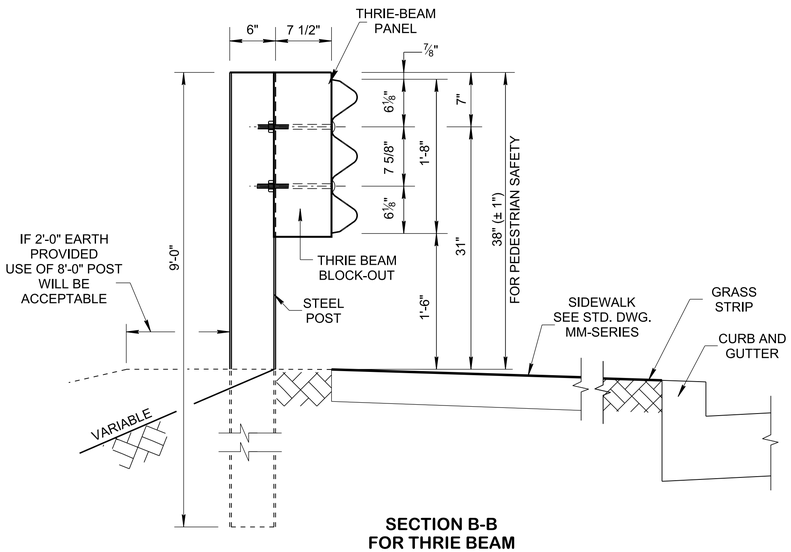
PLAN VIEW



ELEVATION VIEW



SECTION A-A
FOR W-BEAM RAIL



SECTION B-B
FOR THRIE BEAM
VEHICLE AND PEDESTRIAN SAFETY RAIL

GENERAL NOTES

(A) THE 38" VEHICLE AND PEDESTRIAN SAFETY RAIL MAY BE USED AT LOCATIONS WHERE GUARDRAIL IS WARRANTED FOR VEHICLE SAFETY PER S-CZ-1 AND WHERE THE PEDESTRIAN SAFETY RAIL IS WARRANTED PER MM-BPR-1.

(B) THIS DETAIL SHOULD ONLY BE APPLIED FOR PEDESTRIAN FACILITIES. ON SHARED USE PATHS, IN ORDER TO PROVIDE BICYCLE SAFETY, A MINIMUM 42" RAIL HEIGHT SHOULD BE PROVIDED. REFER TO STANDARD DRAWING MM-BPR-2.

(C) SEE STANDARD DRAWINGS S-PL-6 AND S-GR31 SERIES FOR ALL OTHER GUARDRAIL DETAILS AND MATERIAL PROPERTIES NOT SHOWN IN THIS SHEET.

(D) REFER TO STANDARD DRAWING RD11-TS SERIES FOR ROADWAY SECTIONS AND MM-TS-2 FOR PEDESTRIAN FACILITIES.

(E) PAYMENT:

ALL COMPONENTS AS SHOWN ON THIS DRAWING OR ANY COMPONENTS NEEDED TO INSTALL THIS GUARDRAIL SHALL BE INCLUDED UNDER PAY ITEM NUMBER:

705-06.27, THRIE BEAM 38IN VEHICLE & PEDESTRIAN SAFETY RAIL MASH TL-3 LF.

STATE OF TENNESSEE
STANDARD DRAWING
DEPARTMENT OF TRANSPORTATION

VEHICLE AND PEDESTRIAN SAFETY RAIL

10-16-2020 | MM-VPR-1

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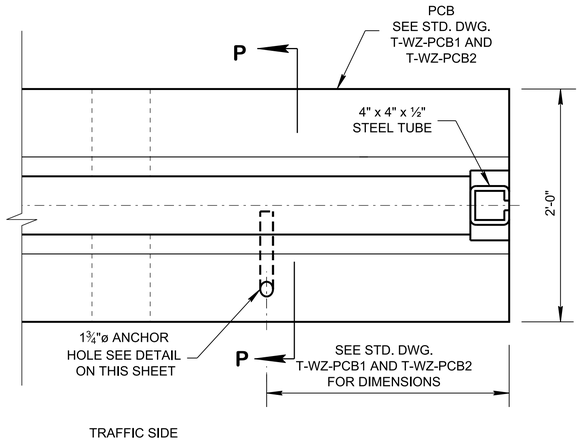
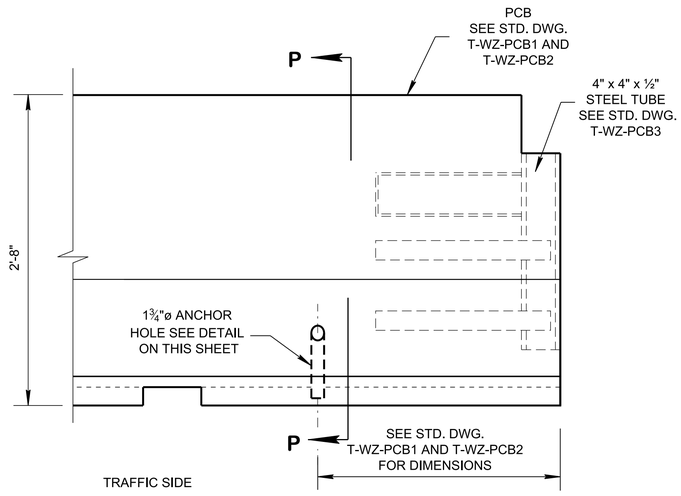
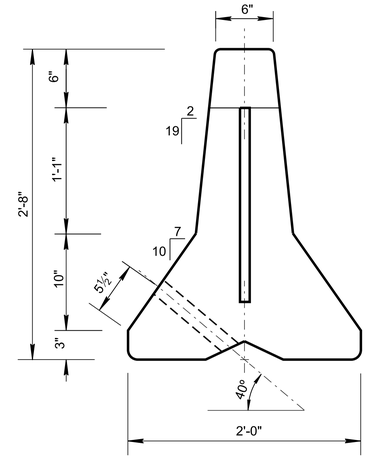


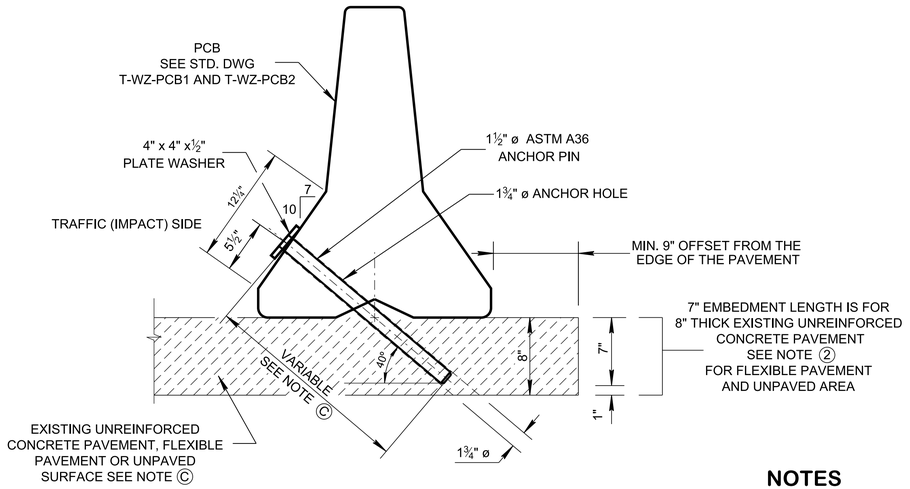
ANCHOR HOLE PLAN VIEW



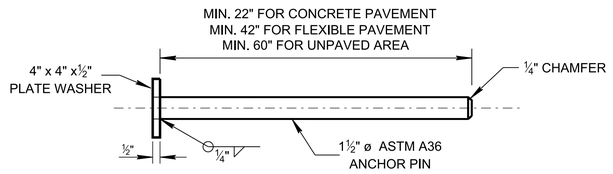
ANCHOR HOLE ELEVATION VIEW



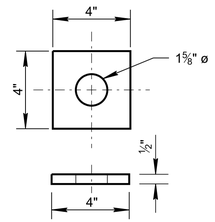
END VIEW



SECTION P - P
FOR ANCHOR PIN DETAIL



ANCHOR PIN



4" x 4" x ½" PLATE WASHER

NOTES

① 1½" ø PIN EMBEDDED IN EXISTING CONCRETE FLEXIBLE PAVEMENT OR UNPAVED SURFACE IN A 1¾" ø HOLE, MAKE SURE THE HOLES ARE SLIGHTLY DEEPER THAN THE LENGTH OF THE ANCHOR PINS.

② ENSURE THAT THE LENGTH OF THE ANCHOR PIN IS SUCH THAT THE FOLLOWING MINIMUM EMBEDMENT LENGTH ARE OBTAINED.

2.1. INTO CONCRETE PAVEMENT	0'-7"
2.2. INTO FLEXIBLE PAVEMENT	2'-3"
2.3. INTO UNPAVED AREA	3'-3"

GENERAL NOTES

Ⓐ ANCHOR PINS SHALL BE USED WITH THE FIRST AND LAST PCB SEGMENTS TO ANCHOR THE INSTALLATION AND PROVIDE TENSION FOR THE SYSTEM TO FUNCTION AS DESIGNED. ALTERNATIVE CRASH CUSHION (SEE STANDARD DRAWING S-CC-1) MAY BE USED WITH APPROVED TRANSITION TO PCB.

Ⓑ SEE STANDARD DRAWINGS T-WZ-PCB1 AND T-WZ-PCB2 FOR PORTABLE CONCRETE BARRIER RAILS.

Ⓒ 1½" DIAMETER ASTM A36M ANCHOR PINS ANCHORED INTO DRILLED UNREINFORCED CONCRETE PAD, DRIVEN INTO FLEXIBLE PAVEMENT AND UNPAVED SURFACE. ANCHOR PINS SHALL BE PLACED ON THE TRAFFIC SIDE OF THE BARRIER. WHEN ANCHOR PINS ARE IN PLACE, THEY WILL NOT PROJECT ABOVE THE PLANE OF THE CONCRETE SURFACE OF THE BARRIER.

Ⓓ THE PERFORMANCE OF DROP PIN ANCHORAGE WITH PCB HAS BEEN EVALUATED AS A ROADSIDE SAFETY RESEARCH POOLED FUND STUDY TPF-5(114) AND DOCUMENTED PER TEST NO. 610231-01.1.

Ⓔ THE MAXIMUM PERMANENT DEFLECTION OF THE BARRIER IS 9". IT IS RECOMMENDED TO PROVIDE 1 FT. OFFSET FROM THE WORK SPACE.

Ⓕ FOR INSTALLATION ON BRIDGE DECK, REFER TO BRIDGE PLANS FOR NECESSARY MODIFICATION AS REQUIRED AND DIRECTED BY THE ENGINEER.

Ⓖ AFTER REMOVAL OF THE BARRIER RAIL, FILL THE HOLES IN FLEXIBLE PAVEMENT OR UNPAVED AREAS, AND CONCRETE PAVEMENT AS DIRECTED BY THE ENGINEER.

Ⓗ PAYMENT FOR ANCHOR PINS WILL BE INCLUDED IN THE UNIT PRICE OF PORTABLE BARRIER RAIL AND PORTABLE BARRIER RAIL, REDUCED DEFLECTION ITEM NUMBERS.

STATE OF TENNESSEE
STANDARD DRAWING
DEPARTMENT OF TRANSPORTATION

PORTABLE CONCRETE BARRIER RAIL ANCHOR PIN DETAILS

10-16-2020 | T-WZ-PCB4

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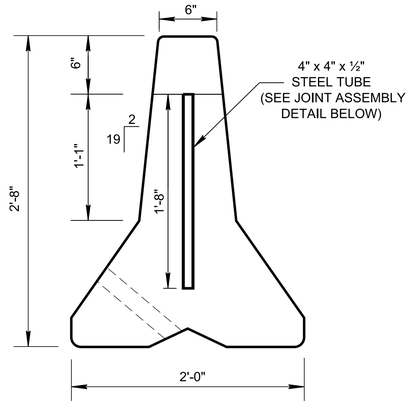

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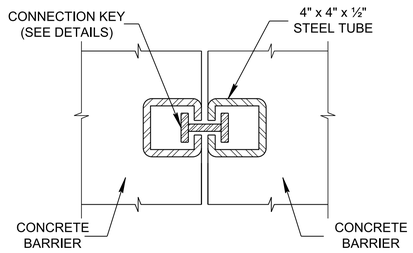
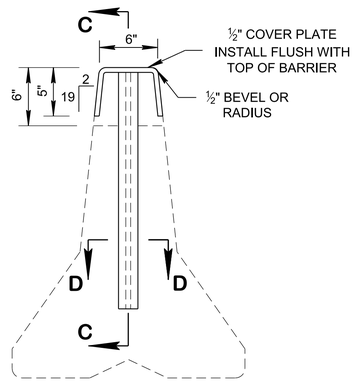


PLAN OF CONNECTION KEY DETAIL



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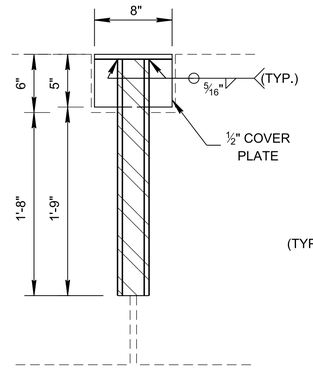
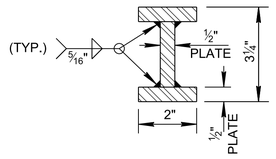
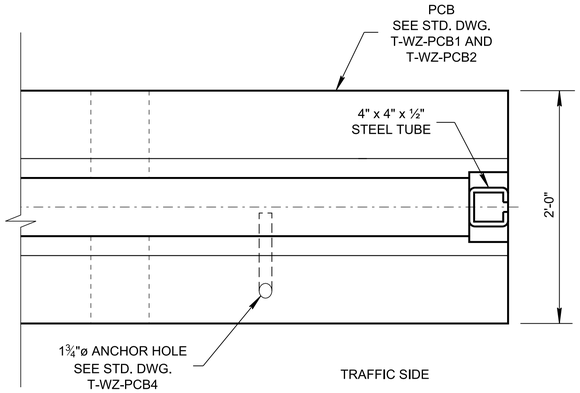


SECTION C - C

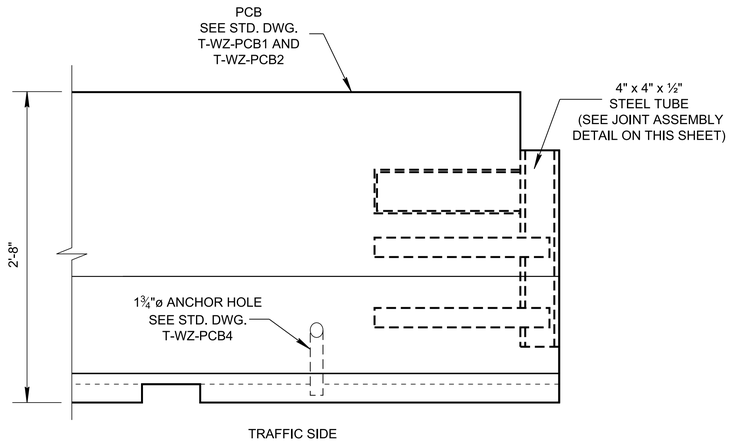


SECTION D - D

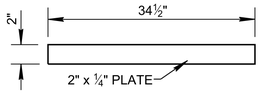
CONNECTION KEY DETAILS



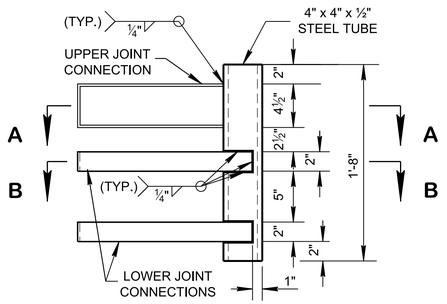
END PLAN VIEW



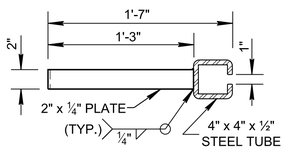
END ELEVATION VIEW



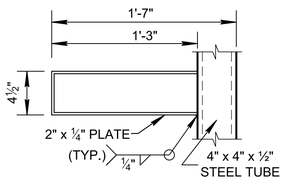
UPPER JOINT PLATE SIZE



JOINT ASSEMBLY DETAIL

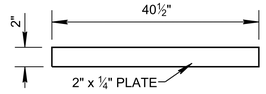


SECTION A - A

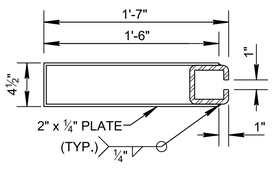


ELEVATION

UPPER JOINT CONNECTION



LOWER JOINT PLATE SIZE



SECTION B - B

LOWER JOINT CONNECTION

GENERAL NOTES

Ⓐ SEE STANDARD DRAWINGS T-WZ-PCB1 AND T-WZ-PCB2 FOR PORTABLE CONCRETE BARRIER RAILS.

Ⓑ THE CONNECTION KEY, STEEL PLATE SHALL BE ASTM A36, A588 OR A572 GRADE 50. STEEL TUBE SHALL BE ASTM A500 GRADE B OR C. ALL STEEL FOR CONNECTION KEY AND TRANSITION KEY ASSEMBLIES AND STEEL TUBES SHALL BE GALVANIZED.

Ⓒ ALL WELDING SHALL BE PERFORMED BY A WELDER QUALIFIED IN ACCORDANCE WITH THE AASHTO/AWS D1.5M/D1.5 BRIDGE WELDING CODE (LATEST EDITION).

Ⓓ CONNECTION KEY COVER PLATE SHALL BE INSTALLED FLASH WITH THE BARRIER TOP.

Ⓔ SEE STANDARD DRAWING T-WZ-PCB4 FOR ANCHOR PIN DETAILS.

Ⓕ PAYMENT FOR CONNECTION KEY, JOINT ASSEMBLY STEEL TUBE AND PLATES WILL BE INCLUDED IN THE UNIT PRICE OF PORTABLE BARRIER RAIL ITEM NUMBER.

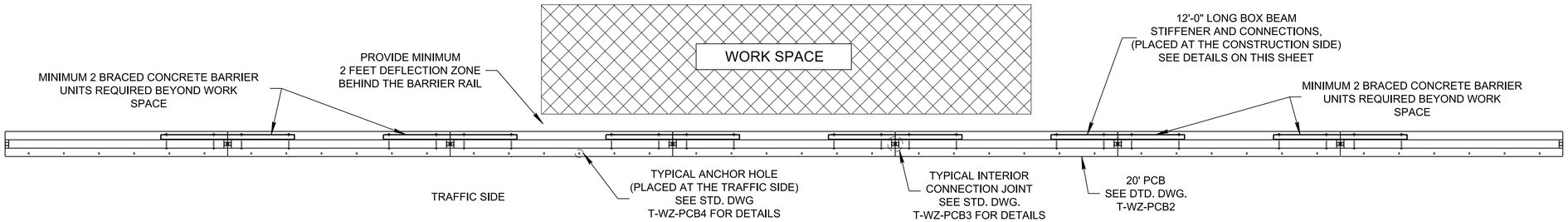
STATE OF TENNESSEE
STANDARD DRAWING
DEPARTMENT OF TRANSPORTATION

PORTABLE CONCRETE BARRIER RAIL DETAILS

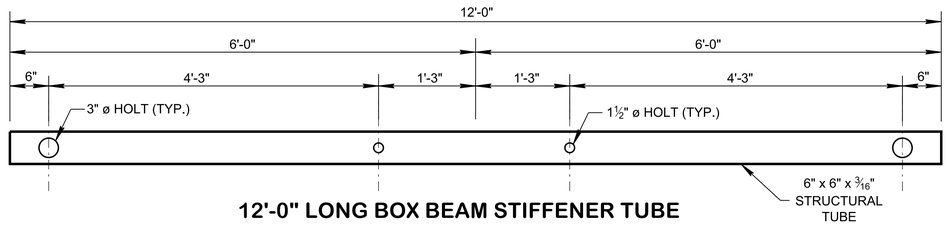
10-16-2020

T-WZ-PCB3

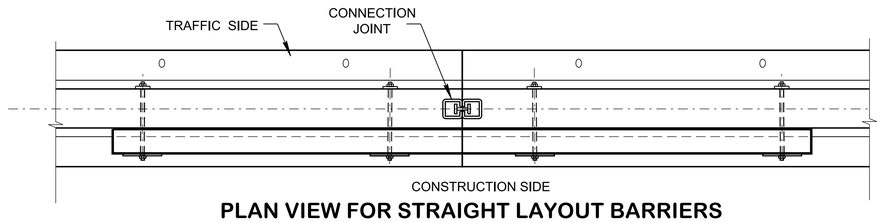
NOT TO SCALE



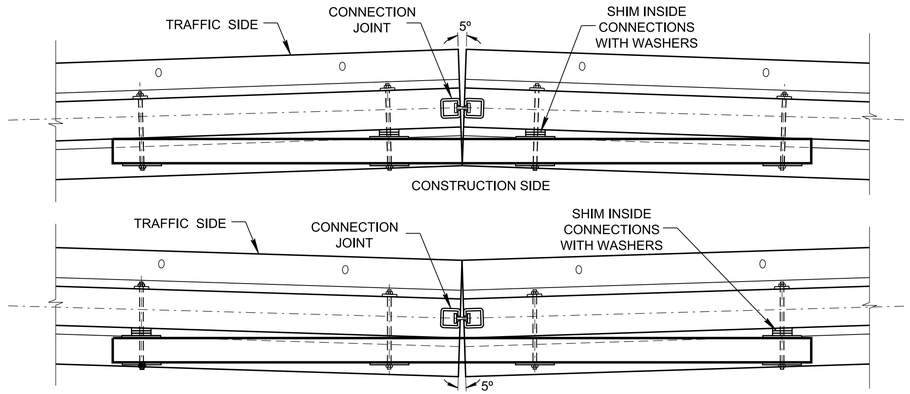
PLAN
FOR 20' PCB LAYOUT



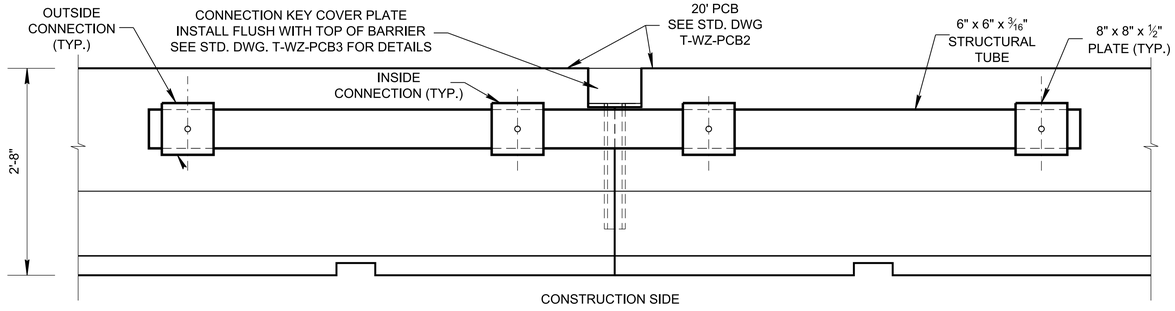
12'-0" LONG BOX BEAM STIFFENER TUBE



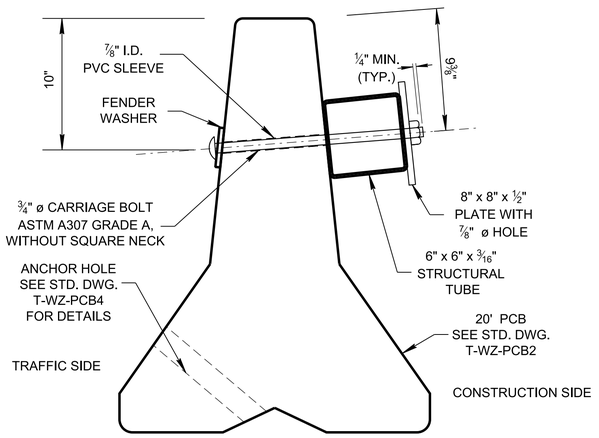
PLAN VIEW FOR STRAIGHT LAYOUT BARRIERS



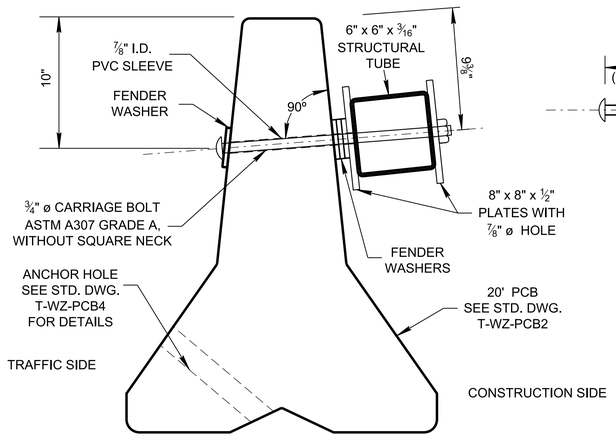
PLAN VIEWS FOR CURVED LAYOUT BARRIERS



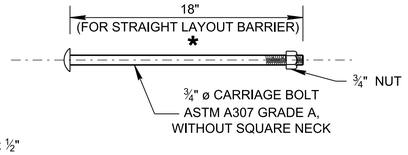
ELEVATION VIEW FOR 20' PCB BOX BEAM STIFFENER TUBE



SECTION FOR STRAIGHT LAYOUT BARRIERS



SECTION FOR CURVED LAYOUT BARRIERS



¾" ø CARRIAGE BOLT WITHOUT SQUARE NECK

* NOTE: THE LENGTH OF CARRIAGE BOLT IS DEPEND ON THE RADIUS OF THE CURVE FOR CURVED LAYOUT BARRIERS.

DETAILS FOR 20' PCB BOX BEAM STIFFENER TUBE

GENERAL NOTES

(A) ALL PORTABLE CONCRETE BARRIER UNITS FOR BOX BEAM STIFFENER SYSTEM SHALL BE A 20 FOOT LONG SEGMENT. SEE STANDARD DRAWING T-WZ-PCB2. DO NOT USE THE BOX BEAM STIFFENING AT LOCATIONS WHERE THE BOX BEAM MAY BE EXPOSED TO TRAFFIC SUCH AT A MEDIAN BARRIER (TRAFFIC ON BOTH SIDES OF THE BARRIER).

(B) STEEL PLATE TO BE ASTM A36, A588, OR A572 GRADE 50, AND GALVANIZED IN ACCORDANCE WITH AASHTO M-111.
BOX BEAM STIFFENER ¾" DIAMETER CARRIAGE BOLT TO BE ASTM A307 GRADE A, WITHOUT SQUARE NECK.
STEEL TUBE SHALL BE ASTM A500 GRADE B OR C. ALL STEEL TUBES SHALL BE GALVANIZED.

(C) THE 32 INCH TALL 20 FOOT LONG STIFFENED PORTABLE CONCRETE BARRIER RAIL WITH FREE STANDING CONFIGURATION, CONNECTED USING CONNECTION KEY AS SHOWN HAS BEEN EVALUATED BY THE MIDWEST ROADSIDE SAFETY FACILITY AND MEET MASH TL-3 STANDARDS. THE EVALUATION OF STIFFENED PCB HAS BEEN DOCUMENTED IN REPORT NUMBER TRP-03-372-18.
THE STIFFENED BARRIER SYSTEM HAS BEEN CRASH TESTED WITH A 28.7' DYNAMIC DEFLECTION.
AT A MINIMUM 5 SEGMENTS WITH A MINIMUM OF 100 FEET OF INSTALLATION WILL BE REQUIRED FOR THE BARRIER SYSTEM TO PERFORM AS EVALUATED. THE DESIGNER SHOULD CONSIDER PLACING THE PCB SO THAT THERE IS ENOUGH SPACE BETWEEN THE WORK SPACE AND THE PCB FOR A 2 FOOT DYNAMIC DEFLECTION.

(D) PCB WITH BOX BEAM STIFFENER LAYOUT SHALL BEGIN AT LEAST MINIMUM TWO 20 FEET BARRIERS PRIOR TO, BE CONTINUOUS THROUGH AND EXTEND AT LEAST MINIMUM TWO 20 FEET BARRIERS BEYOND THE WORK SPACE REQUIRED LIMIT.
AT EACH END OF BRACED BARRIER LAYOUT SHALL BE ANCHORED WITH ANCHOR PINS ON THE TRAFFIC SIDE.

(E) WHERE PORTABLE CONCRETE BARRIERS ARE PLACED ON A RADIUS, THE RESULTING GAP BETWEEN THE BOX BEAM AND CONCRETE BARRIER SHALL BE SHIMMED.

(F) THE SHIMMING SHALL CONSIST OF 8" x 8" x ½" SQUARE PLATES, AND FENDER WASHERS (3" NOMINAL OD.) AS NEEDED TO SNUG THE BOX BEAM STIFFENER TO THE CONSTRUCTION BARRIER CURB.

(G) THE PRESENCE OF NORMAL HOLES DRILLED PER THIS SHEET WILL NOT AFFECT THE REUSABILITY OF THE BARRIER SEGMENT.

(H) DRILL HOLES IN PORTABLE BARRIER FOR PURPOSE OF BOX BEAM ATTACHMENT USING A CORE DRILL OR ANY OTHER APPROVED ROTARY DRILLING DEVICE THAT DOES NOT IMPART AN IMPACT FORCE.

(I) PAYMENT:

PAYMENT FOR PORTABLE BARRIER RAIL, BOX BEAM, PLATES, FENDER WASHERS, CONNECTION KEY, JOINT ASSEMBLY STEEL TUBE, PLATES, ANCHOR PINS AND OTHER HARDWARE MATERIALS WILL BE INCLUDED IN THE COST OF PORTABLE BARRIER RAIL, REDUCED DEFLECTION ITEM NUMBER.

712-02.12, PORTABLE BARRIER RAIL, REDUCED DEFLECTION (MASH TL-3), PER L.F.

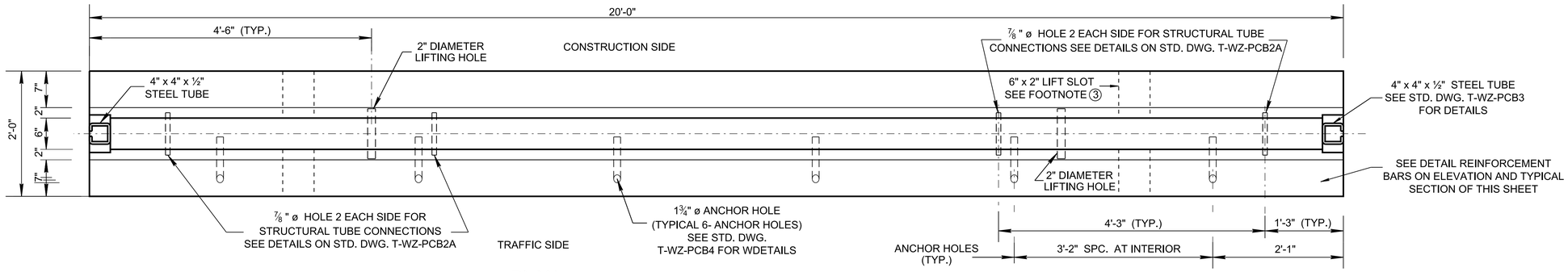
STATE OF TENNESSEE
STANDARD DRAWING
DEPARTMENT OF TRANSPORTATION

20 FOOT PORTABLE CONCRETE BARRIER RAIL STIFFENER TUBE

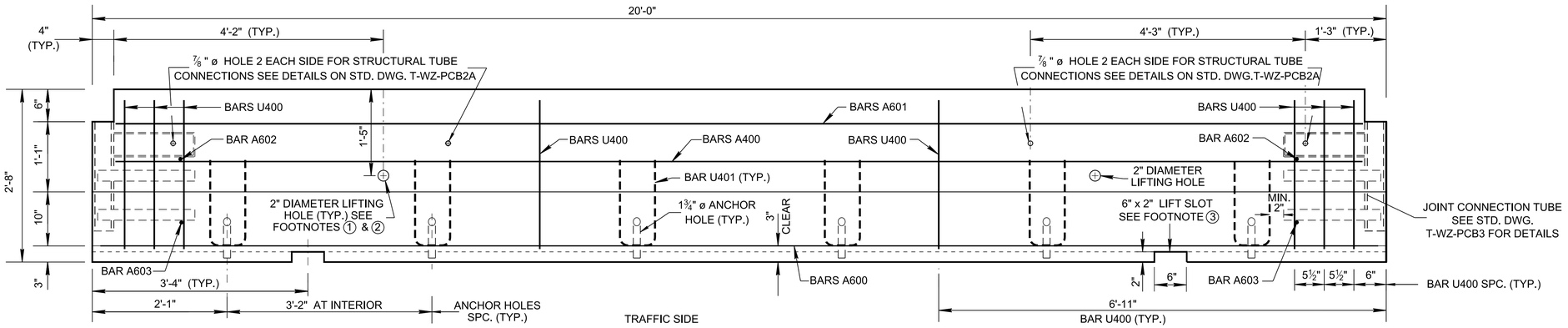
10-16-2020 | T-WZ-PCB2A

LLP

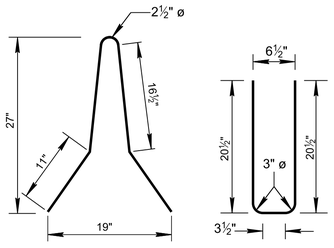
NOT TO SCALE



PLAN



ELEVATION

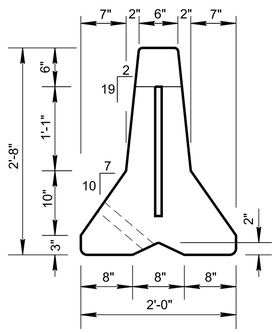


BAR U400

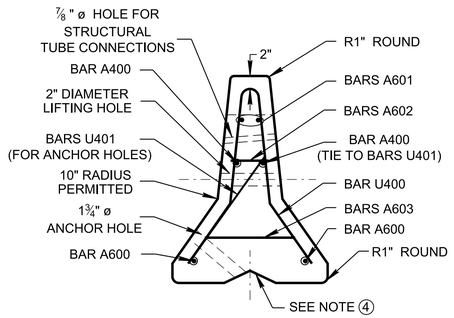
BAR U401
(FOR ANCHOR HOLES)

VARIABLE

BARS A400, A600, A601, A602 AND A603
(SEE TABLE FOR LENGTH)



END VIEW



TYPICAL SECTION

APPROXIMATE WEIGHT AND QUANTITIES

SECTION LENGTH (FT.)	WEIGHT (LB.)	REINFORCING STEEL (LB.)	CONCRETE (C. Y.)
20	8505	208	2.1

BILL OF STEEL

BAR TYPE	BAR SIZE	NUMBER REQUIRED	LENGTH
A600	6	2	19'-6"
A601	6	2	19'-0"
A602	6	2	0'-6"
A603	6	2	1'-2"
A400	4	2	19'-0"
U400	4	8	4'-11"
U401	4	6	4'-1"

LIFTING HOLE AND SLOT FOOTNOTES

① 2" DIAMETER LIFTING HOLE - 2 REQUIRED FOR EACH UNIT AND TO BE PLACED 4'-6" FROM EACH END OF THE 20 FOOT BARRIER WALL. ADDITIONAL HOLES MAY BE ADDED AT THE DISCRETION OF THE FABRICATOR. LIFTING HOLES ARE TO BE FORMED WITH 2" PVC PIPE OR EQUAL.

② LIFTING BARS SHALL BE REQUIRED WHEN MOVING THE BARRIER WALLS TO PREVENT SPALLING OF CONCRETE AROUND HOLES.

③ SIX INCH LIFT SLOTS PROVIDES DRAINAGE FOR THE PAVEMENT, THE OPENING SHALL NOT BE BLOCKED.

④ AT THE DISCRETION OF THE FABRICATOR LIFTING DEVICES MAY BE USED AT THE BOTTOM OF BARRIER. THE LIFTING DEVICES SHALL NOT INTERFERE WITH THE PIN HOLE LOCATIONS.

GENERAL NOTES

Ⓐ PRECAST PORTABLE CONCRETE BARRIER RAIL SHALL BE CONSTRUCTED WITH CLASS 'A' CONCRETE WITH A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI, AND MANUFACTURED IN ACCORDANCE WITH SECTION 604 OF THE STANDARD SPECIFICATIONS.

Ⓑ REINFORCING STEEL: TO BE ASTM A615. PLACE ALL STEEL REINFORCEMENT 2" MINIMUM FROM OUTSIDE FACE OF WALL, EXCEPT AS OTHERWISE SHOWN.

Ⓒ SEE STANDARD DRAWING T-WZ-PCB3 FOR CONNECTION KEY DETAILS.

Ⓓ THE 32 INCH TALL 20 FOOT LONG PORTABLE CONCRETE BARRIER RAIL HAS BEEN EVALUATED BY THE MIDWEST ROADSIDE SAFETY FACILITY AND MEET MASH TL-3 STANDARDS. THE EVALUATION OF THE PCB HAS BEEN DOCUMENTED IN REPORT NUMBER TRP-03-355-18. THE FREE STANDING PORTABLE CONCRETE BARRIER RAIL SYSTEM HAS A DYNAMIC DEFLECTION OF 38.1". THE DESIGNER SHOULD CONSIDER PLACING THE PCB SO THAT THERE IS ENOUGH SPACE BETWEEN THE WORK SPACE AND THE PCB FOR A 3 FOOT DYNAMIC DEFLECTION.

Ⓔ LOCATIONS WHERE PERMANENT DEFLECTION BETWEEN THE BARRIER AND WORK SPACE IS NOT AVAILABLE, BOX BEAM STIFFENER TUBE OR DROP ANCHOR PINS SHALL BE USED TO REDUCE DEFLECTION.

Ⓕ BASED ON SEGMENT LENGTH AND MAXIMUM JOINT ROTATION, THE 20 FEET PORTABLE CONCRETE BARRIER CANNOT BE INSTALLED ON RADIUS TIGHTER THAN 230 FEET.

Ⓖ FOR BARRIER TO PERFORM BOTH ENDS MUST BE ANCHORED. ANCHORING THE ENDS MAY BE ACCOMPLISHED BY ATTACHING A CRASH CUSHION OR USING ANCHOR PINS SEE STANDARD DRAWING T-WZ-PCB4.

Ⓗ A 3" x 4" DELINEATOR SHALL BE INSTALLED ON EACH BARRIER WALL. SEE STANDARD DRAWING T-WZ-PBR2.

Ⓘ AFTER A BARRIER UNIT HAS BEEN PLACED AND ALL THE CONNECTION KEYS HAVE BEEN INSERTED, REMOVE ANY SLACK IN THE JOINT BY PULLING THE UNIT IN A DIRECTION PARALLEL TO IT'S LONGITUDINAL AXIS.

Ⓙ ANY SALVABLE VALUE OF THE PORTABLE CONCRETE BARRIER RAIL WILL BECOME THE PROPERTY OF THE CONTRACTOR. UPON COMPLETION OF THE PROJECT, THE FREE STANDING PORTABLE CONCRETE BARRIER RAIL SHALL BE REMOVED FROM THE PROJECT SITE.

Ⓚ PAYMENT:

PAYMENT FOR CONNECTION KEY, JOINT ASSEMBLY STEEL TUBE, PLATES, ANCHOR PINS AND OTHER HARDWARE MATERIALS WILL BE INCLUDED IN THE UNIT PRICE OF PORTABLE BARRIER RAIL ITEM NUMBER:

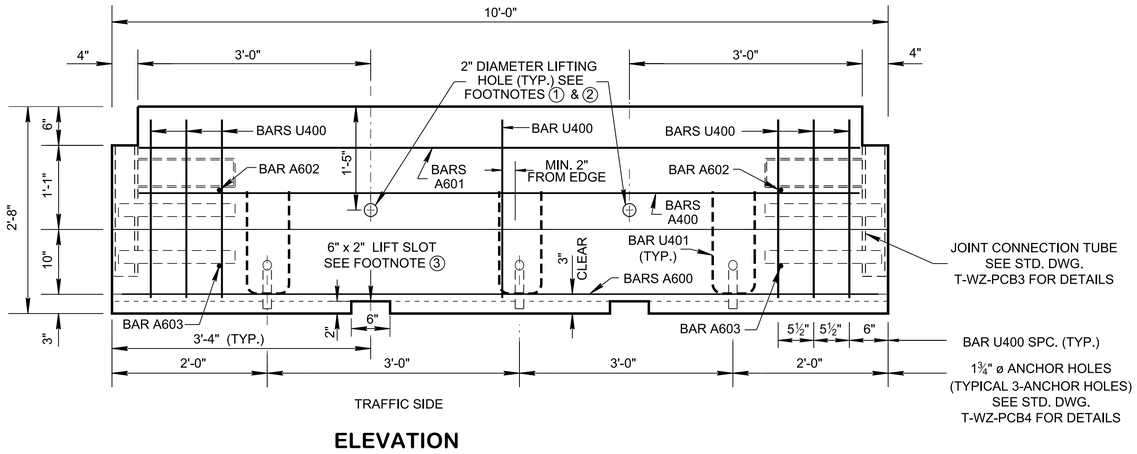
712-02.10, PORTABLE BARRIER RAIL (MASH TL-3), PER L.F.

NOT TO SCALE

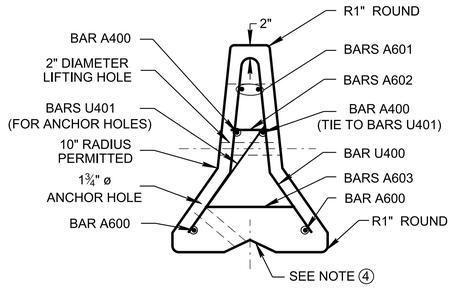
STATE OF TENNESSE
STANDARD DRAWING
DEPARTMENT OF TRANSPORTATION

20 FOOT PORTABLE CONCRETE BARRIER RAIL

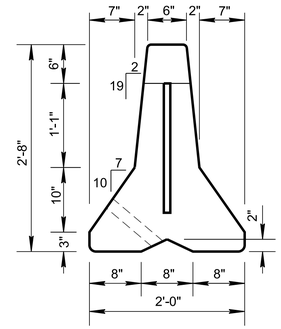
10-16-2020 T-WZ-PCB2



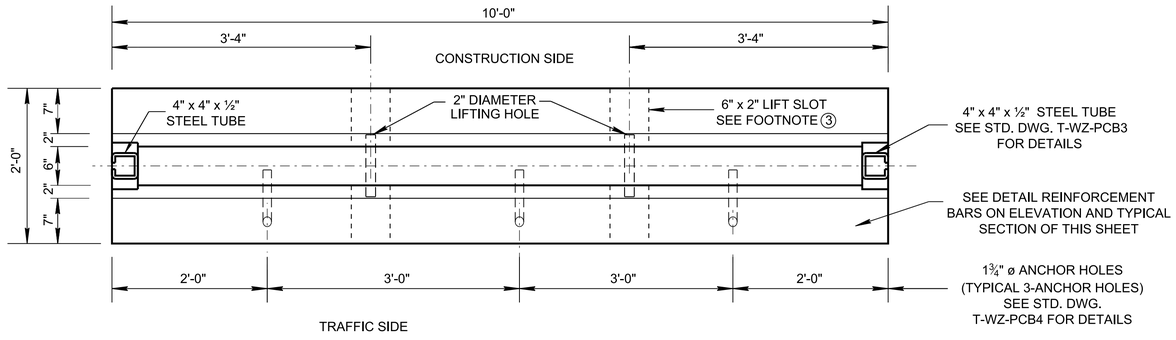
ELEVATION



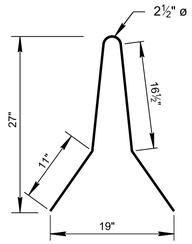
TYPICAL SECTION



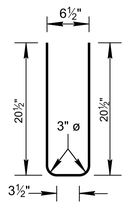
END VIEW



PLAN



BAR U400



BAR U401
(FOR ANCHOR HOLES)

VARIABLE

BARS A400, A600, A601, A602 AND A603
(SEE TABLE FOR LENGTH)

BILL OF STEEL

BAR TYPE	BAR SIZE	NUMBER REQUIRED	LENGTH
A600	6	2	9'-6"
A601	6	2	9'-0"
A602	6	2	0'-6"
A603	6	2	1'-2"
A400	4	2	9'-0"
U400	4	7	4'-11"
U401	4	3	4'-1"

APPROXIMATE WEIGHT AND QUANTITIES

SECTION LENGTH (FT.)	WEIGHT (LB.)	REINFORCING STEEL (LB.)	CONCRETE (C. Y.)
10	4253	114	1.05

LIFTING HOLE AND SLOT FOOTNOTES

① 2" DIAMETER LIFTING HOLE - 2 REQUIRED FOR EACH UNIT AND TO BE PLACED 3'-4" FROM EACH END OF THE 10 FOOT BARRIER WALL. LIFTING HOLES ARE TO BE FORMED WITH 2" PVC PIPE OR EQUAL.

② LIFTING BARS SHALL BE REQUIRED WHEN MOVING THE BARRIER WALLS TO PREVENT SPALLING OF CONCRETE AROUND HOLES.

③ SIX INCH LIFT SLOTS PROVIDES DRAINAGE FOR THE PAVEMENT, THE OPENINGS SHALL NOT BE BLOCKED.

④ AT THE DISCRETION OF THE FABRICATOR LIFTING DEVICES MAY BE USED AT THE BOTTOM OF BARRIER. THE LIFTING DEVICES SHALL NOT INTERFERE WITH THE PIN HOLE LOCATIONS.

GENERAL NOTES

Ⓐ PRECAST PORTABLE CONCRETE BARRIER SHALL BE CONSTRUCTED WITH CLASS 'A' CONCRETE WITH A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI, AND MANUFACTURED IN ACCORDANCE WITH SECTION 604 OF THE STANDARD SPECIFICATIONS.

Ⓑ REINFORCING STEEL: TO BE ASTM A615. PLACE ALL STEEL REINFORCEMENT 2" MINIMUM FROM OUTSIDE FACE OF WALL, EXCEPT AS OTHERWISE SHOWN.

Ⓒ SEE STANDARD DRAWING T-WZ-PCB3 FOR CONNECTION KEY DETAILS.

Ⓓ THE 32 INCH TALL 10 FOOT LONG PORTABLE CONCRETE BARRIER RAIL HAS BEEN EVALUATED BY THE MIDWEST ROADSIDE SAFETY FACILITY AND MEET MASH TL-3 STANDARDS. THE EVALUATION OF THE PCB HAS BEEN DOCUMENTED IN REPORT NUMBER TRP-03-355-18

Ⓔ BASED ON SEGMENT LENGTH AND MAXIMUM JOINT ROTATION, 10 FEET PORTABLE CONCRETE BARRIER CANNOT BE INSTALLED ON RADIUS TIGHTER THAN 115 FEET.

Ⓕ FOR BARRIER TO PERFORM BOTH ENDS MUST BE ANCHORED. ANCHORING THE ENDS MAY BE ACCOMPLISHED BY ATTACHING A CRASH CUSHION OR USING ANCHOR PINS SEE STANDARD DRAWING T-WZ-PCB4.

Ⓖ A 3" x 4" DELINEATOR SHALL BE INSTALLED ON EACH BARRIER WALL. SEE STANDARD DRAWING T-WZ-PBR2.

Ⓗ AFTER A BARRIER UNIT HAS BEEN PLACED AND ALL THE CONNECTION KEYS HAVE BEEN INSERTED, REMOVE ANY SLACK IN THE JOINT BY PULLING THE UNIT IN A DIRECTION PARALLEL TO IT'S LONGITUDINAL AXIS.

Ⓘ ANY SALVABLE VALUE OF THE PORTABLE CONCRETE BARRIER RAIL WILL BECOME THE PROPERTY OF THE CONTRACTOR. UPON COMPLETION OF THE PROJECT, THE FREE STANDING PORTABLE CONCRETE BARRIER RAIL SHALL BE REMOVED FROM THE PROJECT SITE.

Ⓙ PAYMENT:

PAYMENT FOR CONNECTION KEY, JOINT ASSEMBLY STEEL TUBE, PLATES, ANCHOR PINS AND OTHER HARDWARE MATERIALS WILL BE INCLUDED IN THE UNIT PRICE OF PORTABLE BARRIER RAIL ITEM NUMBER:

712-02.10, PORTABLE BARRIER RAIL (MASH TL-3), PER L.F.

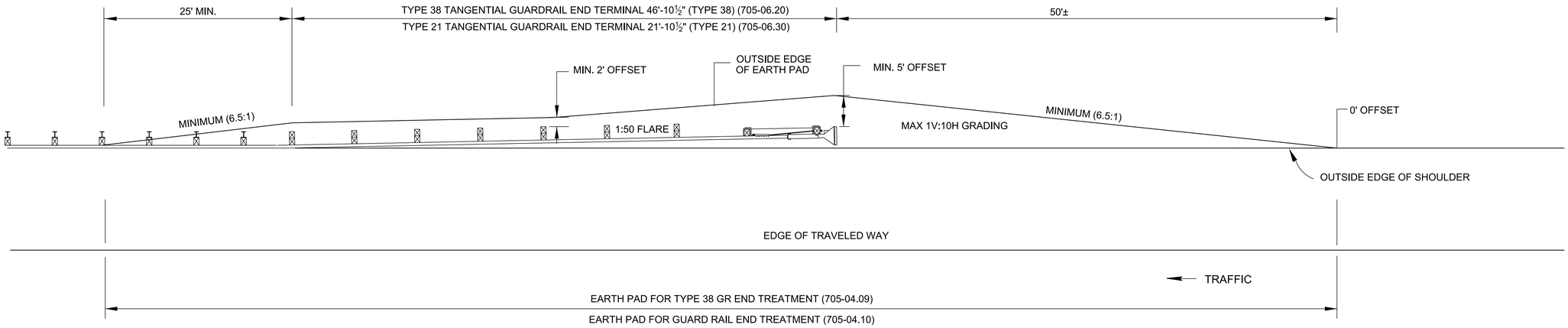
STATE OF TENNESSEE
STANDARD DRAWING
DEPARTMENT OF TRANSPORTATION

10 FOOT PORTABLE CONCRETE BARRIER RAIL

10-16-2020 | T-WZ-PCB1

NOT TO SCALE

- REV. 5-26-16: CORRECTED PREFERRED TAPER RATE.
- REV. 7-5-16: UPDATED TITLE AND GENERAL NOTES TO INCLUDE TYPE 21 TERMINAL.
- REV. 7-5-17: ADDED ITEM NUMBERS TO THE PLAN VIEW.
- REV. 06-28-2019: REDREW SHEET.
- REV. 10-16-2020: ADDED GENERAL NOTE (H).



PLAN VIEW OF EARTH PAD CONSTRUCTION

GENERAL NOTES

(A) REFER TO RD11-S-SERIES FOR ROADSIDE SLOPE DEVELOPMENT AND ROADSIDE DITCH DETAILS.

(B) TYPE 21 TERMINAL HAS 3 LESS SPANS THAN TYPE 38 TERMINAL. SEE S-GRT-2 FOR TYPE 38 TERMINAL DETAILS. SEE S-GRT-3 FOR TYPE 21 TERMINAL DETAILS. APPLICABLE FOR TANGENT INSTALLATIONS ONLY.

(C) THE DESIGNER SHALL INCORPORATE AN EARTH PAD IN CONJUNCTION WITH ALL TYPE 38 AND TYPE 21 GUARDRAIL TERMINALS IN THE RIGHT-OF-WAY AND CONSTRUCTION PLANS AS WELL AS THE ROADWAY CROSS-SECTION SHEETS.

(D) THE CONTRACTOR SHALL CONSTRUCT AN EARTH PAD AS PART OF THE INITIAL GRADING OPERATIONS AS SHOWN ON THIS STANDARD DRAWING AFTER FIELD VERIFICATION OF HAZARD LOCATION AND ENGINEER'S APPROVAL. THE OFFSETS SHOWN INDICATE THE MINIMUM OFFSETS REQUIRED BEHIND THE GUARDRAIL END TERMINAL, ACTUAL OFFSETS FROM THE OUTSIDE SHOULDER FOR THE GRADED PAD WILL DEPEND ON THE APPROVED TYPE 38 OR TYPE 21 GUARDRAIL END TERMINAL WHICH IS UTILIZED IN THE LOCATION.

(E) ON ALL NEW GRADE AND DRAIN PROJECTS, THE EARTH PAD SHALL BE BUILT AS SHOWN ON THIS STANDARD DRAWING WITHOUT EXCEPTION AND PAID UNDER ROADWAY GRADING. RESURFACING, MAINTENANCE OR BRIDGE REPAIR PROJECTS MAY SUBSTITUTE RETROFIT STANDARD S-GRT-2R.

(F) REFER TO S-PL-1 FOR LENGTH OF NEED AND CLEAR ZONE REQUIREMENTS.

(G) ON PROJECTS OF LIMITED SCOPE OR WITH NO ADDITIONAL ROADWAY GRADING, THE EARTH PAD SHALL BE PAID UNDER THE ITEM NUMBER:

705-04.09	EARTH PAD FOR TYPE 38 GR END TREATMENT	PER EACH
705-04.10	EARTH PAD FOR GUARD RAIL END TREATMENT	PER EACH

(H) THESE ITEM NUMBERS SHALL INCLUDE ALL WORK AND MATERIALS NECESSARY TO CONSTRUCT AND STABILIZE THE EARTH PADS, INCLUDING BUT NOT LIMITED TO FILL MATERIAL, WATER, COMPACTION, TOPSOIL AND SODDING.

NOT TO SCALE

- MINOR REVISION -- FHWA APPROVAL NOT REQUIRED

STATE OF TENNESSEE
STANDARD DRAWING
DEPARTMENT OF TRANSPORTATION

EARTH PAD FOR TYPE 38 AND TYPE 21 TERMINAL

07-11-2013 | S-GRT-2P