



**STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION**

ROADWAY DESIGN DIVISION
SUITE 1200 JAMES K. POLK BUILDING
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CLAY BRIGHT
COMMISSIONER

BILL LEE
GOVERNOR

INSTRUCTIONAL BULLETIN NO. 19-18

Regarding Various Revised and New Standard Drawings.

Effective May 15, 2020 letting (March 4, 2020 Turn-in), the following standard drawings are new or have been revised. Section 10 of the Roadway Design Guidelines has been revised to incorporate these changes.

New Standard Drawings:

DRAWING NUMBER	REVISION DATE	DESCRIPTION
RP-J-26 ^{1,2}		STANDARD CONSTRUCTION DETAILS FOR ROUNDABOUTS
S-GRC-1M ¹		GUARDRAIL CONNECTION TO BRIDGE ENDS OR BARRIER WALL
S-GRC-2M ¹		GUARDRAIL CONNECTION TO BRIDGE END FOR LOCAL ROADS (ADT<2000)
S-GRC-3M ¹		MEDIAN DIVIDER GUARDRAIL TRANSITION TO CONCRETE MEDIAN BARRIER
T-WZ-FAB ^{1,3}		FLASHING YELLOW ARROW BOARD
T-WZ-PBR ^{1,4}		INTERCONNECTED PORTABLE BARRIER RAIL
T-WZ-PBR ^{2,5}		DETAILS FOR FLEXIBLE DELINEATORS

DRAWING NUMBER	REVISION DATE	DESCRIPTION
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Revised Standard Drawings:

S-CZ-1 ¹	06-28-19	CLEAR ZONE CRITERIA
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S-PL-3 ¹	06-28-19	SAFETY PLAN MINIMUM INSTALLATION AT BRIDGE ENDS
S-PL-4 ¹	06-28-19	SAFETY PLAN FOR BRIDGE PIERS IN CLEAR ZONE
S-PL-5 ¹	06-28-19	SAFETY PLAN FOR BRIDGE ENDS IN MEDIANS
S-PL-6 ¹	06-28-19	SAFETY PLAN SAFETY HARDWARE PLACEMENT ON OUTSIDE EDGE
S-PL-6A ¹	06-28-19	SAFETY PLAN SAFETY HARDWARE PLACEMENT IN MEDIAN
T-M-1 ¹	06-28-19	DETAILS OF PAVEMENT MARKINGS FOR CONVENTIONAL ROADS AND MARKING ABBREVIATIONS
T-M-2 ¹	06-28-19	DETAILS OF PAVEMENT MARKINGS FOR CONVENTIONAL ROADS
T-M-3 ¹	06-28-19	MARKING STANDARDS FOR TRAFFIC ISLANDS, PAVED SHOULDERS AND MEDIANS FOR CONVENTIONAL ROADS
T-M-5 ¹	06-28-19	MARKING DETAIL FOR EXPRESSWAY AND FREEWAYS
T-M-6 ¹	06-28-19	MARKING DETAIL FOR EXPRESSWAY AND FREEWAY INTERCHANGES
T-M-16 ¹	06-28-19	ASPHALT SHOULDER RUMBLE STRIPE INSTALLATION DETAILS FOR NON-ACCESS CONTROLLED RURAL ROUTES
T-M-16A ¹	06-28-19	ASPHALT CENTERLINE RUMBLE STRIPE
T-WZ-16 ⁶	06-28-19	LANE SHIFT ON DIVIDED HIGHWAYS AND FREEWAYS

These standard drawings are revised in the Roadway Design Guidelines, Chapter 10, Index of Standard Drawings and are available online.

Voided Standard Drawings:

The following standard drawings will be voided on December 31, 2019.

RP-R-2	STANDARD CONSTRUCTION DETAILS FOR ROUNDABOUTS
T-FAB-1	FLASHING YELLOW ARROW BOARD
T-PBR-1	INTERCONNECTED PORTABLE BARRIER RAIL
T-PBR-2	DETAILS FOR FLEXIBLE DELINEATORS

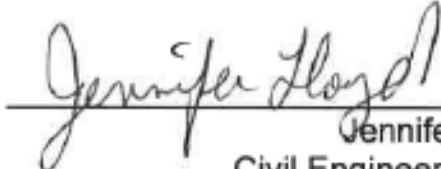
- Note 1: F.H.W.A. approval was given on 09/23/19.
- Note 2: Replaced Standard Drawing RP-R-2.
- Note 3: Replaced Standard Drawing T-FAB-1.
- Note 4: Replaced Standard Drawing T-PBR-1.
- Note 5: Replaced Standard Drawing T-PBR-2.
- Note 6: F.H.W.A. approval was given on 10/23/19.

Standard Drawings:

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

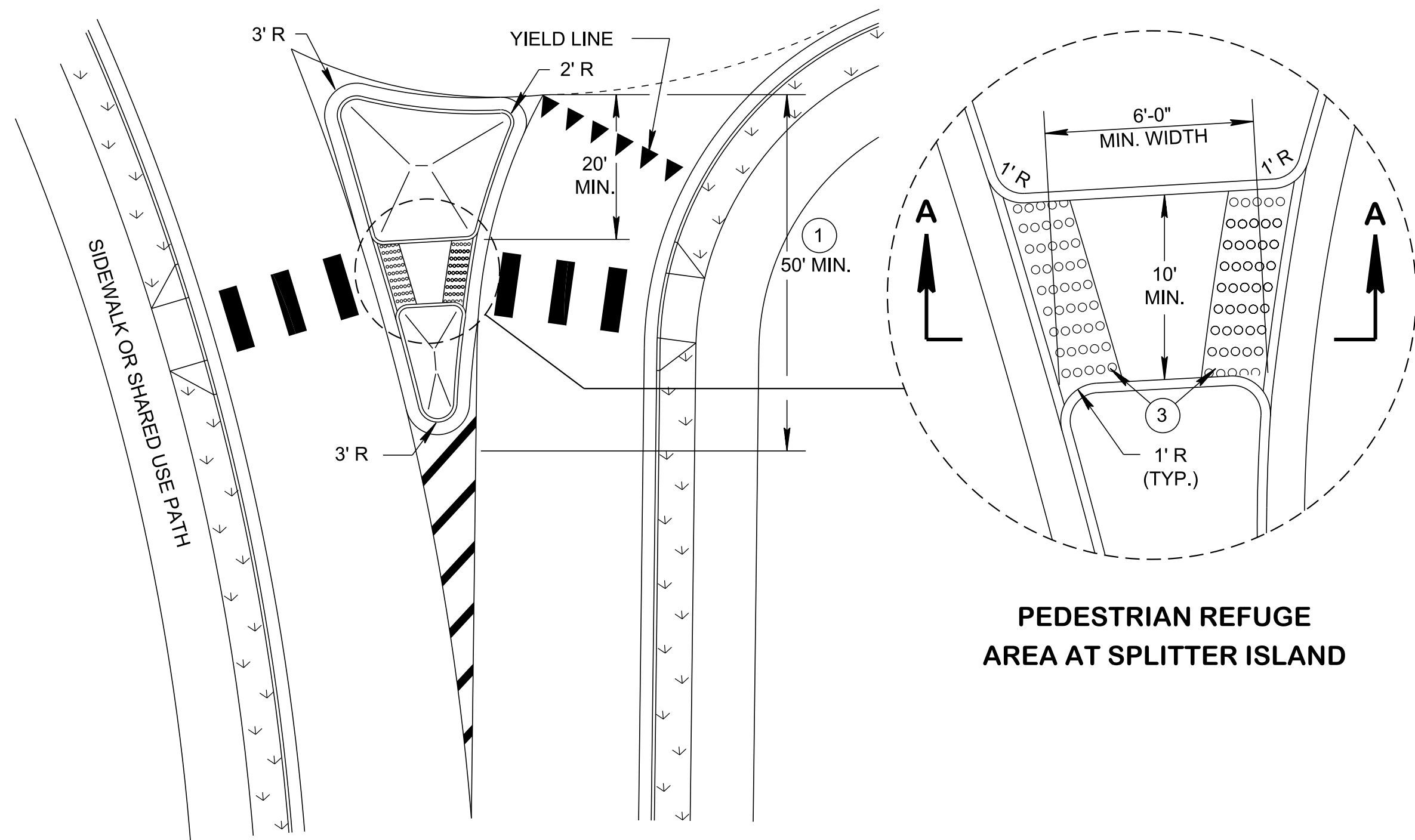
Chapter 10 - Index of Standard Drawings is available online at this location:

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

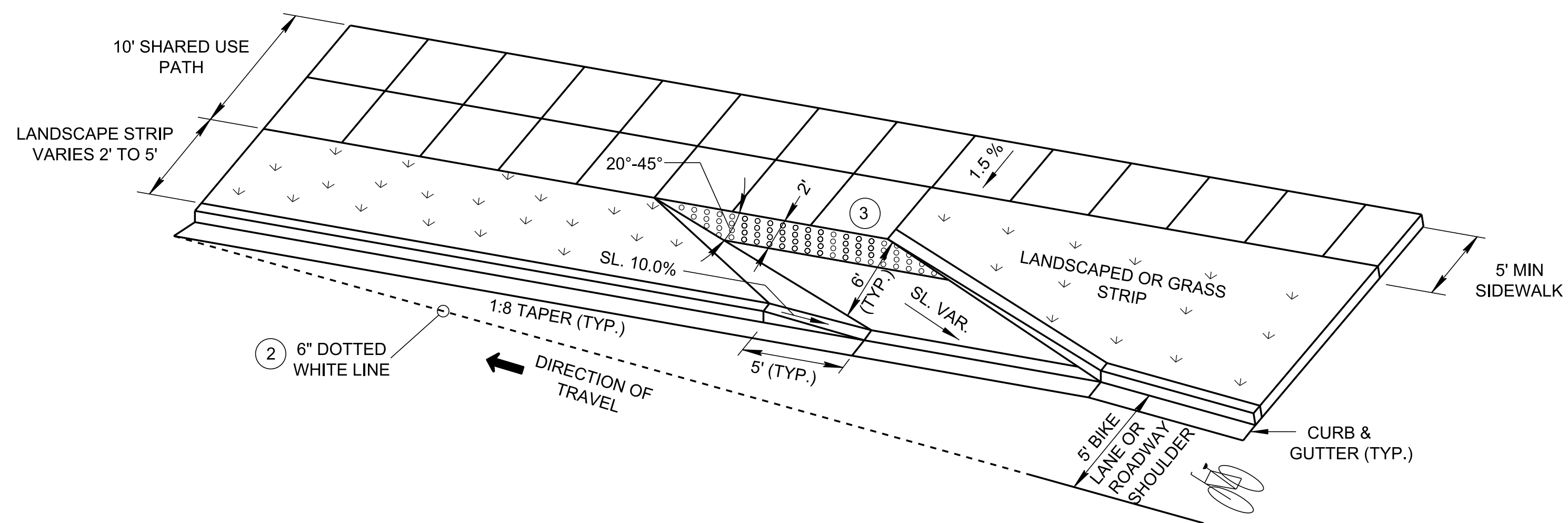


Jennifer Lloyd, PE
Civil Engineering Director
Roadway Design Division

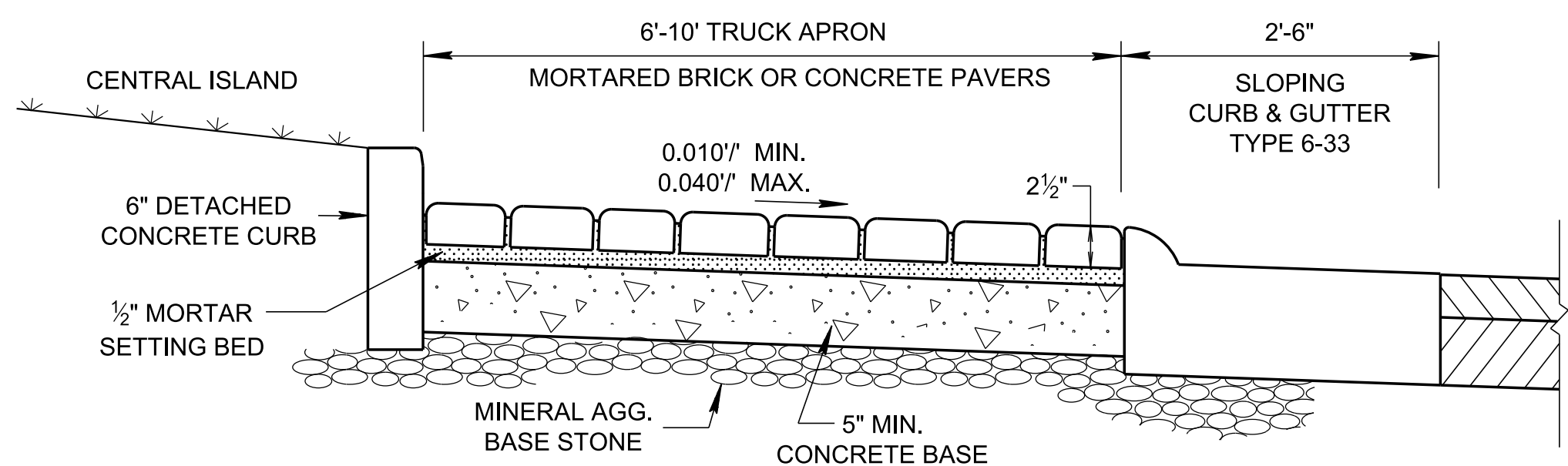
KJL:ARH:RBB:LLP
November 5, 2019



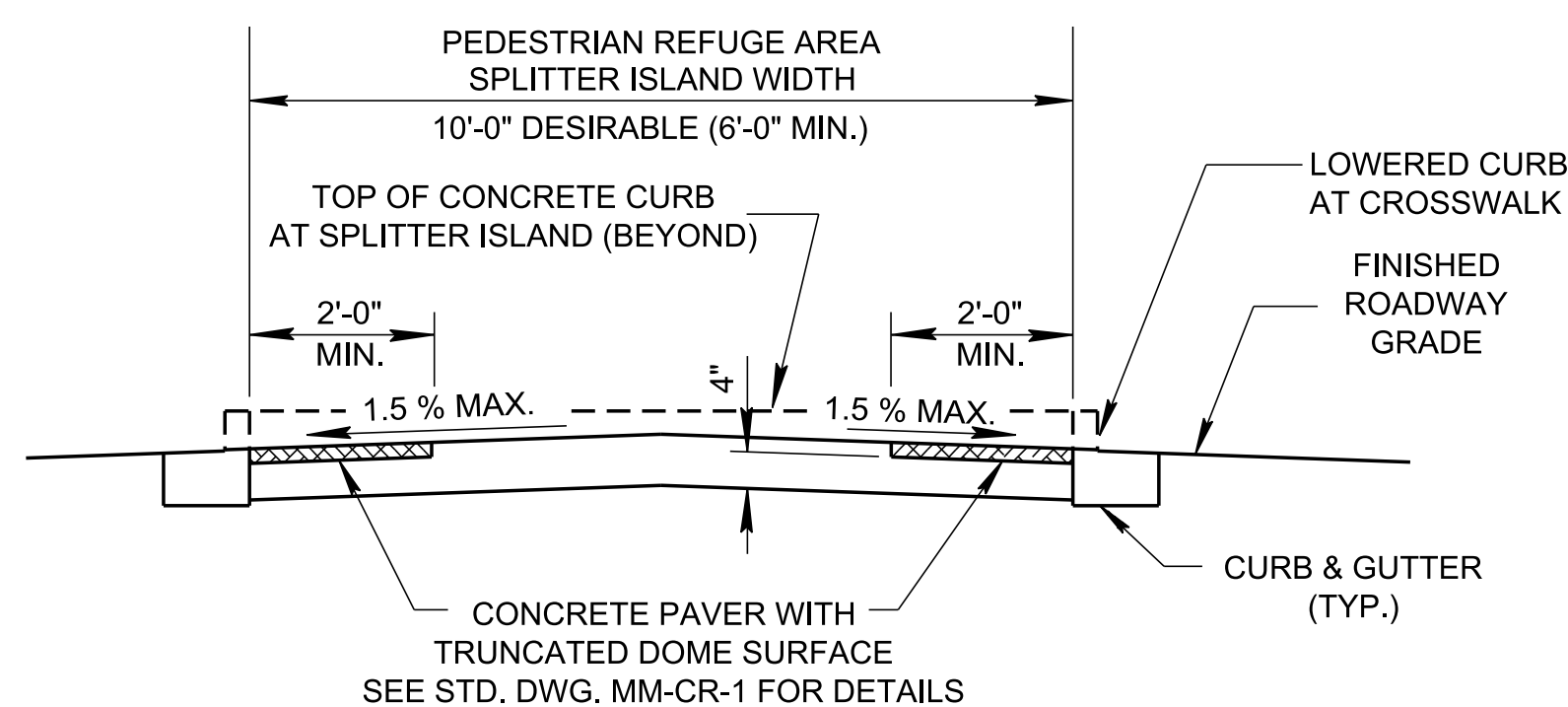
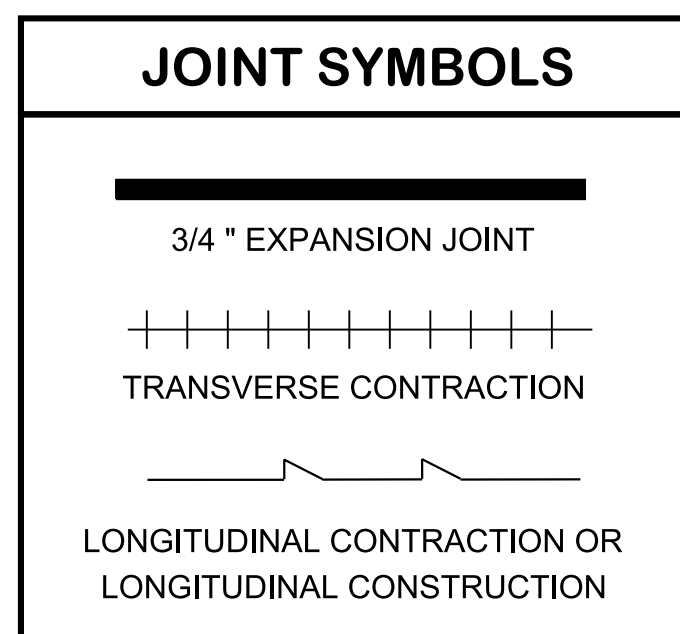
TYPICAL SPLITTER ISLAND



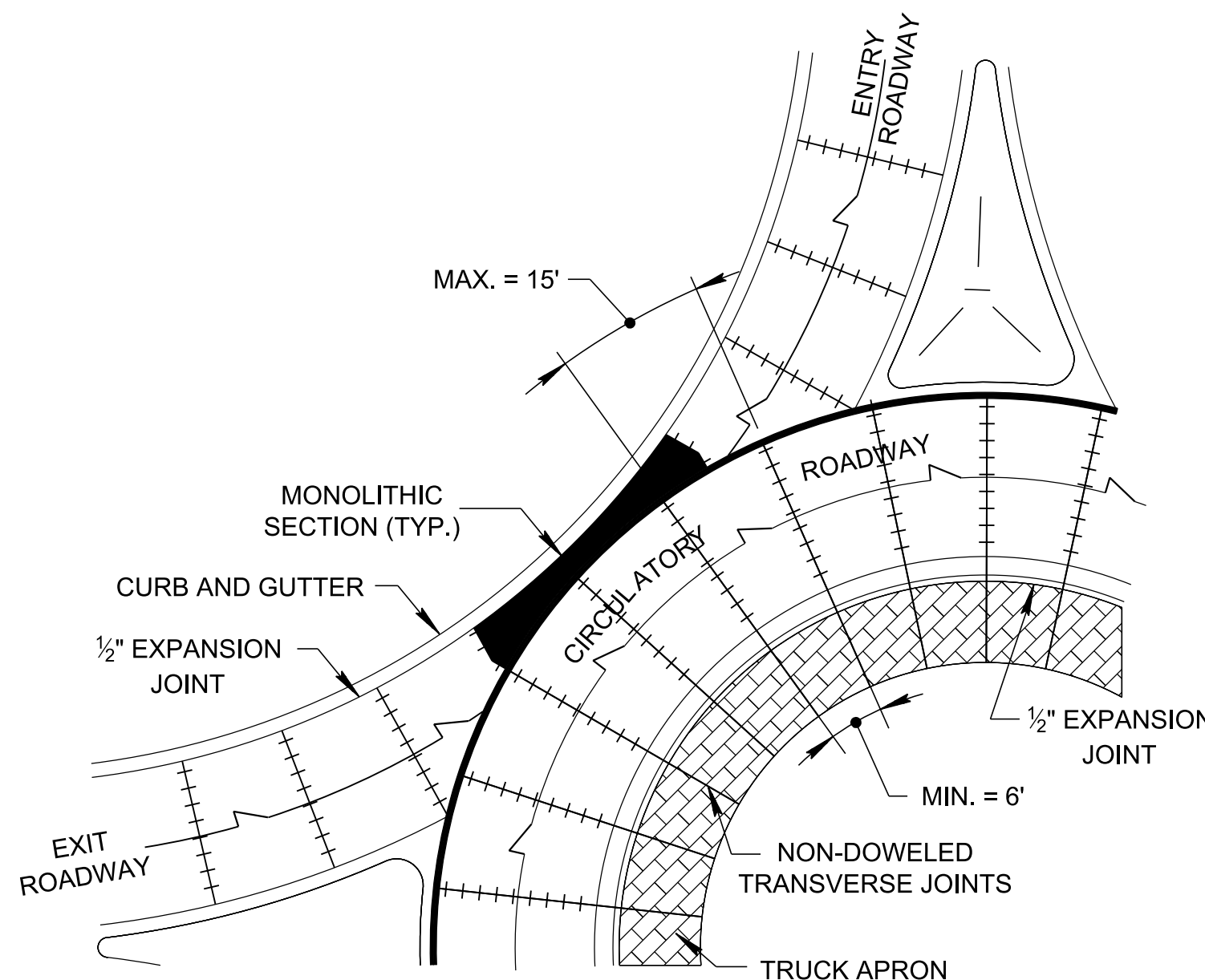
BICYCLE EXIT RAMP DETAIL
(ENTRANCE RAMP SIMILAR)



TRUCK APRON WITH CONCRETE OR BRICK PAVERS
(BRICK PAVERS SHOWN)



SPLITTER ISLAND CROSSING SECTION A-A



TYPICAL JOINTING DETAIL ④
FOR CONCRETE PAVEMENT

DESIGN NOTES

- ① SPLITTER ISLAND SHOULD BE A RAISED MEDIAN WITH CONCRETE HARDSCAPING (PREFERRED). SPLITTER ISLAND SHOULD EXTEND A MINIMUM OF 50' FROM THE YIELD LINE. SEE STD. DWG. MM-CR-4 FOR ADDITIONAL DETAILS OF MEDIAN CROSSINGS.
- ② 6" X 2" DOTTED WHITE LINE ALONG ENTIRE LENGTH OF TAPER AT BICYCLE RAMP.
- ③ DETECTABLE WARNING SURFACE SHALL BE INSTALLED AT BOTH SIDES OF THE SPLITTER ISLAND PEDESTRIAN REFUGE AREA AND AT THE TOP OF ALL BICYCLE EXIT AND ENTRANCE RAMPS. SEE STD. DWG. MM-CR-1 FOR DETAILS.
- ④ WHEN CIRCULATORY ROADWAY IS CONCRETE, THE TRANSVERSE CONTRACTION JOINTS SHOULD LINE UP WITH CONTRACTION JOINTS IN THE TRUCK APRON. THE JOINTS IN THE TRUCK APRON SHOULD NOT BE DOWELED. THE COMBINED CURB AND GUTTER SHOULD BE TIED TO THE ROADWAY CONCRETE.
- ⑤ FOR CONCRETE CURB AND CONCRETE CURB AND GUTTER DETAILS SEE STD. DWG. RP-SC-1 & RP-VC-10.
- ⑥ FOR CONCRETE PAVEMENT DETAILS SEE STD. DWG. RP-J- SERIES.
- ⑦ FOR PAVEMENT MARKINGS AND SIGNAGE AT BICYCLE RAMP AND SHARED USE PATH DETAILS, SEE STD. DWG. MM-PM-1.
- ⑧ FOR TRUNCATED DOME SURFACE DETAILS SEE STD. DWG. MM-CR-1.

GENERAL NOTES

- (A) 6" SLOPING CONCRETE COMBINED CURB AND GUTTER SHOULD BE USED BETWEEN CIRCULATORY ROADWAY AND TRUCK APRON UNLESS OTHERWISE NOTED. 6" DETACHED CONCRETE CURB SHOULD BE USED BETWEEN THE TRUCK APRON AND THE CENTRAL ISLAND.
- (B) THE CROSS SLOPE OF THE LANDING AREA SHALL BE 1.5% IN THE SIDEWALK AREA.
- (C) SPLITTER ISLAND SIZE AND SHAPE WILL BE DETERMINED BY THE ROADWAY DEFLECTION.
- (D) THE FINISH ON THE TRUCK APRON SHOULD CREATE A CONTRAST IN COLOR OR TEXTURE BETWEEN THE CIRCULATORY ROADWAY AND THE APRON. THIS CAN BE ACCOMPLISHED WITH THE USE OF CONCRETE, STAMPED CONCRETE, COLORED CONCRETE, CONCRETE PAVERS, OR BRICK PAVERS. WHEN PAVERS ARE USED, A BASKETWEAVE OR HERRINGBONE PATTERN SHOULD BE APPLIED.
- (E) UNLESS OTHERWISE NOTED ON PLANS, THE CIRCULATORY ROADWAY SHOULD BE CONSTRUCTED OF ASPHALT. THE USE OF CONCRETE PAVEMENT SHALL BE ON A CASE-BY-CASE BASIS.

PAYMENT:

- (F) ALL COST FOR BICYCLE EXIT AND ENTRANCE RAMPS TO BE INCLUDED IN COST OF SIDEWALK, ITEM NO. 701-01.01, CONCRETE SIDEWALK (4"), PER SQUARE FOOT, OR ITEM NO. 701-01.02, CONCRETE SIDEWALK (6"), PER SQUARE FOOT
- (G) ALL COST FOR CONSTRUCTING A TRUCK APRON INCLUDING MORTARED BRICK OR CONCRETE PAVERS, MORTAR SETTING BED AND CONCRETE BASE WILL BE INCLUDED IN, ITEM NO. 604-01.01, CLASS A CONCRETE (ROADWAY), PER CUBIC YARD
- (H) PAYMENT FOR TYPE 6-33 SLOPING CURB & GUTTER AND 6" DETACHED CONCRETE CURB WILL BE AS FOLLOWS:
ITEM NO. 702-01, CONCRETE CURB, PER CUBIC YARD
ITEM NO. 702-03, CONCRETE COMBINED CURB AND GUTTER, PER CUBIC YARD

(Replaced Std Dwg RP-R-2)

STATE OF TENNESSEE
STANDARD
DRAWING
DEPARTMENT OF TRANSPORTATION

STANDARD
CONSTRUCTION
DETAILS
FOR
ROUNDBABOUTS

TABLE A. CLEAR ZONE DISTANCE (Lc) (FEET)

DESIGN SPEED	DESIGN ADT	FORESLOPES (H:V)			BACKSLOPES (H:V)		
		6:1 OR FLATTER	5:1 TO 4:1	3:1	6:1 OR FLATTER	5:1 TO 4:1	3:1
40 MPH OR LESS	UNDER 750 (7)	7 - 10	7 - 10	(4)	7 - 10	7 - 10	7 - 10
	750 - 1500	10 - 12	12 - 14	(4)	12 - 14	12 - 14	12 - 14
	1500 - 6000	12 - 14	14 - 16	(4)	14 - 16	14 - 16	14 - 16
	OVER 6000	14 - 16	16 - 18	(4)	16 - 18	16 - 18	16 - 18
45-50 MPH	UNDER 750 (7)	10 - 12	12 - 14	(4)	10 - 12	8 - 10	8 - 10
	750 - 1500	14 - 16	16 - 20	(4)	14 - 16	12 - 14	10 - 12
	1500 - 6000	16 - 18	20 - 26	(4)	16 - 18	14 - 16	12 - 14
	OVER 6000	20 - 22	24 - 28	(4)	20 - 22	18 - 20	14 - 16
55 MPH	UNDER 750 (7)	12 - 14	14 - 18	(4)	10 - 12	10 - 12	8 - 10
	750 - 1500	16 - 18	20 - 24	(4)	16 - 18	14 - 16	10 - 12
	1500 - 6000	20 - 22	24 - 30	(4)	20 - 22	16 - 18	14 - 16
	OVER 6000	22 - 24	26 - 32 (3)	(4)	22 - 24	20 - 22	16 - 18
60 MPH	UNDER 750 (7)	16 - 18	20 - 24 (9)	(4)	14 - 16	12 - 14	10 - 12
	750 - 1500	20 - 24	26 - 32 (9)	(4)	20 - 22	16 - 18	12 - 14
	1500 - 6000	26 - 30	32 - 40 (9)	(4)	24 - 26	18 - 22	14 - 18
	OVER 6000	30 - 32 (3)	36 - 44 (9)	(4)	26 - 28	24 - 26	20 - 22
65-70 MPH	UNDER 750 (7)	18 - 20	20 - 26 (9)	(4)	14 - 16	14 - 16	10 - 12
	750 - 1500	24 - 26	28 - 36 (9)	(4)	20 - 22	18 - 20	12 - 16
	1500 - 6000	28 - 32 (3)	34 - 42 (9)	(4)	26 - 28	22 - 24	16 - 20
	OVER 6000	30 - 34 (3)	38 - 46 (9)	(4)	28 - 30	26 - 30	22 - 24

ADAPTED FROM TABLE 3.1 OF THE "ROADSIDE DESIGN GUIDE," AASHTO, 2011.

TABLE B. HORIZONTAL CURVE CORRECTION FACTORS (Kcz) (5)

RADIUS (FT)	DESIGN SPEEDS (MPH)							
	40	45	50	55	60	65	70	
2950	1.1	1.1	1.1	1.2	1.2	1.2	1.2	
2300	1.1	1.1	1.2	1.2	1.2	1.2	1.3	
1970	1.1	1.2	1.2	1.2	1.3	1.3	1.4	
1640	1.1	1.2	1.2	1.3	1.3	1.3	1.4	
1475	1.2	1.2	1.3	1.3	1.4	1.4	1.5	
1315	1.2	1.2	1.3	1.3	1.4	1.4	-	
1150	1.2	1.2	1.3	1.4	1.5	1.5	-	
985	1.2	1.3	1.4	1.5	1.5	1.5	-	
820	1.3	1.3	1.4	1.5	-	-	-	
660	1.3	1.4	1.5	-	-	-	-	
495	1.4	1.5	-	-	-	-	-	
330	1.5	-	-	-	-	-	-	

ADAPTED FROM TABLE 3.2 OF THE "ROADSIDE DESIGN GUIDE," AASHTO, 2011.

CZc = (Lc) (Kcz)
 WHERE CZc = CLEAR ZONE ON OUTSIDE OF CURVATURE, (FEET)
 Lc = CLEAR ZONE DISTANCE, (FEET) (FROM TABLE-A)
 Kcz = CURVE CORRECTION FACTOR

NOTE:
 THE CLEAR ZONE CORRECTION FACTOR IS APPLIED TO THE OUTSIDE OF CURVES ONLY. CURVES FLATTER THAN 2950 FEET DO NOT REQUIRE AN ADJUSTED CLEAR ZONE.

LEGEND

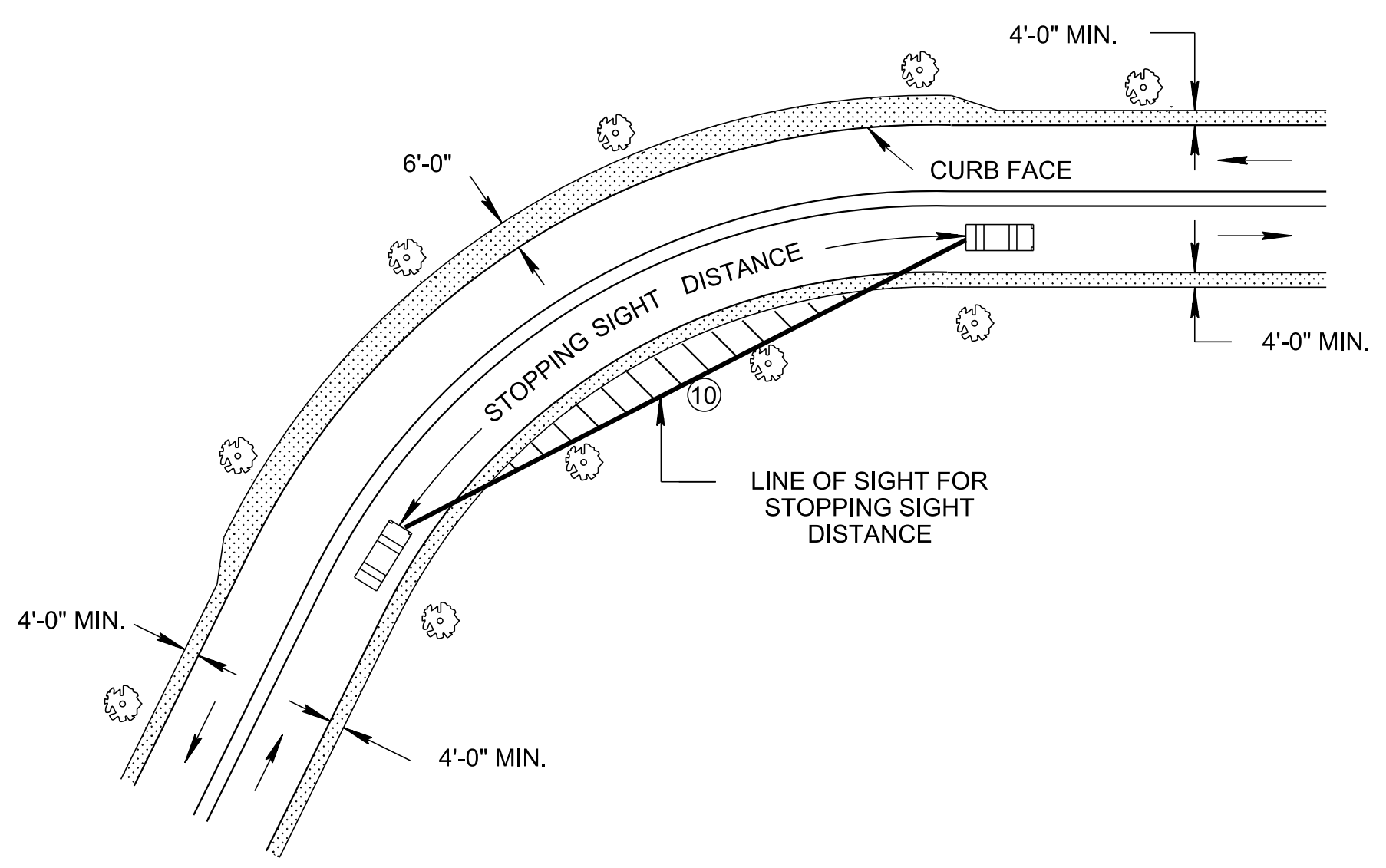
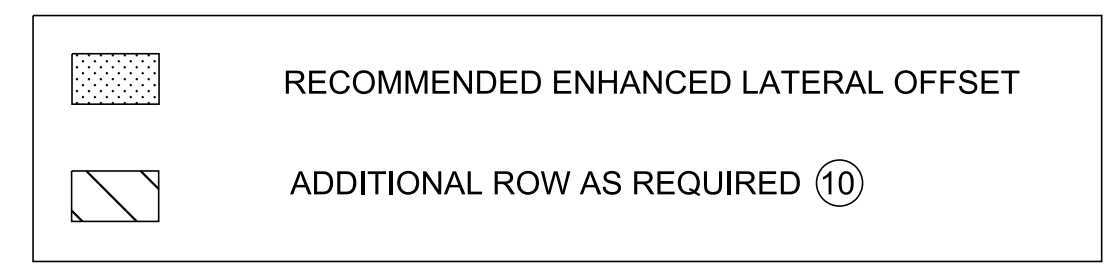


FIGURE B. MINIMUM LATERAL OFFSET FOR LOW SPEED URBAN ROADS (8)

IF HAZARD IS IDENTIFIED IN CLEAR ZONE

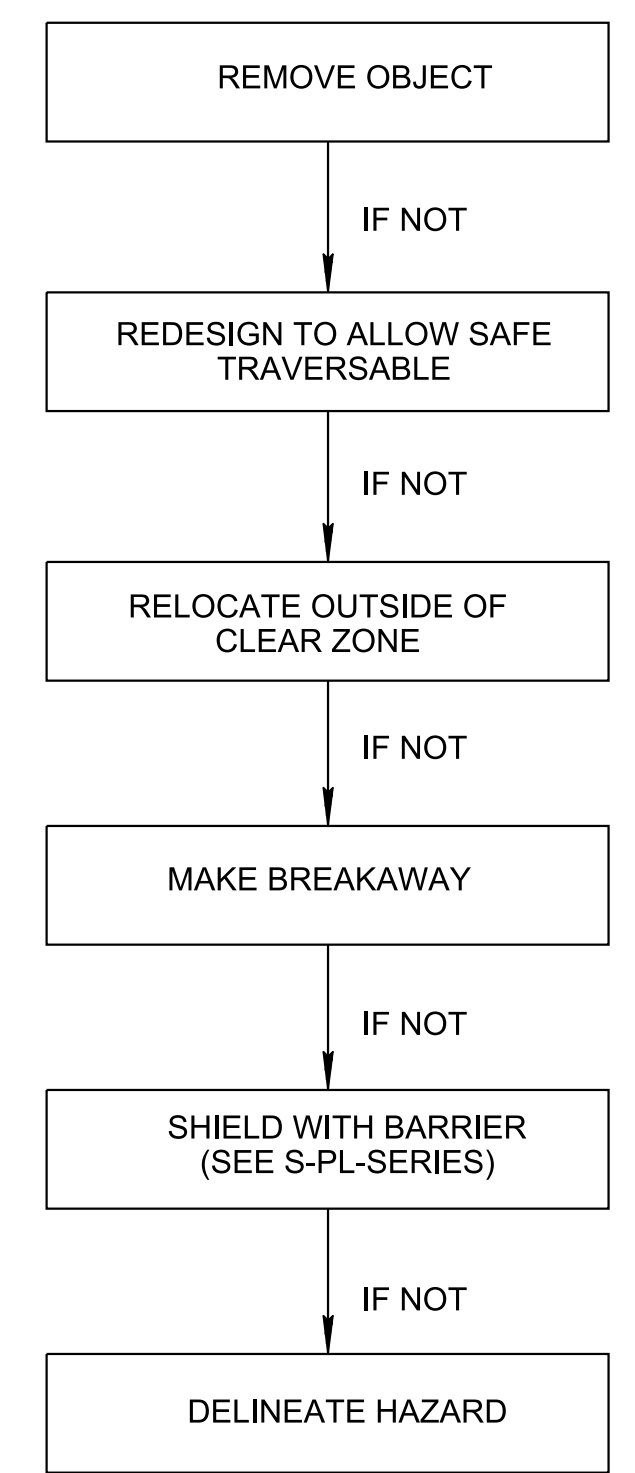
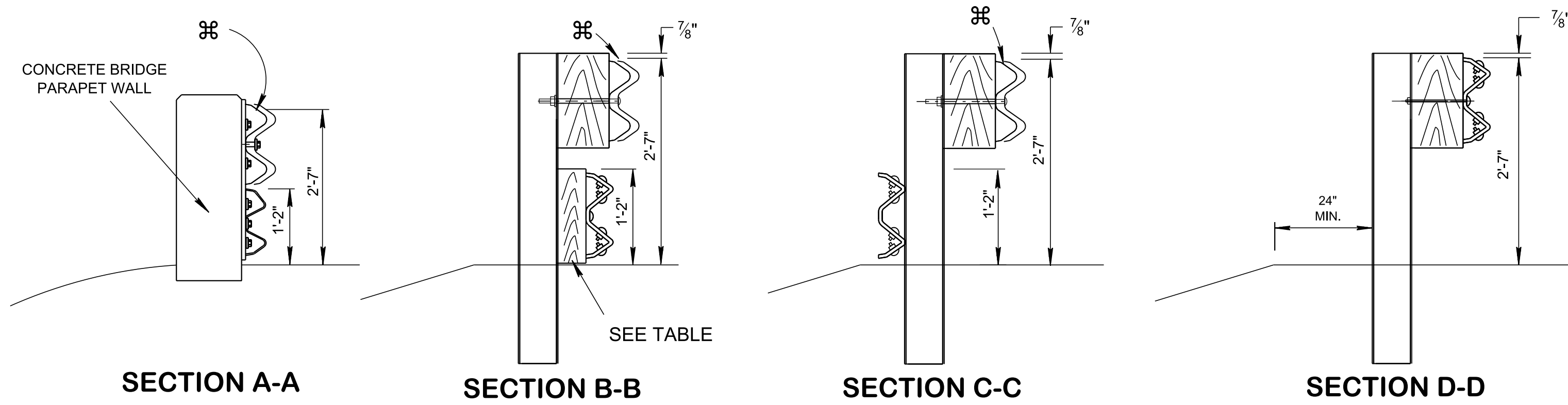


FIGURE A. DESIGN OPTIONS FOR HAZARDS IN CLEAR ZONE

GENERAL NOTES

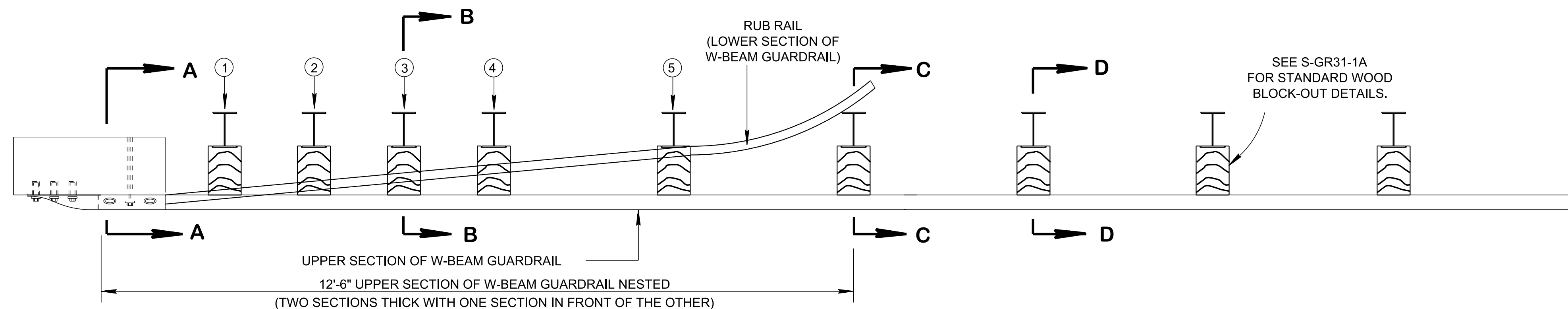
- (1) CLEAR ZONE IS DEFINED IN THE "ROADSIDE DESIGN GUIDE," AASHTO, 2011, AS THE TOTAL ROADSIDE BORDER AREA, STARTING AT THE EDGE OF THE TRAVELED WAY, AVAILABLE FOR SAFE USE BY ERRANT VEHICLES. THIS AREA MAY CONSIST OF A SHOULDER, A RECOVERABLE SLOPE, A NON-RECOVERABLE SLOPE, AND/OR A CLEAR RUN-OUT AREA. THE DESIRED WIDTH IS DEPENDENT ON THE TRAFFIC VOLUMES, SPEEDS, AND THE ROADSIDE GEOMETRY. SEE THE "ROADSIDE DESIGN GUIDE," AASHTO, 2011 FOR MORE DETAILED INFORMATION.
- (2) CLEAR ZONE DISTANCES ARE RELATED TO DESIGN SPEED, TRAFFIC VOLUME AND SLOPE CONDITIONS AS SHOWN IN TABLE A.
- (3) WHERE A SITE SPECIFIC INVESTIGATION INDICATES A HIGH PROBABILITY OF CONTINUING CRASHES, OR SUCH OCCURRENCES ARE INDICATED BY CRASH HISTORY, THE DESIGNER MAY PROVIDE CLEAR-ZONE DISTANCES GREATER THAN THE CLEAR ZONE SHOWN IN THE TABLE A.
- (4) BECAUSE RECOVERY IS LESS LIKELY ON THE UNSHIELDED, TRAVERSABLE (3:1), FILL SLOPES, FIXED OBJECTS SHOULD NOT BE PRESENT IN THE VICINITY OF THE TOES OF THESE SLOPES. RECOVERY OF HIGH-SPEED VEHICLES THAT ENCROACH BEYOND THE EDGE OF THE SHOULDER MAY BE EXPECTED TO OCCUR BEYOND THE TOE OF SLOPE. DETERMINATION OF THE WIDTH OF THE RECOVERY AREA AT THE TOE OF THE SLOPE SHOULD TAKE INTO CONSIDERATION RIGHT-OF-WAY AVAILABILITY, ENVIRONMENTAL CONCERNS, ECONOMIC FACTORS, SAFETY NEEDS, AND CRASH HISTORIES. ALSO, THE DISTANCE BETWEEN THE EDGE OF THE THROUGH TRAVELED LANE AND THE BEGINNING OF THE 3:1 SLOPE SHOULD INFLUENCE THE RECOVERY AREA PROVIDED AT THE TOE OF THE SLOPE. SEE THE ROADSIDE DESIGN GUIDE, AASHTO 2011 FOR MORE INFORMATION.
- (5) THESE MODIFICATIONS ARE NORMALLY CONSIDERED ONLY WHEN CRASH HISTORIES INDICATE A NEED OR A SPECIFIC SITE INVESTIGATION SHOWS A DEFINITE CRASH POTENTIAL THAT COULD BE SIGNIFICANTLY LESSENED BY INCREASING THE CLEAR-ZONE WIDTH, AND WHEN SUCH INCREASES ARE COST EFFECTIVE.
- (6) SEE THE "ROADSIDE DESIGN GUIDE," AASHTO, 2011, FOR COMPOSITE ROADSIDE SECTIONS AND DISCUSSION ON OUTSIDE DITCHES AND CHANNELS.
- (7) FOR ROADWAYS WITH LOW VOLUMES. IT MAY NOT BE PRACTICAL TO PROVIDE FULL CLEAR ZONE DISTANCE IN SUCH CASES PROVIDE MAXIMUM AMOUNT OF CLEAR ZONE THAT IS PRACTICAL.
- (8) CLEAR ZONE DISTANCES DO NOT APPLY TO LOW SPEED URBAN ROADS. IN SUCH CASES PROVIDE A MINIMUM LATERAL OFFSET FROM EDGE OF TRAVELED WAY TO CURB. (SEE FIGURE B)
- (9) USE 6:1 SLOPES ONLY ON ROADWAYS WITH DESIGN SPEEDS 60 MPH AND ABOVE. IF 6:1 IS IMPRACTICAL, CONSIDER SHIELDING AREA WITH BARRIER SYSTEM.
- (10) STOPPING SIGHT DISTANCE THROUGHOUT THE HORIZONTAL CURVE SHALL BE MAINTAINED. IN SOME CASES ADDITIONAL RIGHT OF WAY MAY BE REQUIRED TO INSURE THIS AREA IS KEPT CLEAR OF SIGHT OBSTRUCTIONS.

NOTE: 12'-6" UPPER SECTION OF W-BEAM GUARDRAIL WHICH IS TO BE NESTED
(TWO SECTIONS THICK WITH ONE SECTION IN FRONT OF THE OTHER)

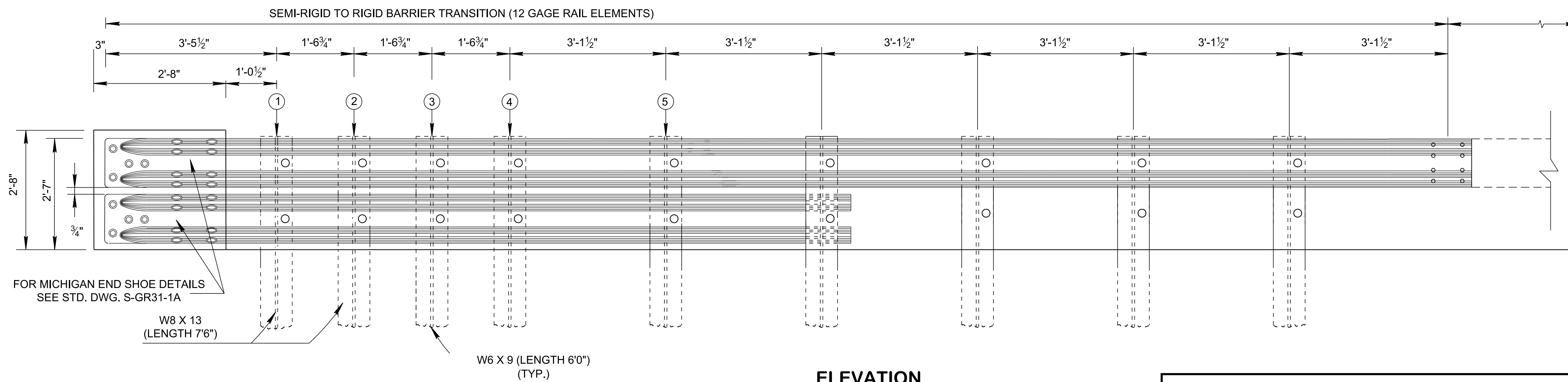


GUARDRAIL RUB-RAIL BLOCK-OUT THICKNESS TABLE	
POST	THICKNESS
1	0.556'
2	0.446'
3	0.338'
4	0.230'
5	NO BLOCK

TREATED TIMBER 14½" X 4" BLOCK-OUT



PLAN



ELEVATION

**THIS DRAWING IS TO BE USED FOR MAINTENANCE PROJECTS ONLY.
THIS DRAWING IS NOT INTENDED TO BE USED FOR NEW CONSTRUCTION
OR RE CONSTRUCTION PROJECTS.**

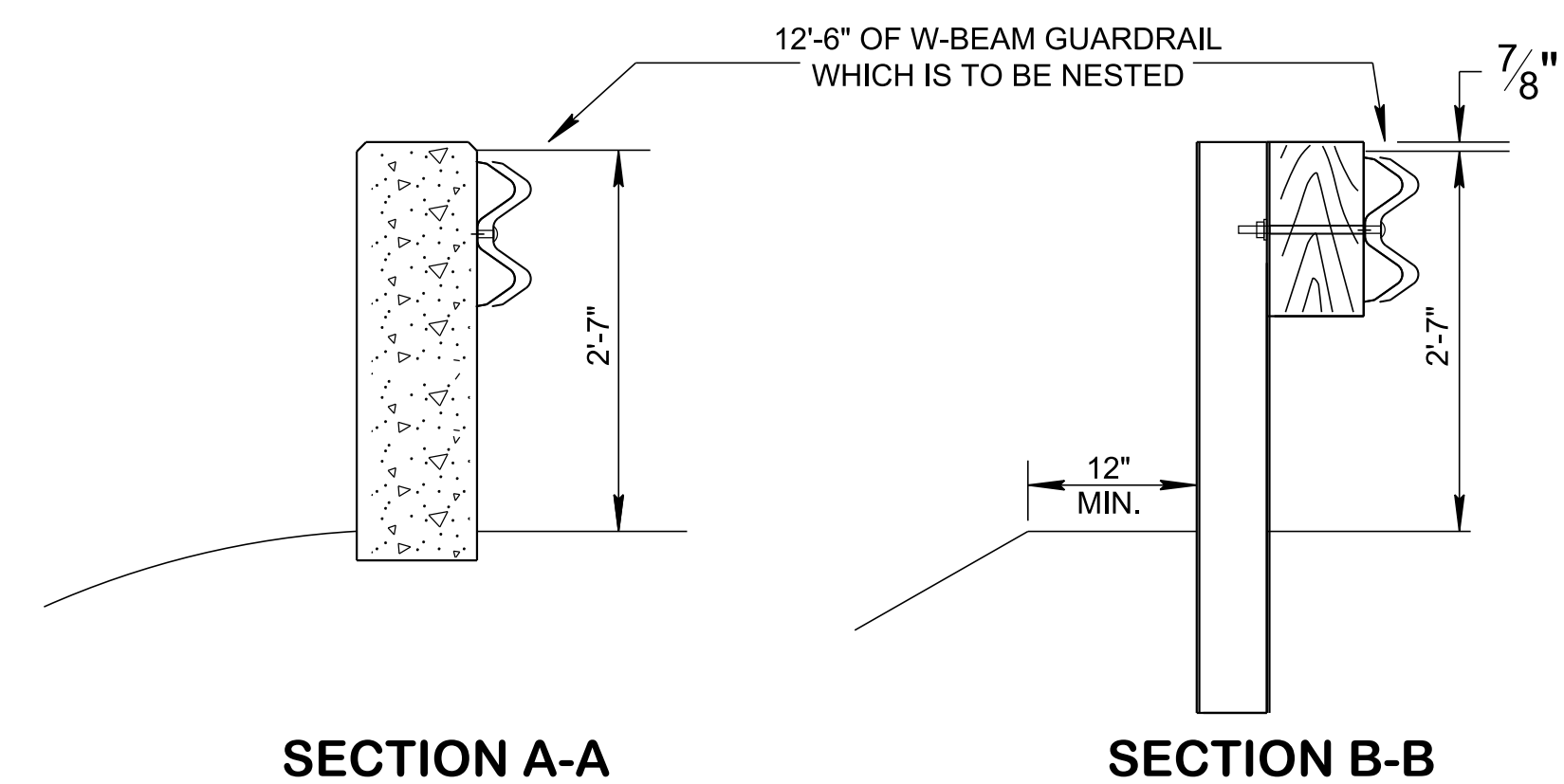
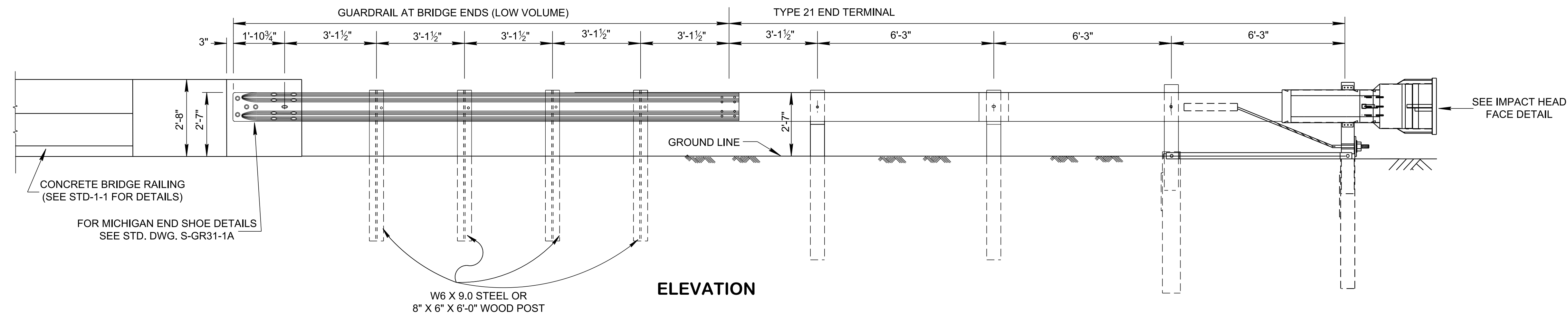
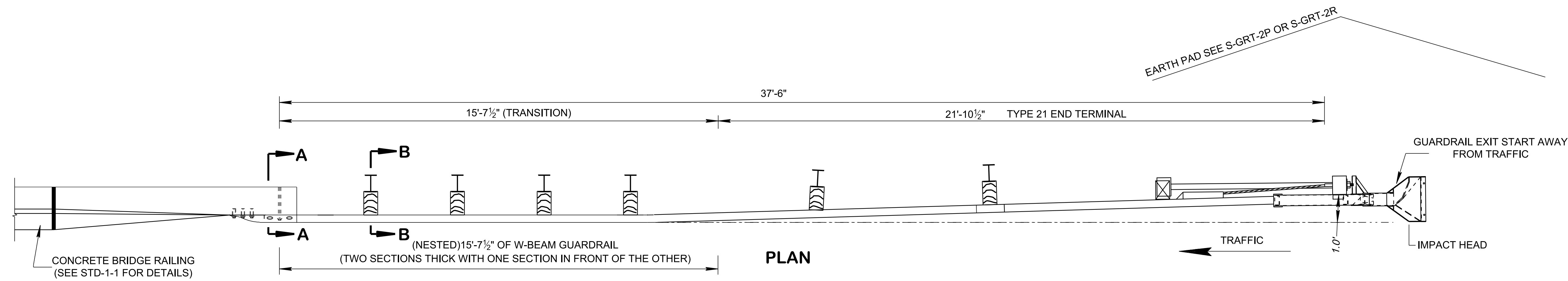
GENERAL NOTES

- (A) TO BE USED AT ALL GUARDRAIL TRANSITIONS TO BRIDGE RAIL OR CONCRETE BARRIER WALLS WITH ADT > 400 VEH/DAY.
- (B) CONNECTION TO BRIDGE RAIL SHOWN; FOR CONNECTION TO CONCRETE BARRIER WALLS, SEE S-SSMB-6.
- (C) BOLTS FROM MICHIGAN SHOE TO BRIDGE RAIL TO BE AS SHOWN ON STRUCTURE'S BRIDGE RAIL STANDARD DRAWINGS.
- (D) SEE S-GR31-SERIES FOR ALL OTHER DETAILS AND MATERIAL PROPERTIES NOT SHOWN.
- (E) RUB RAIL IS ONLY REQUIRED AT BRIDGES.
- (F) SEE S-PL-3 FOR MINIMUM LENGTH AND DELINEATOR REQUIREMENTS.
- (G) THE GUARDRAIL INSTALLATION SHOWN ON THIS STANDARD DRAWING HAS BEEN EVALUATED PER NCHRP 350 TL-3.

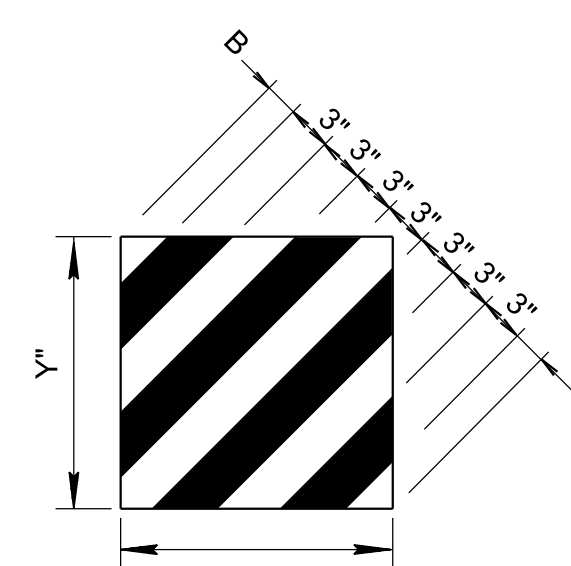
STATE OF TENNESSEE
STANDARD DRAWING
DEPARTMENT OF TRANSPORTATION

GUARDRAIL CONNECTION TO BRIDGE ENDS OR BARRIER WALL

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STRIPES AT 45° TOWARD THE TRAVELED WAY.
 BACKGROUND: YELLOW (IN ACCORDANCE WITH STANDARD SPECIFICATION 916.06)
 COPY: BLACK
 "X" AND "Y" SHALL BE WITHIN 3" OF FACE WIDTH AND HEIGHT, RESPECTIVELY, AND FACE SHALL HAVE A MINIMUM 300 SQUARE INCHES COPY AREA.



SPECIAL NOTE
 THIS DRAWING IS TO BE USED FOR LOW SPEED (V < 45 MPH) LOCAL ROADS (ADT < 2000) ONLY

- GENERAL NOTES**
- (A) SEE STANDARD DRAWING RD11-TS-1A FOR DETAILS AND SPECIFICATIONS REGARDING DESIGN STANDARDS FOR LOW-VOLUME LOCAL ROADS.
 - (B) THE POST OFFSET DIMENSIONS ARE GIVEN TO THE CENTER OF THE TRAFFIC FACE OF THE BLOCK-OUTS, EXCEPT AT THE FIRST TWO POSTS, WHERE THE DIMENSION IS TO THE CENTER OF THE TRAFFIC FACE OF THE POST. OFFSET POINTS ARE TO BE LOCATED BY CHORD MEASUREMENTS AT THE BACK OF THE RAIL EQUAL TO THE NOMINAL POST SPACINGS SHOWN. POSTS ARE TO BE SET APPROXIMATELY RADIAL TO THE RAILINGS AT EACH POST LOCATION.
 - (C) SEE MANUFACTURER'S FABRICATION DRAWINGS FOR DETAILS.
 - (D) SEE STRUCTURE'S BRIDGE RAIL STANDARD DRAWING FOR BOLT CONNECTION FOR MICHIGAN SHOE TO BRIDGE RAIL.
 - (E) TO BE USED ONLY FOR LOW SPEED TL-2 CONDITIONS. TRANSITION WAS EVALUATED BY TTI (REPORT 4564-1) AT NCHRP 350 TL-2.
 - (F) SEE S-GR31-SERIES FOR ALL OTHER DETAILS AND MATERIAL PROPERTIES NOT SHOWN.

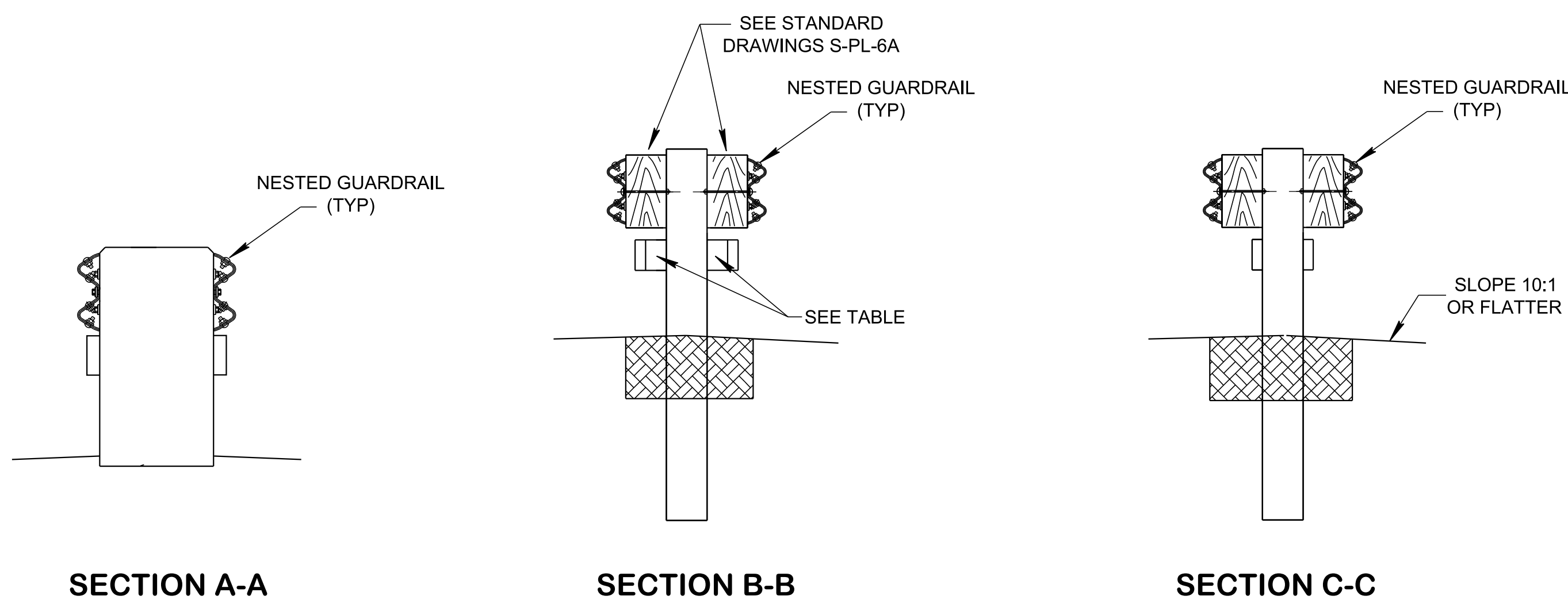
**THIS DRAWING IS TO BE USED FOR MAINTENANCE PROJECTS ONLY.
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 OR RE CONSTRUCTION PROJECTS.**

STATE OF TENNESSEE
 STANDARD DRAWING
 DEPARTMENT OF TRANSPORTATION

GUARDRAIL CONNECTION TO BRIDGE END FOR LOCAL ROADS (ADT < 2000)

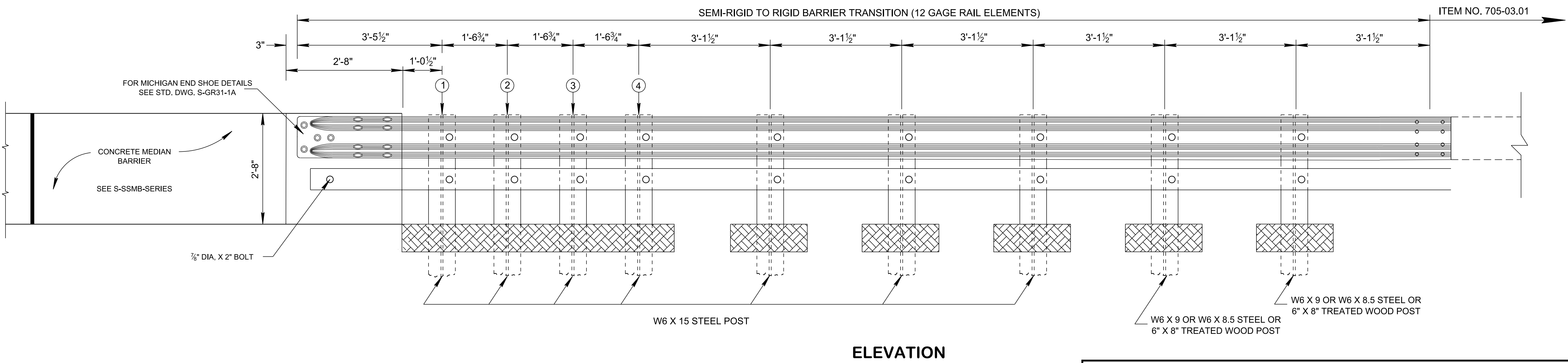
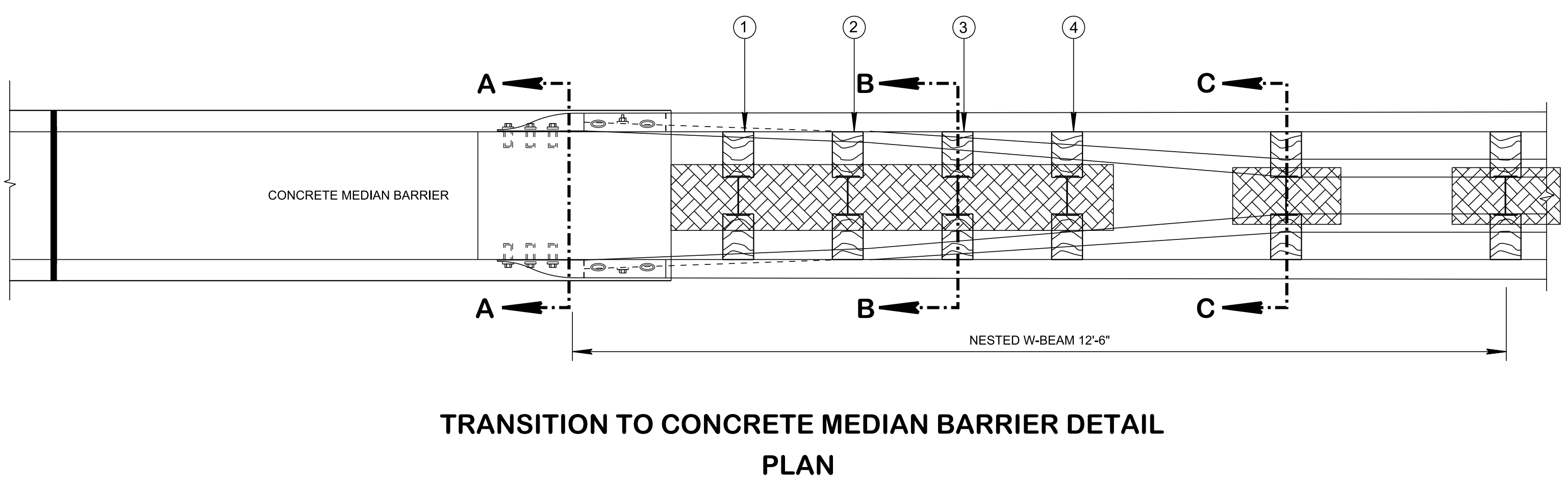
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GUARDRAIL RUB-RAIL BLOCK-OUT THICKNESS TABLE	
POST	THICKNESS
1	0.556'
2	0.446'
3	0.338'
4	0.230'

TREATED TIMBER 14½" X 4" BLOCK-OUT



**THIS DRAWING IS TO BE USED FOR MAINTENANCE PROJECTS ONLY.
THIS DRAWING IS NOT INTENDED TO BE USED FOR NEW CONSTRUCTION
OR RE CONSTRUCTION PROJECTS.**

- GENERAL NOTES**
- (A) TO BE USED AT ALL TRANSITIONS FROM CONCRETE MEDIAN BARRIER TO MEDIAN DIVIDER GUARDRAIL.
 - (B) SEE S-SSMB-6 FOR CONNECTION DETAILS TO MEDIAN BARRIER.
 - (C) SEE S-GR31-SERIES FOR ALL OTHER DETAILS AND MATERIAL PROPERTIES NOT SHOWN.
 - (D) THE GUARDRAIL INSTALLATION SHOWN ON THIS STANDARD DRAWING HAS BEEN EVALUATED PER NCHRP 350 TL-2.

STATE OF TENNESSEE
STANDARD DRAWING
DEPARTMENT OF TRANSPORTATION

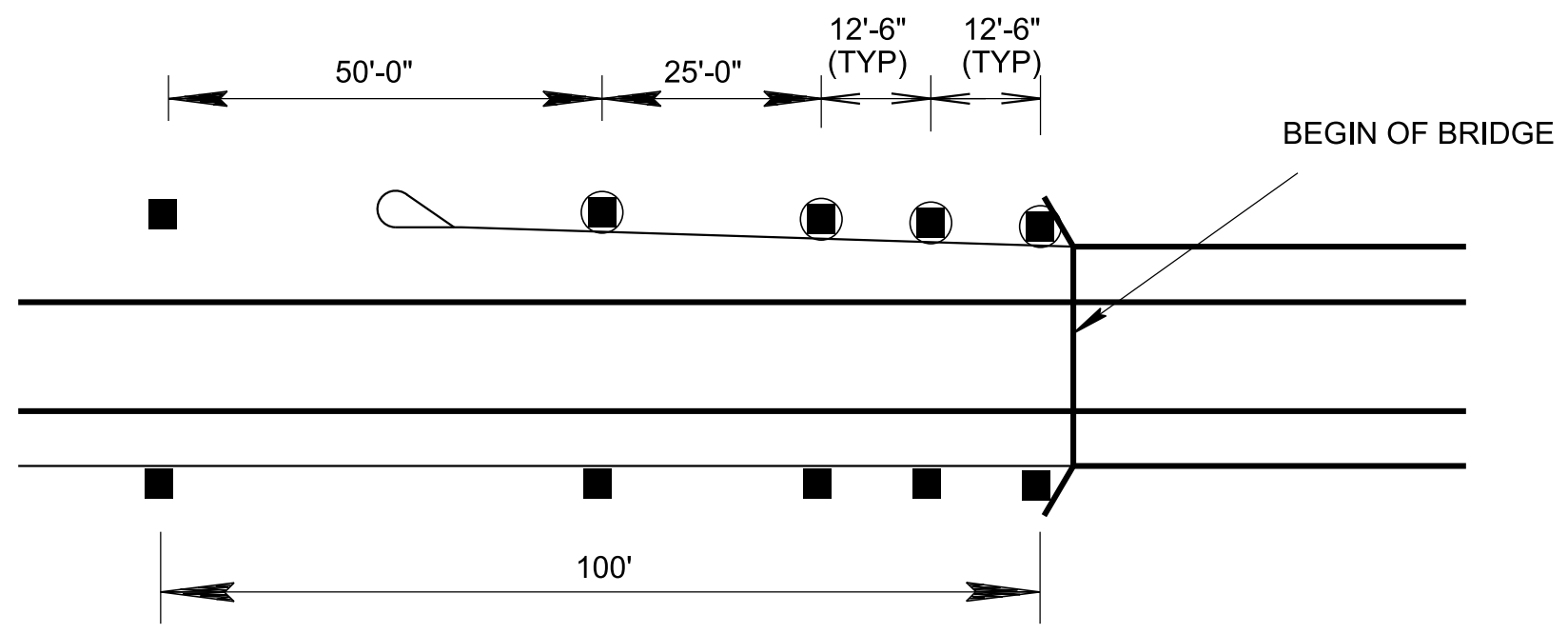
MEDIAN DIVIDER
GUARDRAIL
TRANSITION
TO CONCRETE
MEDIAN BARRIER

06-28-2019 S-GRC-3M

NOT TO SCALE

10/4/2019 3:02:45 PM P:\StandDraw\DESIGN STANDARDS\Standards Drawings Library\Standard Roadway Drawings - CURRENT\In Progress\150.00 Safety Design and Fences IP\150.01 Clear Zone & Safety Plans IP\SP\3-20190628.D

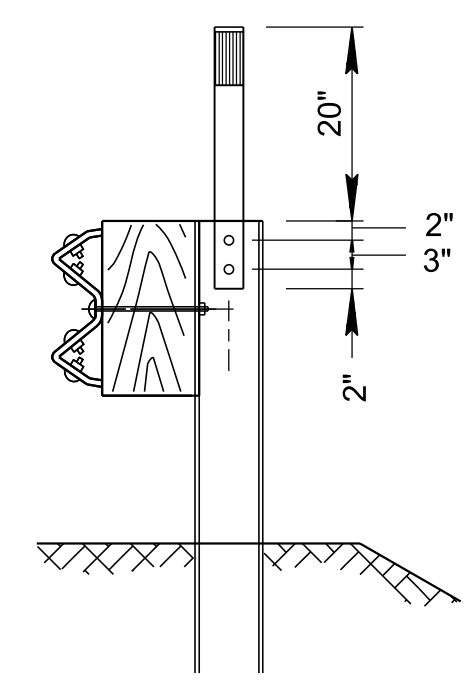
REV. 10-10-16: UPDATED REFERENCES TO OTHER STANDARD DRAWINGS. UPDATED LENGTH OF TYPE 38 TERMINAL AND MODIFIED PLAN VIEW FOR TYPE 38 TERMINAL.
 REV. 06-28-19: UPDATED TO MASH GUARDRAIL ITEM NUMBERS. REDREW SHEET.



MIN. DELINEATOR PLACEMENT AT BRIDGE APPROACHES INSTALLED ON GUARDRAIL POSTS

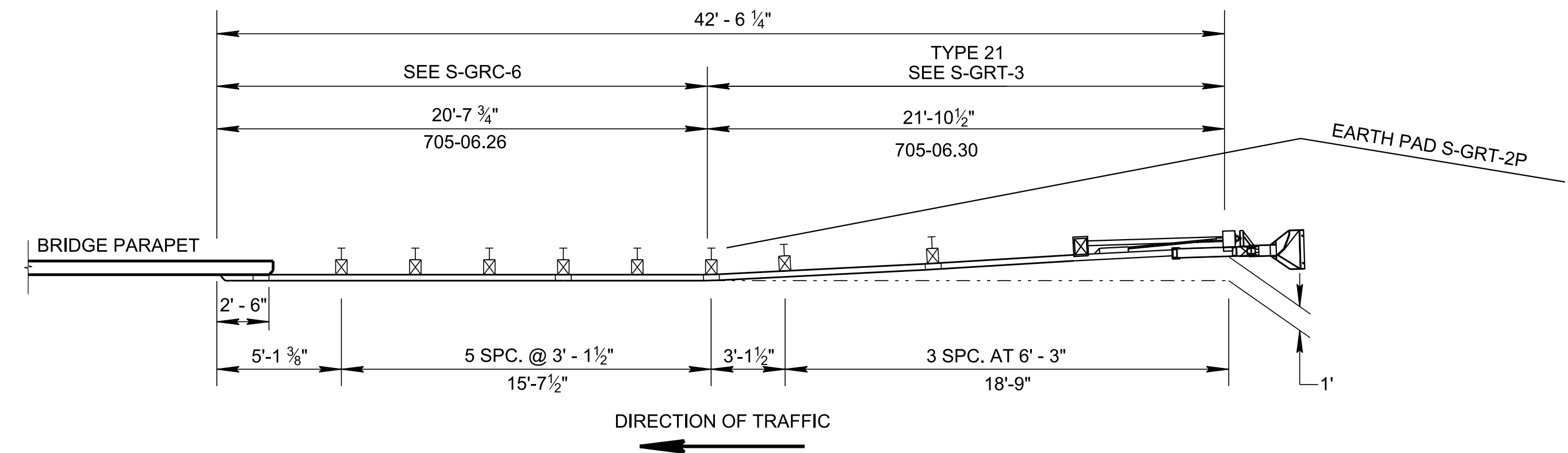
LEGEND

- DELINEATOR ON GUARDRAIL POST
- DELINEATOR



STEEL POST

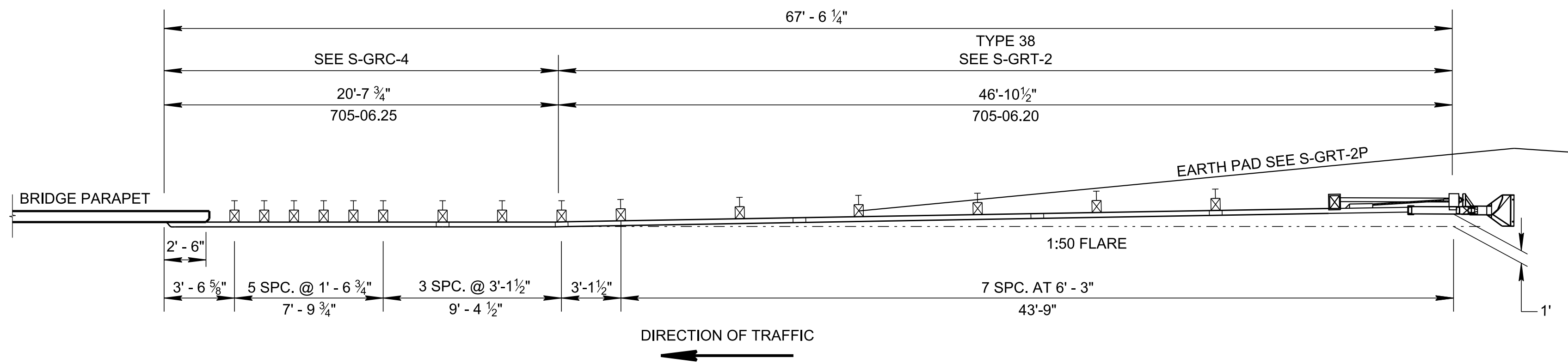
SEE STANDARD DRAWING S-GR31-1C, W-BEAM GUARDRAIL



PLAN FOR TYPE 21

MINIMUM INSTALLATION LENGTH FOR TL-2 GUARDRAIL TERMINAL (FOR LOW SPEED FACILITIES V < 45 MPH)

SAFETY PERFORMANCE OF SLOTTED GUARDRAIL TERMINAL IS ACCEPTABLE ACCORDING TO THE TL-2 EVALUATION CRITERIA SPECIFIED IN AASHTO MASH. SLOTTED GUARDRAIL TERMINAL MAY BE USED ON ALL LOW SPEED ROADS ON THE NATIONAL HIGHWAY SYSTEM WHEN THE CURRENT DESIGN SPEED IS LESS THAN 45 MPH. EARTH PAD IS REQUIRED AS SHOWN ON S-GRT-2P. FOR LOW SPEED LOCAL ROADS WITH ADT < 2000 VEH/DAY, S-GRC-2 MAY BE USED.



PLAN FOR TYPE 38

MINIMUM INSTALLATION LENGTH FOR TANGENTIAL GUARDRAIL END TERMINAL

SAFETY PERFORMANCE OF TANGENTIAL GUARDRAIL TERMINAL END SHALL MEET THE TL-3 EVALUATION CRITERIA SPECIFIED AASHTO MASH. ONLY TERMINALS LISTED ON QPL LIST SHALL BE USED. EARTH PAD IS REQUIRED AS SHOWN ON S-GRT-2P AS DESCRIBED ON THE DRAWING.

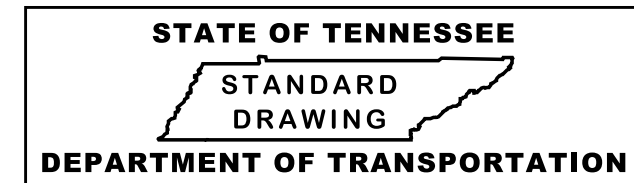
FLEXIBLE DELINEATOR GENERAL NOTES

<p>(A) DELINEATORS SHALL CONFORM TO NOTES AND DETAILS SPECIFIED ON STANDARD DRAWING T-S-11.</p> <p>(B) DELINEATORS SHALL BE INSTALLED ACROSS BRIDGES ONLY WHEN GUARDRAIL IS CONTINUOUS ACROSS BRIDGES. DELINEATOR SPACING ON BRIDGES SHALL BE AT 12'-6" INTERVALS.</p> <p>(C) THE COLOR OF DELINEATORS SHALL CONFORM TO THE COLOR OF EDGELINES STIPULATED IN SECTION 3B.06 OF THE MUTCD (CURRENT EDITION).</p> <p>(D) DELINEATORS SHALL BE FACED TOWARD THE APPROACHING TRAFFIC IN THE LANE ADJACENT TO THE GUARDRAIL AT ALL LOCATIONS.</p> <p>(E) DELINEATORS SHALL BE FIRMLY SECURED TO THE POST BY TWO CONNECTIONS.</p>	<p>(F) THE TWO HOLES IN THE STEEL GUARDRAIL POSTS ARE USED TO ATTACH THE DELINEATOR POST IN THE FIELD. THE HOLES SHALL BE 1/4" IN DIAMETER. IF THE HOLES ARE SHOP DRILLED, THEY SHALL BE DRILLED PRIOR TO GALVANIZING THE POST. IF THE HOLES ARE FIELD DRILLED, THEY SHALL BE THOROUGHLY PAINTED WITH A TOUCH-UP GALVANIZING SPRAY PAINT PRIOR TO ATTACHING THE DELINEATOR POST.</p> <p>(G) THE COST OF FURNISHING AND INSTALLING THESE BRIDGE APPROACH GUARDRAIL DELINEATORS SHALL BE INCLUDED IN THE PRICE BID FOR THE ITEMS OF GUARDRAIL TO WHICH THE DELINEATORS ARE ATTACHED.</p> <p>(H) ONLY DELINEATORS LISTED ON THE QPL, LIST 1, SECTION G.2 GUARDRAIL POST DELINEATION, MAY BE USED.</p> <p>(I) DELINEATORS ARE NOT REQUIRED IF GUARDRAIL IS TERMINATED PRIOR TO INDICATED LOCATION.</p>
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GENERAL NOTES

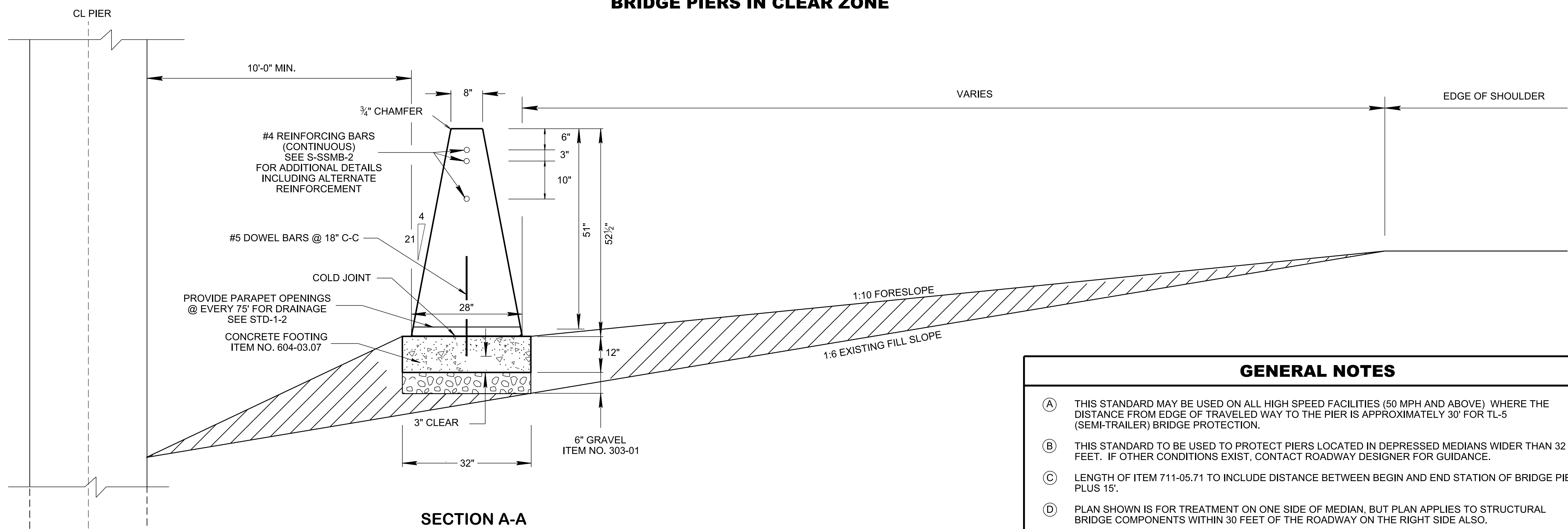
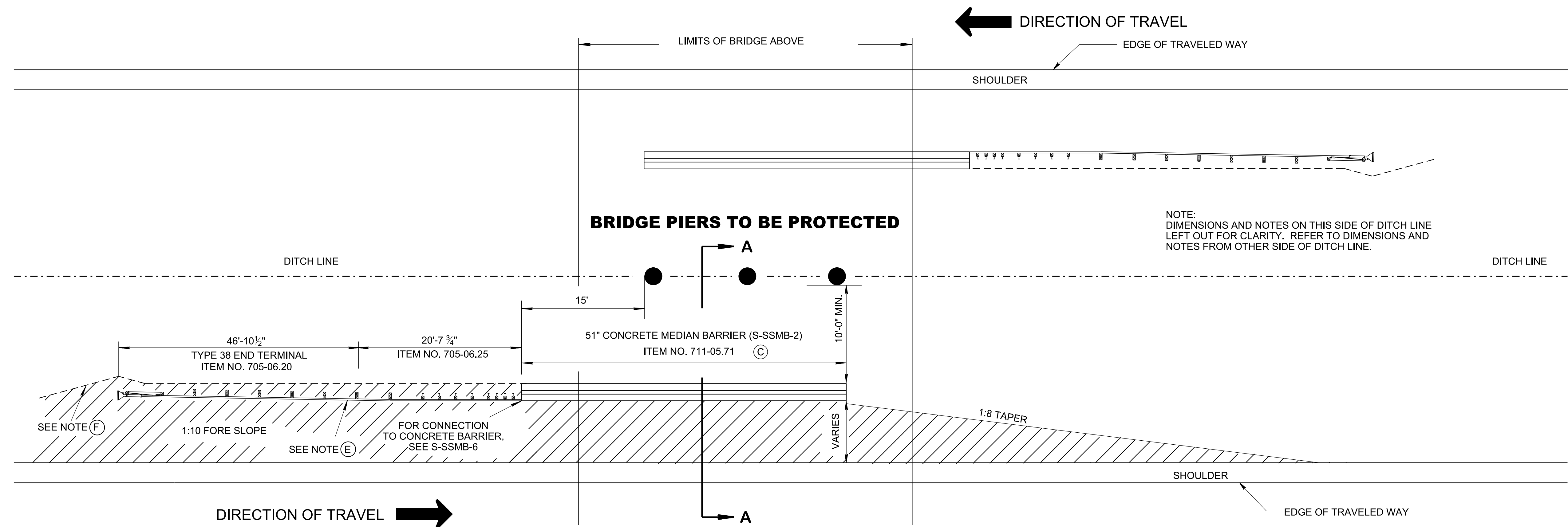
<p>(A) THIS DRAWING SHALL BE USED FOR BRIDGE ENDS OR RIGID CONCRETE BARRIER WALL ENDS ONLY. FOR OTHER HAZARDS, S-PL-1 SHALL BE USED TO DETERMINE LENGTH OF NEED FOR GUARDRAIL.</p> <p>(B) SEE S-GRC-1 FOR DETAILS AND SPECIFICATIONS REGARDING INSTALLATION OF PROTECTIVE GUARDRAIL AT BRIDGE ENDS. TO BE PAID FOR UNDER ITEM NO. 705-01.01 GUARDRAIL AT BRIDGE ENDS.</p> <p>(C) IF A FIELD EVALUATION DISCOVERS A SECONDARY HAZARD, THEN S-PL-1 SHALL BE USED TO DETERMINE LENGTH OF NEED.</p> <p>(D) LOCATIONS WHERE THE ABOVE SHOWN MINIMUM TRANSITION AND GUARDRAIL TERMINAL ANCHOR CANNOT BE INSTALLED DUE TO A SIDE ROAD OR DRIVEWAY, OTHER ALTERNATIVES SHALL BE CONSIDERED SUCH AS CURVED GUARDRAIL (S-PL-2) OR INTRODUCING A NON-GATING ATTENUATOR.</p>	<p>(A) MINOR REVISION -- FHWA APPROVAL NOT REQUIRED</p>
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MINOR REVISION -- FHWA APPROVAL NOT REQUIRED



SAFETY PLAN MINIMUM INSTALLATION AT BRIDGE ENDS

REV. 4-11-14: ADDED NOTE (7)
 REV. 2-5-16: ADDED WALL SECTION DETAIL. UPDATED GENERAL NOTES.
 REV. 10-10-16: REVISED BARRIER LOCATION. REMOVED LENGTH OF NEED TABLE.
 REV. 06-28-19: UPDATED TO MASH GUARDRAIL ITEM NUMBERS. CORRECTED ITEM NUMBERS FOR 51" CONCRETE MEDIAN BARRIER. REDREW SHEET.



- GENERAL NOTES**
- (A) THIS STANDARD MAY BE USED ON ALL HIGH SPEED FACILITIES (50 MPH AND ABOVE) WHERE THE DISTANCE FROM EDGE OF TRAVELED WAY TO THE PIER IS APPROXIMATELY 30' FOR TL-5 (SEMI-TRAILER) BRIDGE PROTECTION.
 - (B) THIS STANDARD TO BE USED TO PROTECT PIERS LOCATED IN DEPRESSED MEDIANS WIDER THAN 32 FEET. IF OTHER CONDITIONS EXIST, CONTACT ROADWAY DESIGNER FOR GUIDANCE.
 - (C) LENGTH OF ITEM 711-05.71 TO INCLUDE DISTANCE BETWEEN BEGIN AND END STATION OF BRIDGE PIERS PLUS 15'.
 - (D) PLAN SHOWN IS FOR TREATMENT ON ONE SIDE OF MEDIAN, BUT PLAN APPLIES TO STRUCTURAL BRIDGE COMPONENTS WITHIN 30 FEET OF THE ROADWAY ON THE RIGHT SIDE ALSO.
 - (E) IF SPACE IS LIMITED, NON-GATING ATTENUATOR MAY BE SUBSTITUTED AND ATTACHED TO THE END OF THE CONCRETE BARRIER WALL.
 - (F) FOR ADDITIONAL GRADING REQUIREMENTS AT END TERMINAL, SEE S-GRT-2P OR S-GRT-2R.

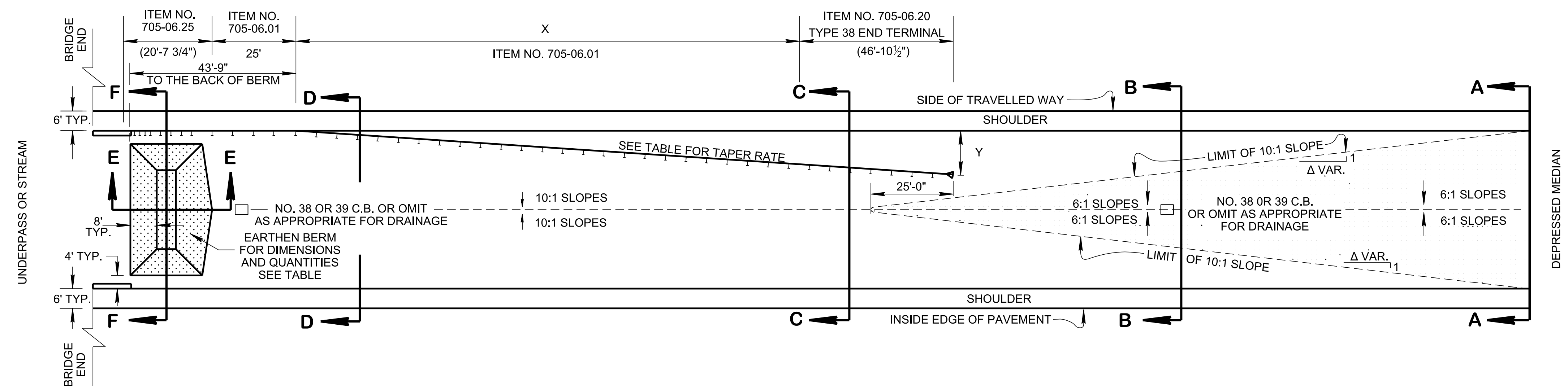
MINOR REVISION -- FHWA APPROVAL NOT REQUIRED

STATE OF TENNESSEE
 STANDARD DRAWING
 DEPARTMENT OF TRANSPORTATION

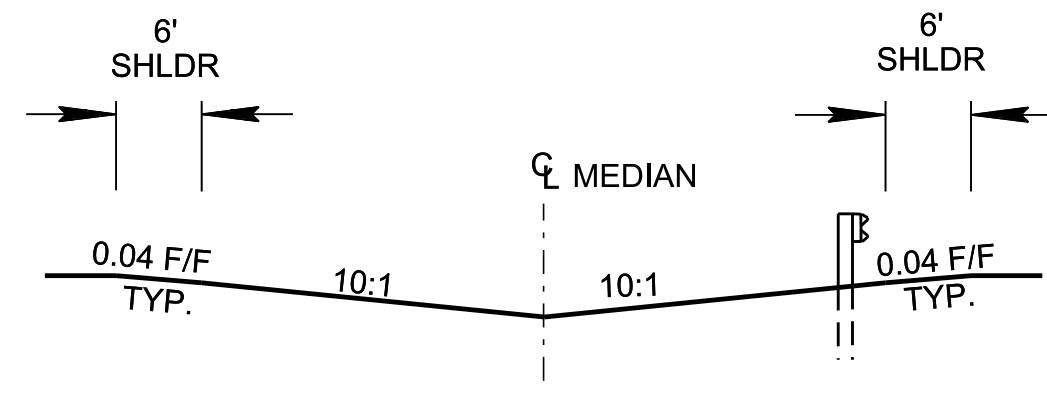
SAFETY PLAN FOR BRIDGE PIERS IN CLEAR ZONE

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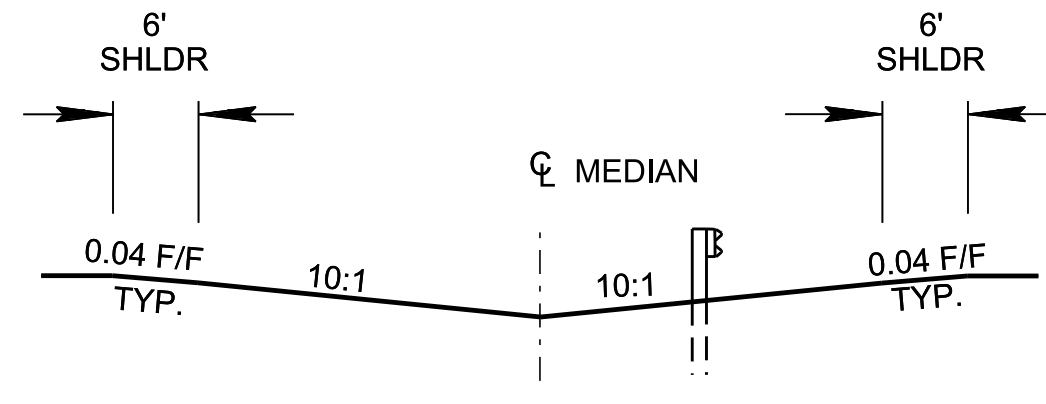
REV. 4-11-14: CORRECTED CUT SECTION LABELS.
 REV. 10-10-16: UPDATED LENGTH OF TYPE 38 TERMINAL.
 REV. 06-28-19: UPDATED TO MASH GUARDRAIL ITEM NUMBERS. REDREW SHEET.



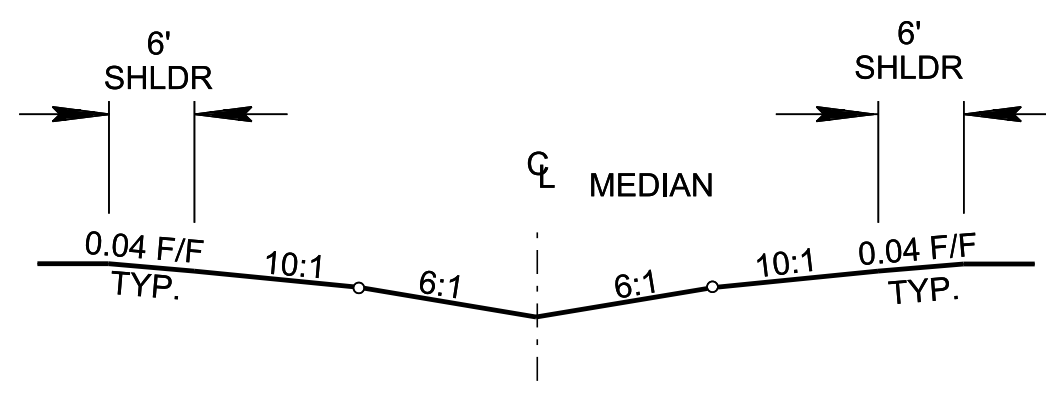
BARRIER TREATMENT DETAILS



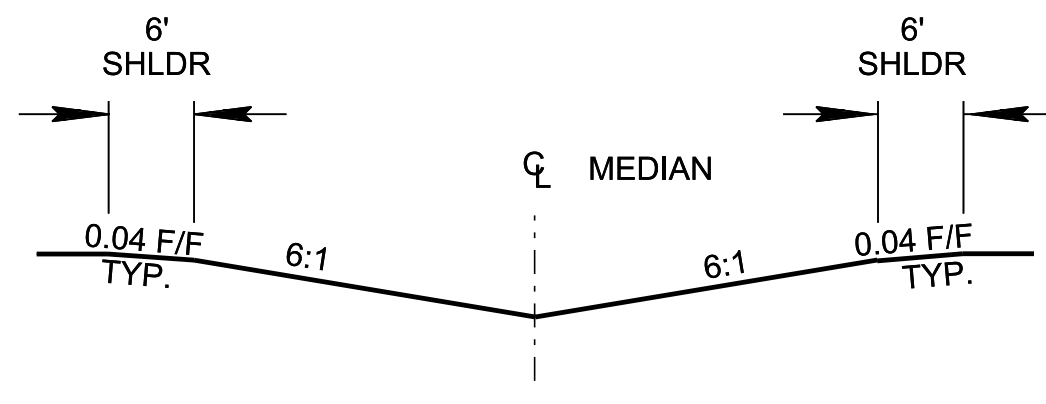
SECTION D-D



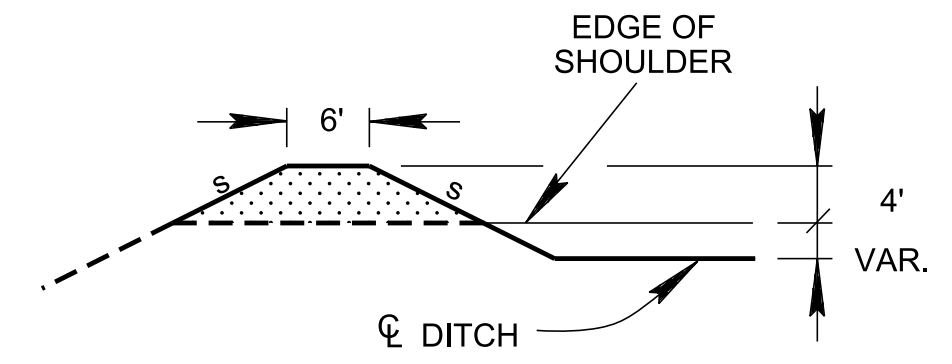
SECTION C-C



SECTION B-B



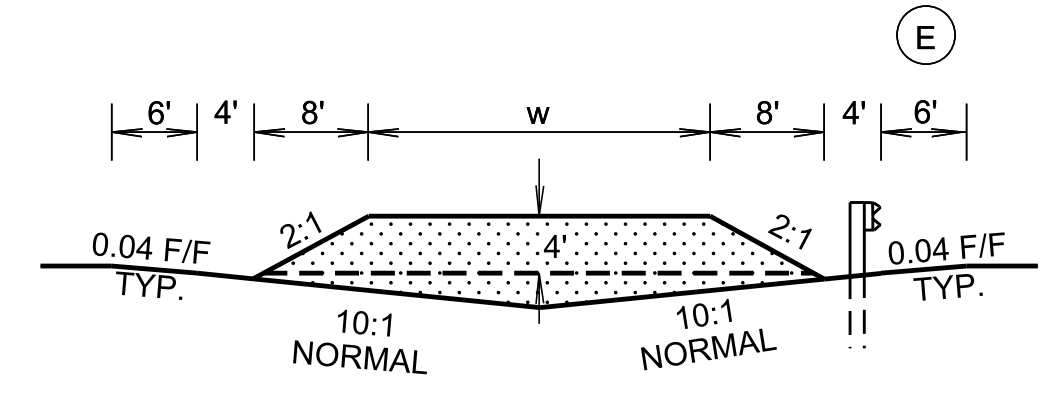
SECTION A-A



SECTION E-E

EARTHEN BERM DIMENSIONS AND QUANTITIES			
MEDIAN WIDTH	W	ITEM NO 203-01 CY	FILL SLOPE S
36'	4	23	1.5:1
40'	8	33	1.5:1
48'	12	49	2:1
60'	24	83	2:1
64'	28	96	2:1

EARTHEN BERM DETAILS



SECTION F-F

GUARDRAIL DIMENSIONS AND QUANTITIES						
DESIGN SPEED MPH	DIMENSIONS			ESTIMATED QUANTITIES (D)		
	TAPER RATE	X	Y	705-06.25	705-06.01	705-06.20
70	15:1	200'-0"	16'-8"	EACH	225'-0"	1 EACH
60	14:1	137'-6"	13'-5"	EACH	162'-6"	1 EACH
≤55	12:1	100'-0"	12'-6"	EACH	125'-0"	1 EACH

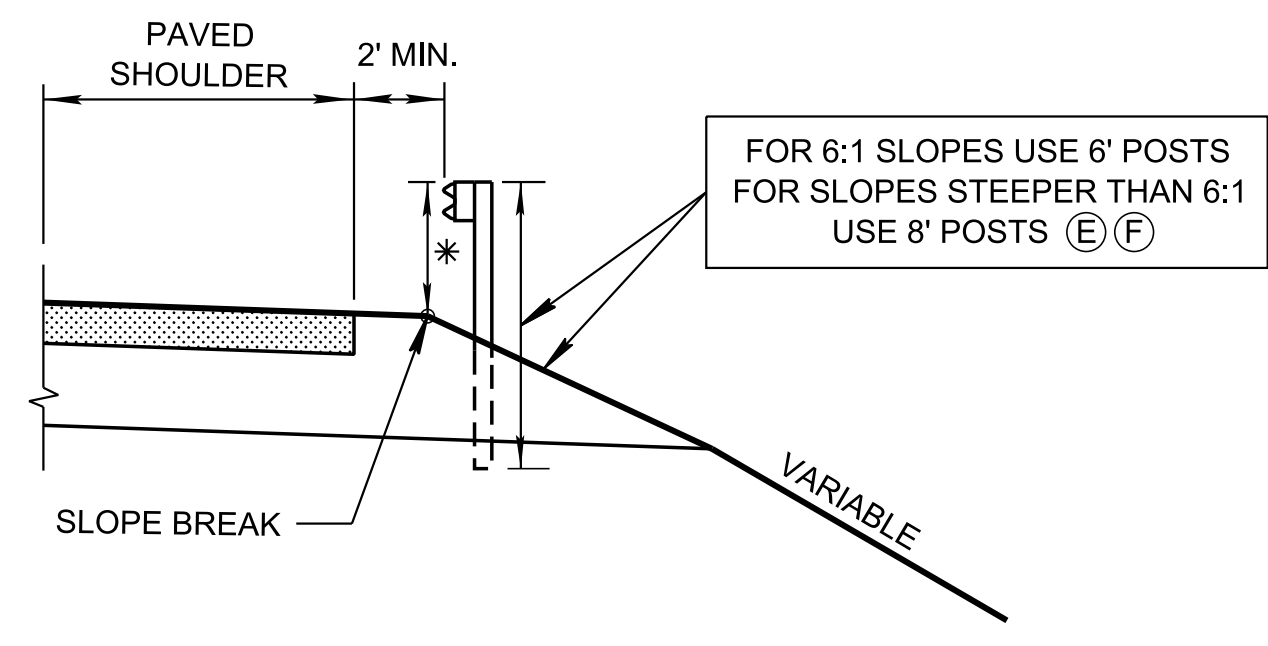
- GENERAL NOTES**
- (A) THE CONTRACTOR IS TO ELIMINATE THE 1 FOOT FLARE SHOWN ON GUARDRAIL STANDARD DRAWINGS FOR TANGENTIAL GUARDRAIL TERMINAL ANCHORS (FLARED INSTALLATIONS ONLY).
 - (B) ONLY ONE APPROACH SHOWN; OTHER APPROACH IDENTICAL.
 - (C) THE DIMENSIONS SHOWN IN THIS TABLE ARE TO BE USED IN ALL TANGENT OR NEARLY TANGENT SITUATIONS WITH DESIGN SPEEDS 70 MPH OR BELOW. WHEN THE DESIGN SPEED EXCEEDS 70 MPH OR OTHER GEOMETRIC FEATURES SUCH AS CURVATURE, SKEWED BRIDGES, OR ADDITIONAL HAZARDS ARE PRESENT, THE DESIGNER SHALL USE STANDARD DRAWING S-PL-1.
 - (D) QUANTITIES SHOWN ARE FOR ONE APPROACH.
 - (E) BASED ON 6' SHOULDER; FOR OTHER SHOULDER WIDTHS ADJUST WIDTH OF BERM AS NECESSARY. PLACEMENT OF GUARDRAIL IS NOT AFFECTED.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED

STATE OF TENNESSEE
 STANDARD DRAWING
 DEPARTMENT OF TRANSPORTATION

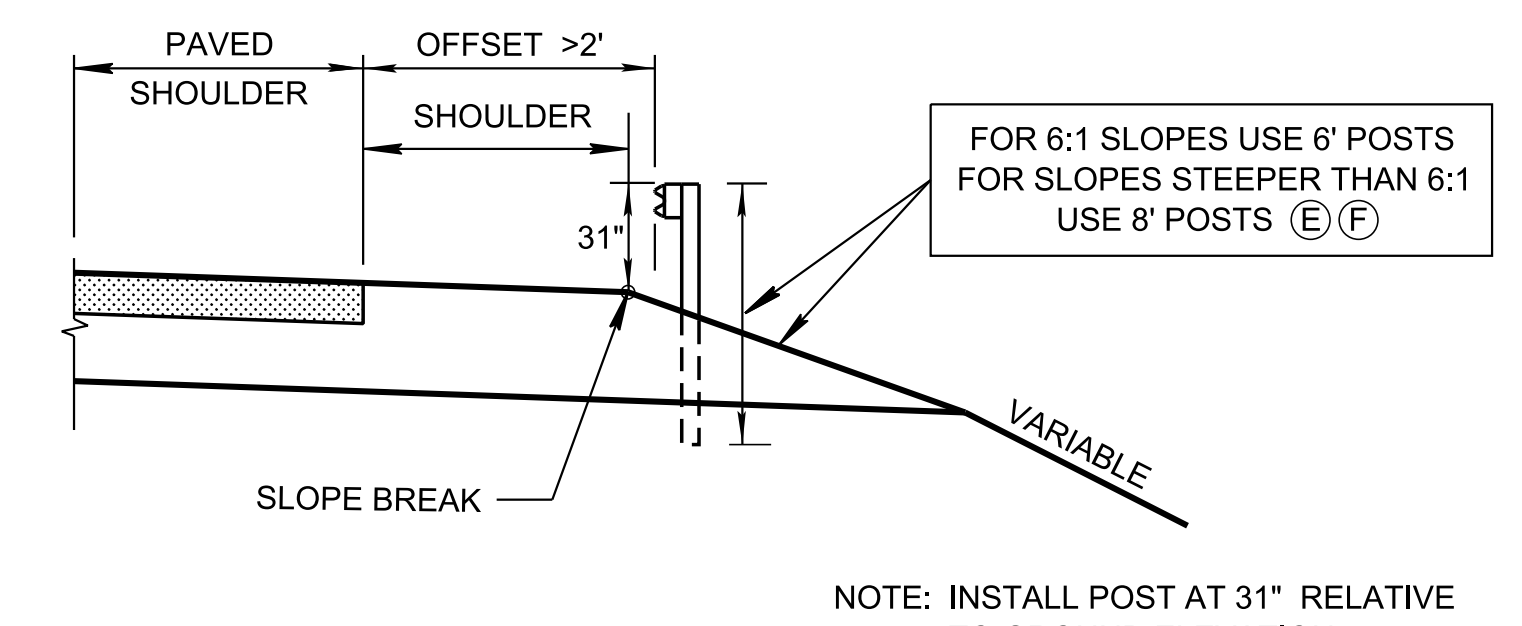
SAFETY PLAN
 FOR BRIDGE
 ENDS IN MEDIANS

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* NOTE: INSTALL POST AT 31" RELATIVE TO A LINE EXTENDED FROM THE SHOULDER SLOPE

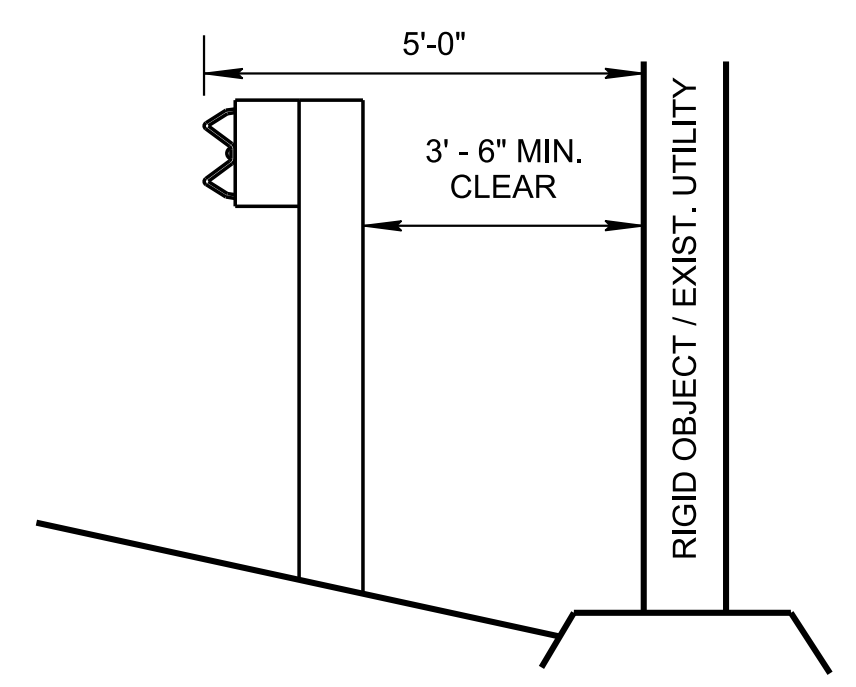
DETAIL A
GUARDRAIL PLACEMENT AT SLOPE BREAK



NOTE: INSTALL POST AT 31" RELATIVE TO GROUND ELEVATION

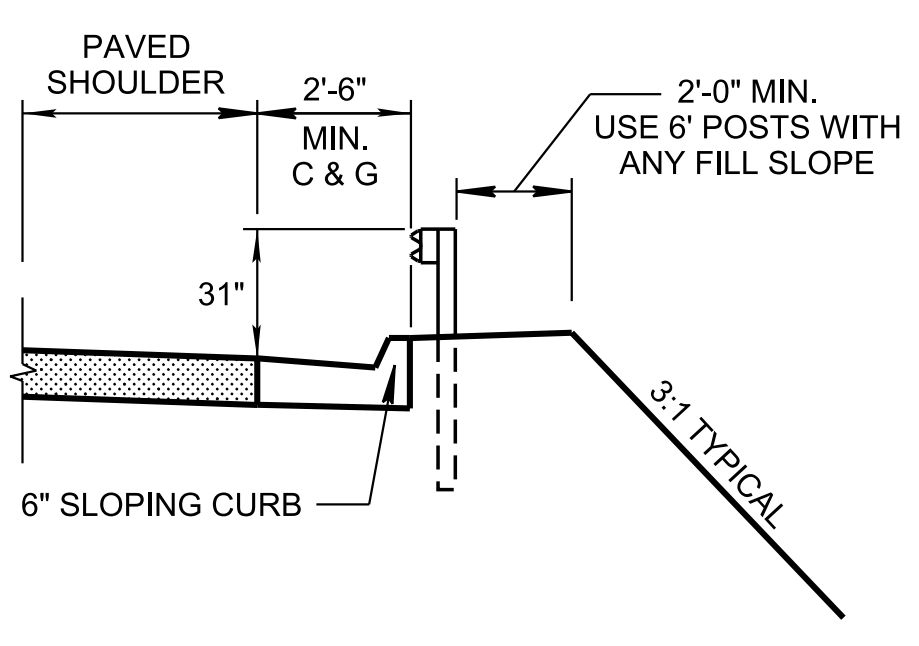
DETAIL B
OFFSET GUARDRAIL PLACEMENT

TYPICAL SECTIONS (NON CURB & GUTTER)

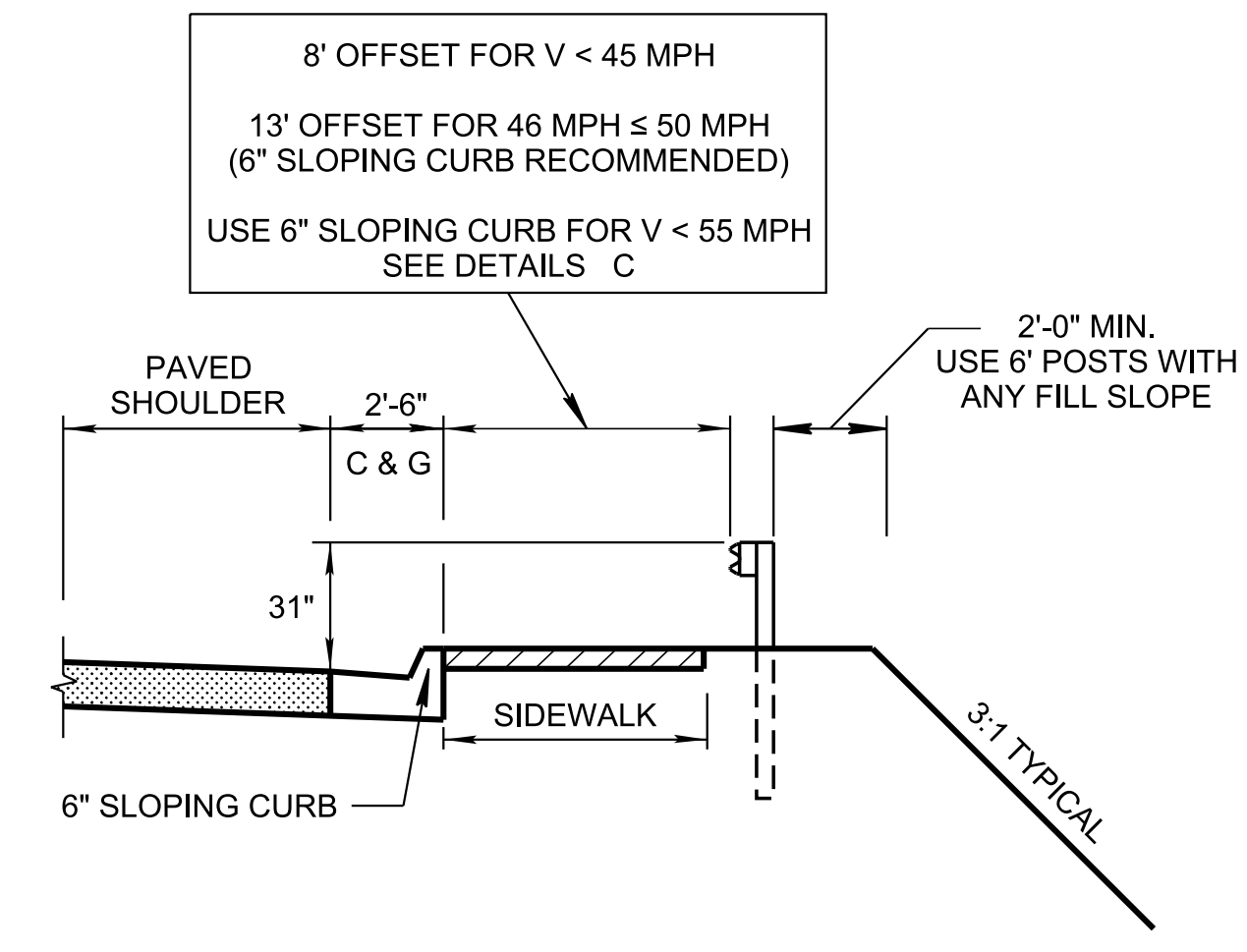


TYPICAL MIN. CLEAR TO A RIGID OBJECT
(SEE TABLE BELOW IF LESS DEFLECTION IS DESIRED)
(REFER TO MWRSF REPORT TRP 03-171-06)

GUARDRAIL POST REDUCTION IN DEFLECTION FOR SINGLE W-BEAM			
POST SPACING	6' - 3"	3' - 1 1/2"	1' - 6 3/4"
DEFLECTION	3' - 6"	3' - 0"	2' - 6"



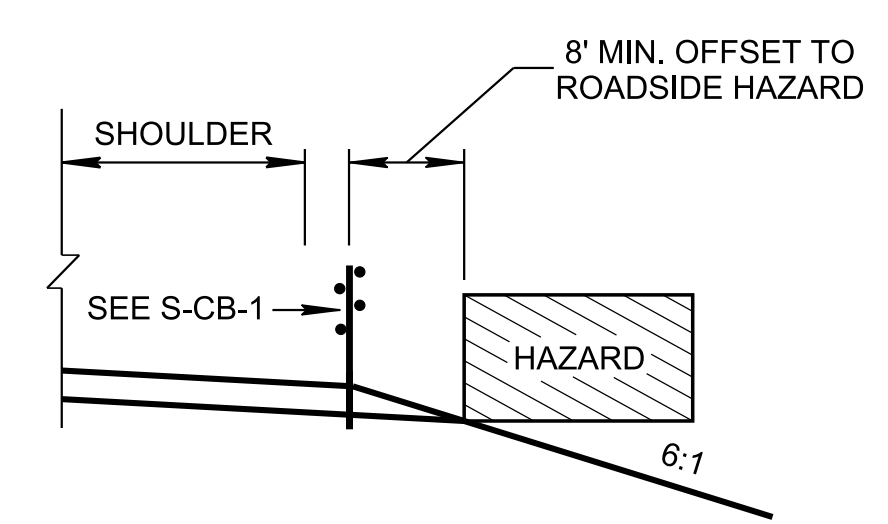
DETAIL C
GUARDRAIL PLACEMENT ON CURB AND GUTTER SECTION



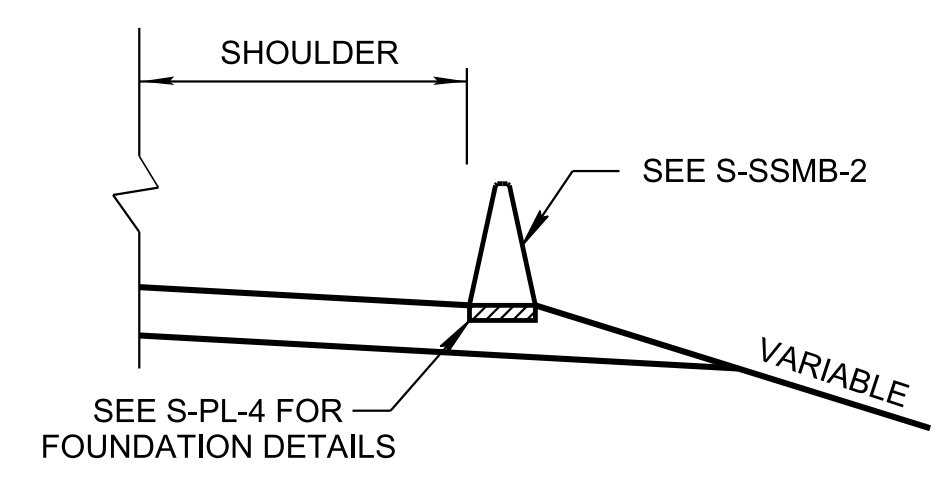
DETAIL D
OFFSET GUARDRAIL PLACEMENT ON CURB AND GUTTER SECTION

TYPICAL SECTIONS WITH CURB AND GUTTER

USE 6" SLOPING CURB AT LOCATIONS WHERE THE POSTED SPEED IS BETWEEN 45 - 55 M.P.H. DO NOT USE CURB AND GUTTER AT LOCATIONS WHERE THE POSTED SPEEDS ARE ABOVE 55 M.P.H.



DETAIL E
HIGH TENSION 4 STRAND CABLE BARRIER (TL-3 OR TL-4)



DETAIL F
FREE STANDING CONCRETE BARRIER RAIL (TL-3, TL-4 OR TL-5)

ALTERNATE TO W-BEAM GUARDRAIL WHERE HIGHER PERFORMANCE IS NEEDED

GENERAL NOTES FOR GUARDRAIL

- (A) THIS DRAWING PROVIDES GUIDANCE FOR FACILITIES WITH POSTED SPEED LIMIT EQUAL TO OR GREATER THAN 60 MPH. SOME GUIDANCE FOR FACILITIES WITH POSTED SPEED LIMITS LESS THAN 60 MPH ARE INCLUDED IN THIS DRAWING AND ARE LESS STRINGENT, REFER TO THE STANDARDS AND POLICY OFFICE IN THE ROADWAY DESIGN DIVISION FOR ADDITIONAL GUIDANCE.
- (B) IF GUARDRAIL IS IN A CURB AND GUTTER SECTION, IT SHALL BE PLACED SUCH THAT THE GUARDRAIL FACE IS EVEN WITH THE CURB (DETAIL C) OR A MINIMUM OF 8' FROM THE CURB (DETAIL D).
- (C) ON 6:1 OR FLATTER SLOPE, GUARDRAIL MAY BE PLACED AT THE SLOPE BREAK.
- (D) REFER TO RD11-TS SERIES OF STANDARD DRAWINGS FOR TYPICAL SECTION INFORMATION.
- (E) REFER TO TEXAS A & M REPORT NUMBER 405160-20, FOR GUARDRAIL PLACED ON 3:1 SLOPE.
- (F) PAY ITEMS:
705-06.01, W BEAM GR (TYPE 2) MASH TL3, L.F. (6' POST)
705-06.02, W BEAM GR (TYPE 2) MASH TL3 (LONG POST), L.F. (8' POST)

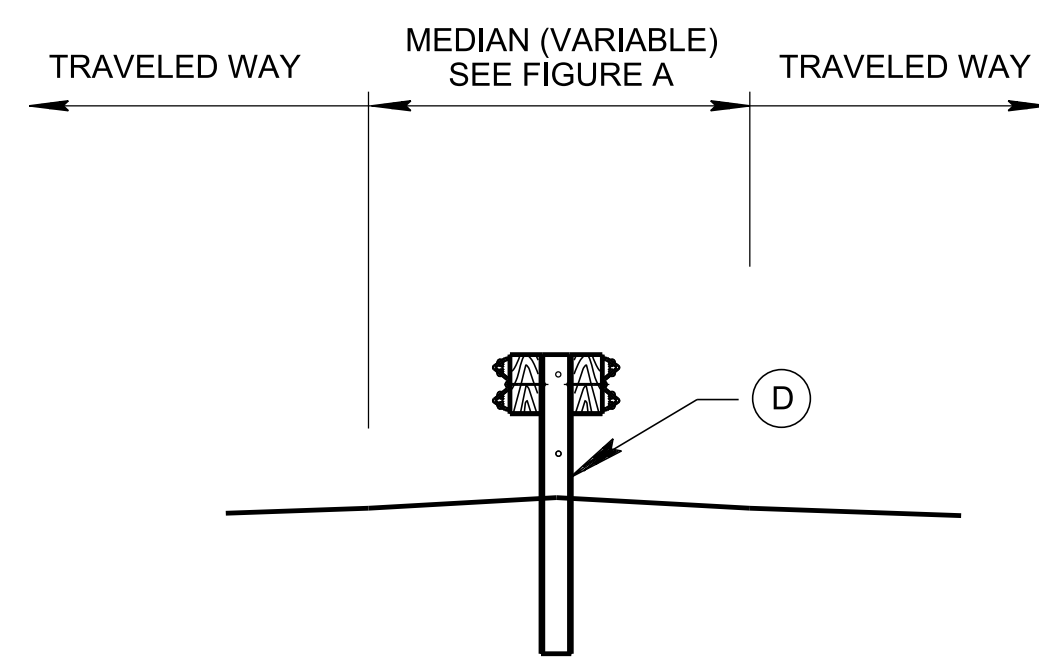
MINOR REVISION -- FHWA APPROVAL NOT REQUIRED

STATE OF TENNESSEE
STANDARD DRAWING
DEPARTMENT OF TRANSPORTATION

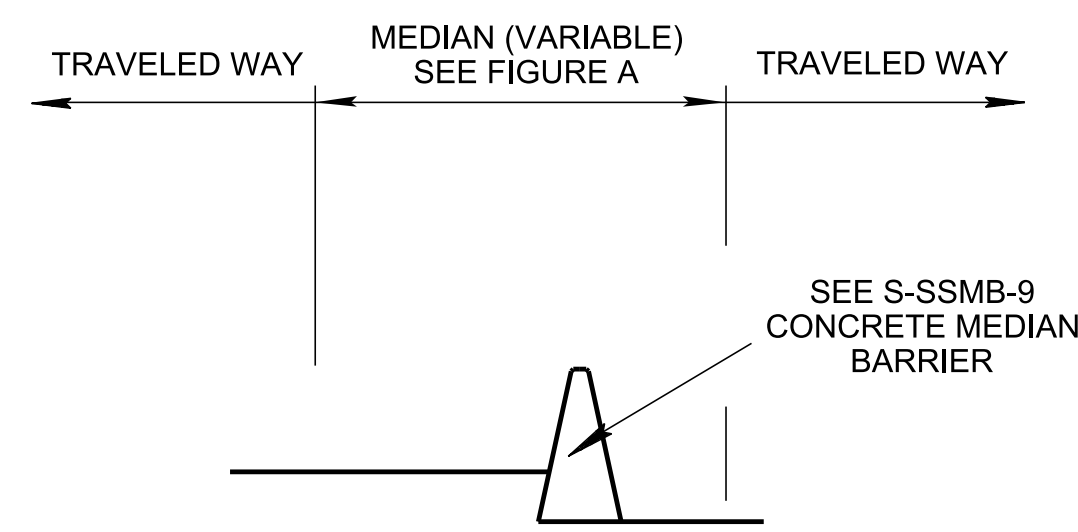
**SAFETY PLAN
SAFETY HARDWARE
PLACEMENT
ON OUTSIDE
EDGE**

7-11-13 S-PL-6

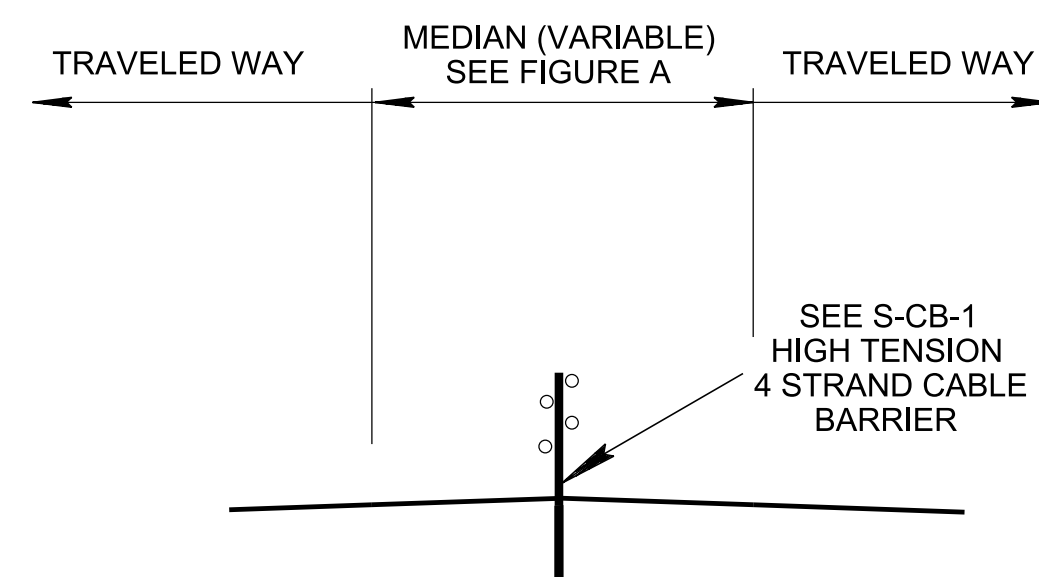
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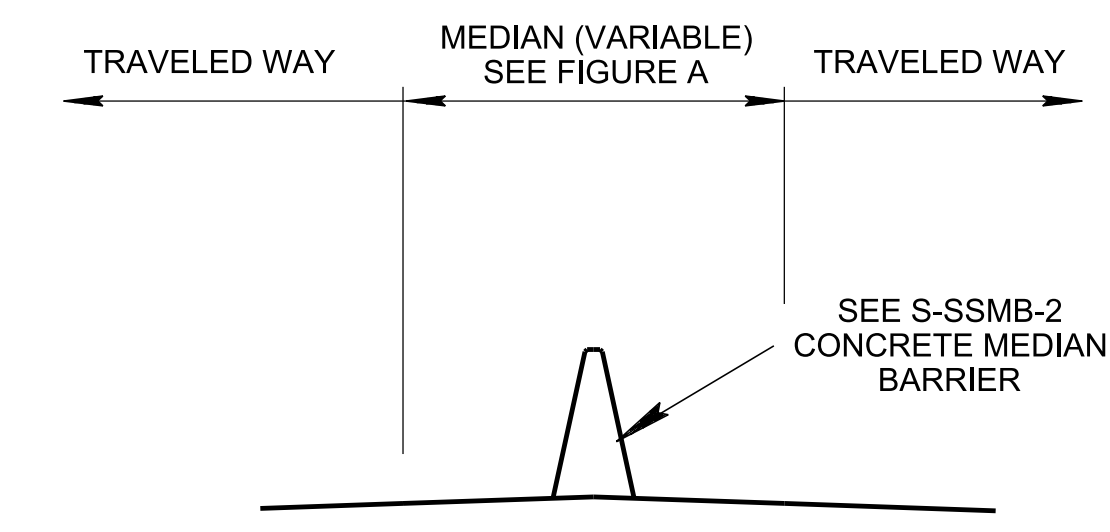
TL-3



TL-4
(6' OR LESS GRADE DIFFERENCE)

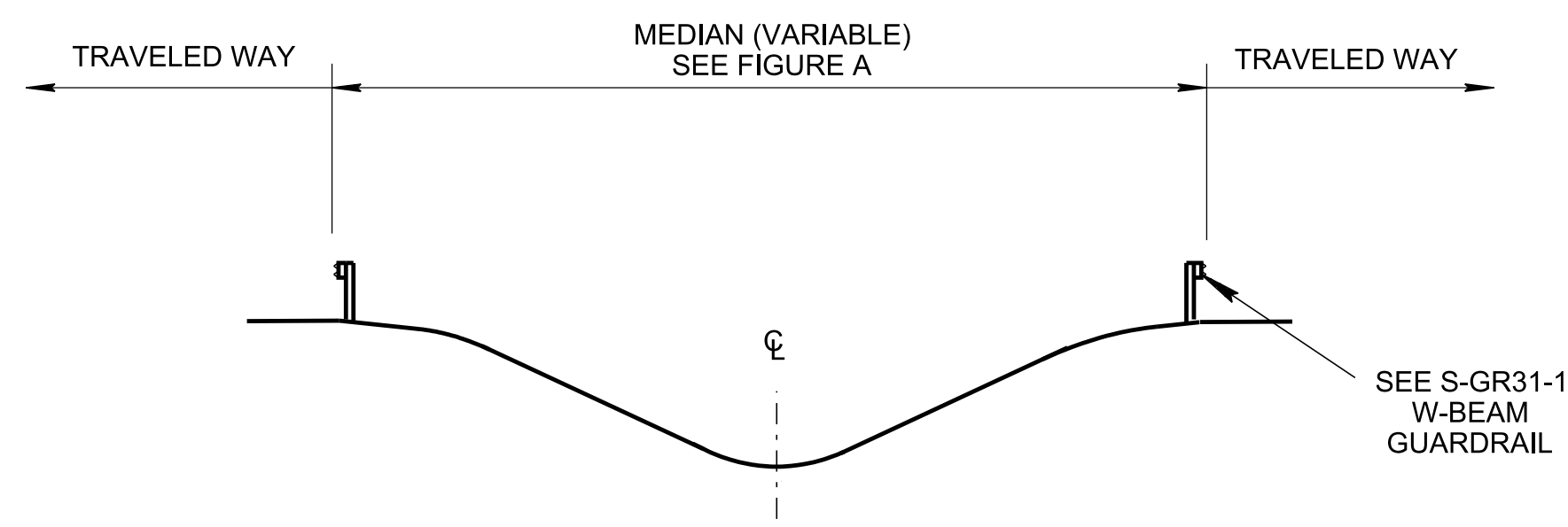


TL-4
(16' OR LESS MEDIAN)

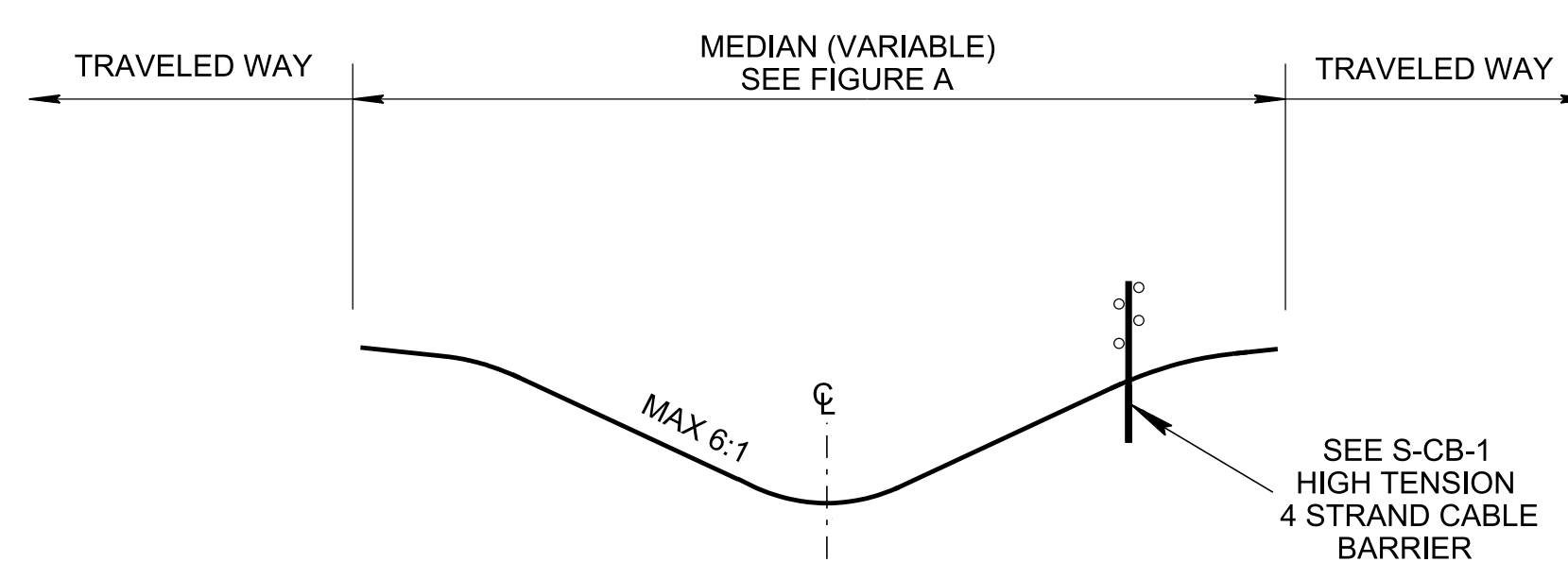


TL-5

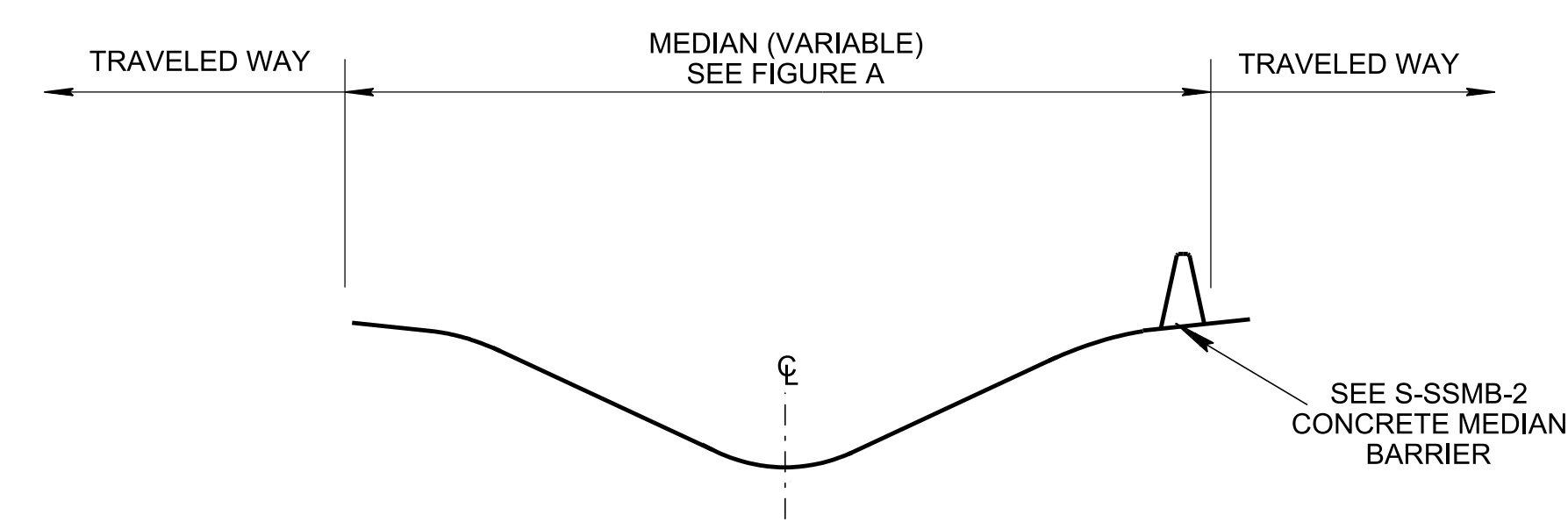
**NARROW MEDIANS
(28' OR LESS)**



TL-3



TL-4



TL-5

**DEPRESSED MEDIANS
(28' TO 64')**

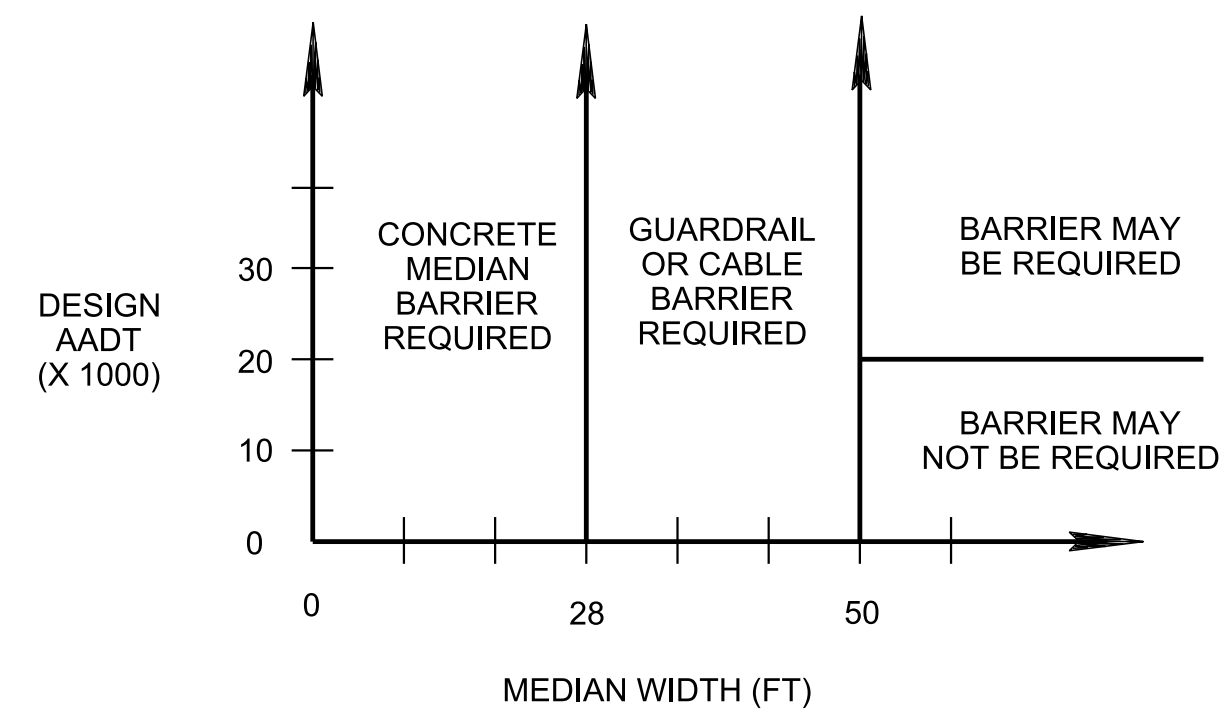


FIGURE A

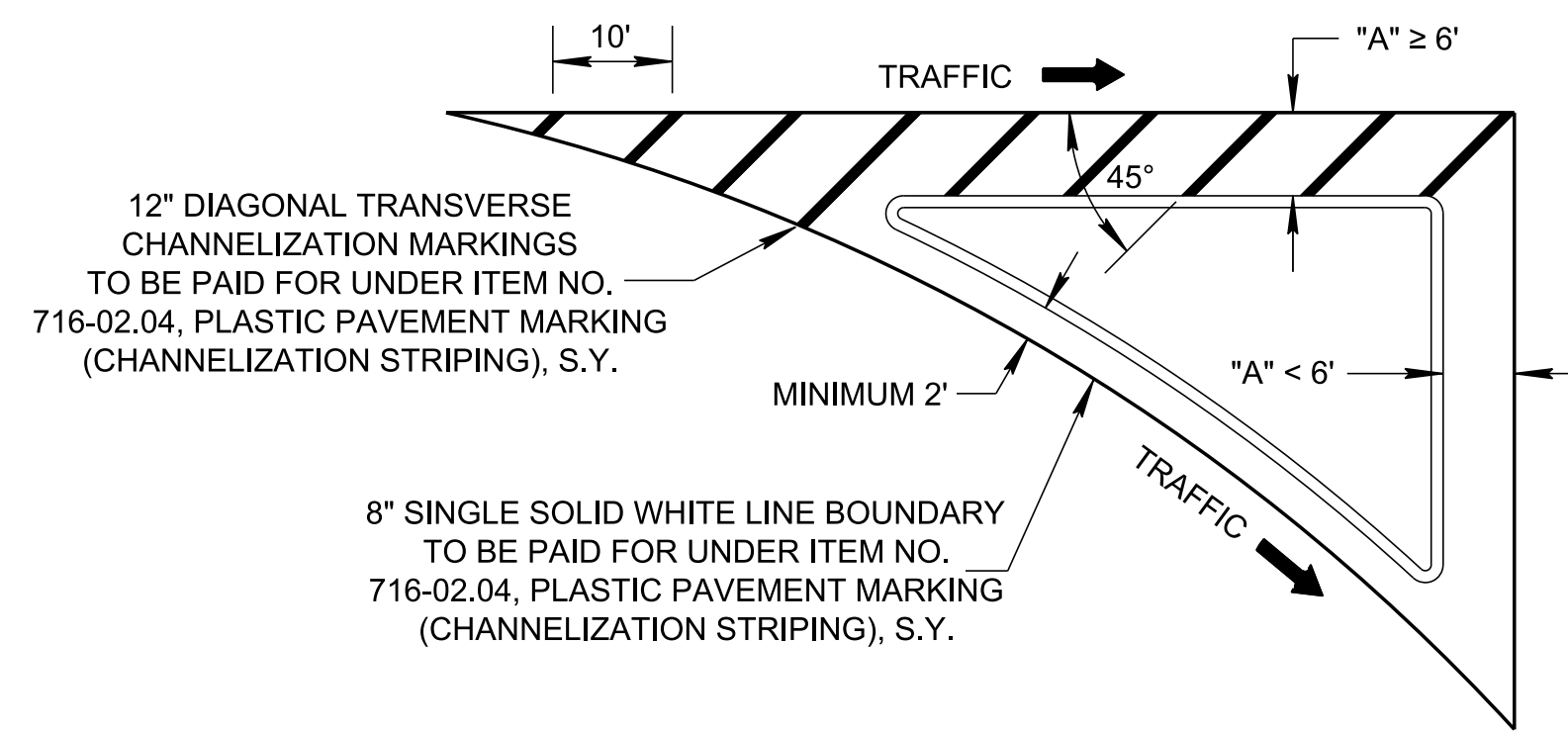
THE NEED OF BARRIER DETERMINATION GUIDE FOR MEDIAN BARRIER INSTALLATION

FIGURE A IS TO BE USED AS A GUIDE, BUT IS NOT A SUBSTITUTE FOR GOOD ENGINEERING JUDGEMENT. OTHER CONSIDERATIONS, SUCH AS CRASH HISTORY, MAY BE USED TO JUSTIFY BARRIER INSTALLATION. THIS STANDARD DOES NOT APPLY TO FREEWAYS WITH INDEPENDENT ROADWAYS (RD11-TS-5A)

GENERAL NOTES FOR MEDIAN DIVIDER GUARDRAIL

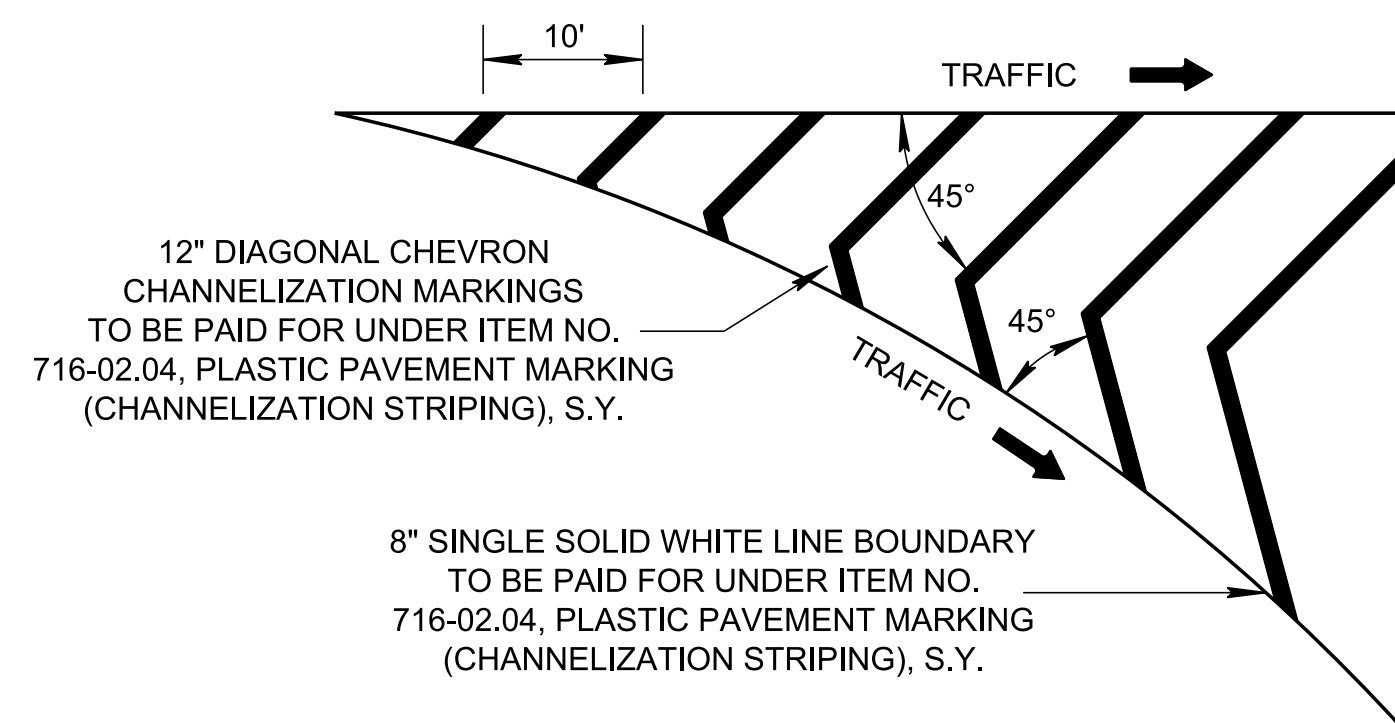
- (A) TO BE USED IN MEDIANS BETWEEN 10 TO 32' WIDE ONLY WHERE CONCRETE MEDIAN BARRIER CANNOT BE INSTALLED.
- (B) SEE S-GR31-1 FOR DETAILS NOT SHOWN.
- (C) THE POST SHALL NOT BE PLACED IN ASPHALT. IF NECESSARY PAVED MEDIAN ASPHALT SHALL BE REMOVED AT POST LOCATIONS.
- (D) FOR CONNECTION TO CONCRETE MEDIAN BARRIER SEE S-SSMB-6 SERIES.
- (E) W-BEAM MEDIAN BARRIER SYSTEM HAS BEEN EVALUATED AND DOCUMENTED ON THE TTL TEST REPORT 9-1002-12-8 (2016).
- (F) USE ONLY PRODUCTS LISTED ON THE TDOT QPL.
- (G) REFER TO REFERENCED STANDARD DRAWINGS FOR PAY ITEMS.

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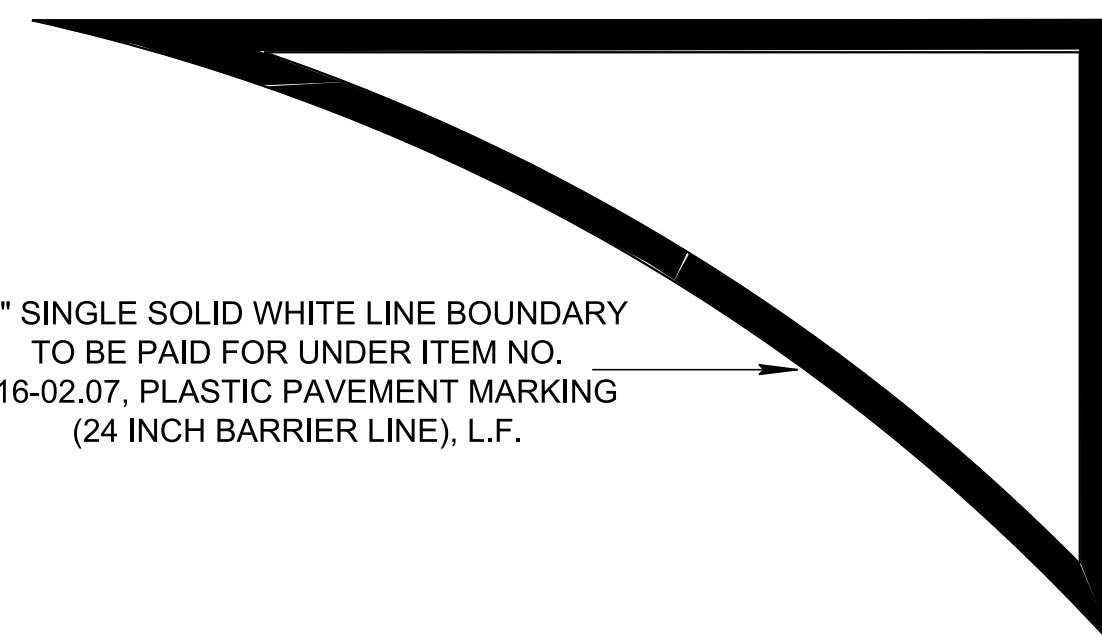


WHEN DISTANCE "A" IS LESS THAN 6', NO DIAGONAL MARKING WILL BE REQUIRED (MEASURED FACE OF CURB TO OUTSIDE OF BOUNDARY LINE).

**RAISED ISLAND
(SAME FOR DEPRESSED ISLAND)**

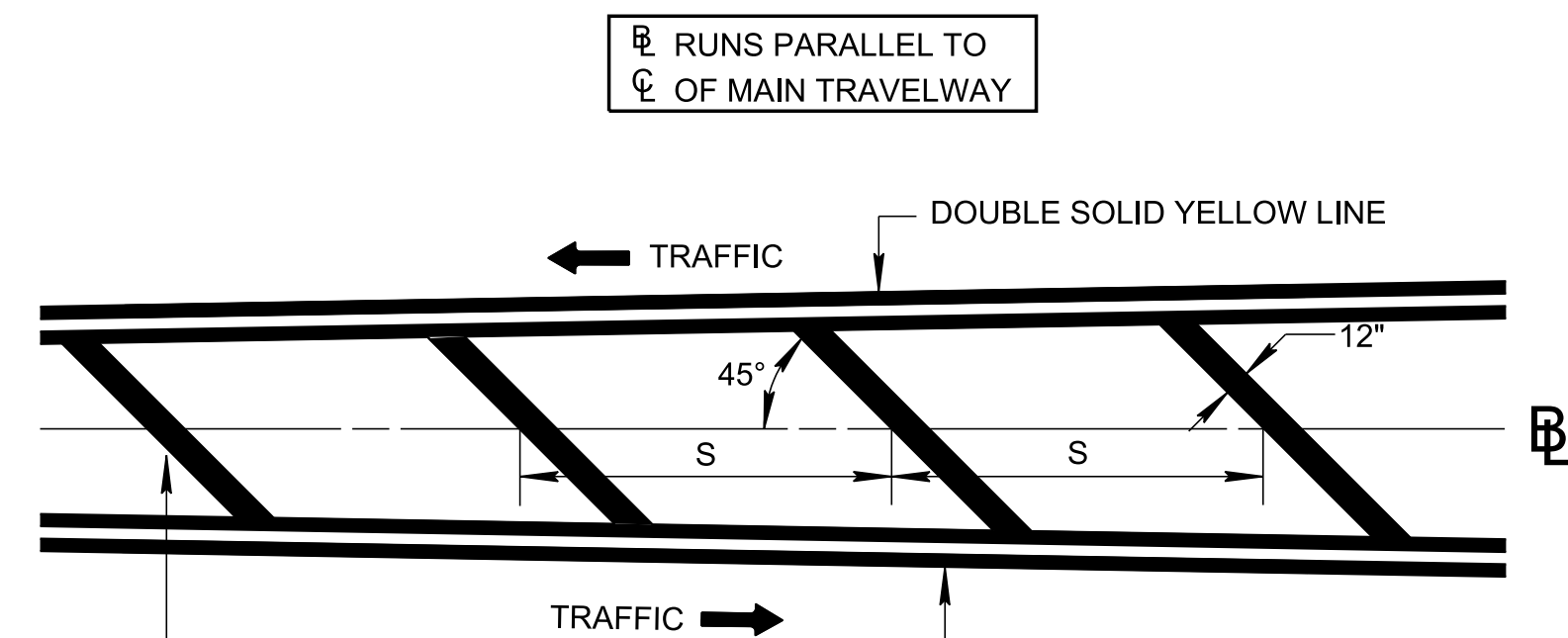


**MARKED ISLAND
AREA GREATER THAN 400 SQUARE FEET**



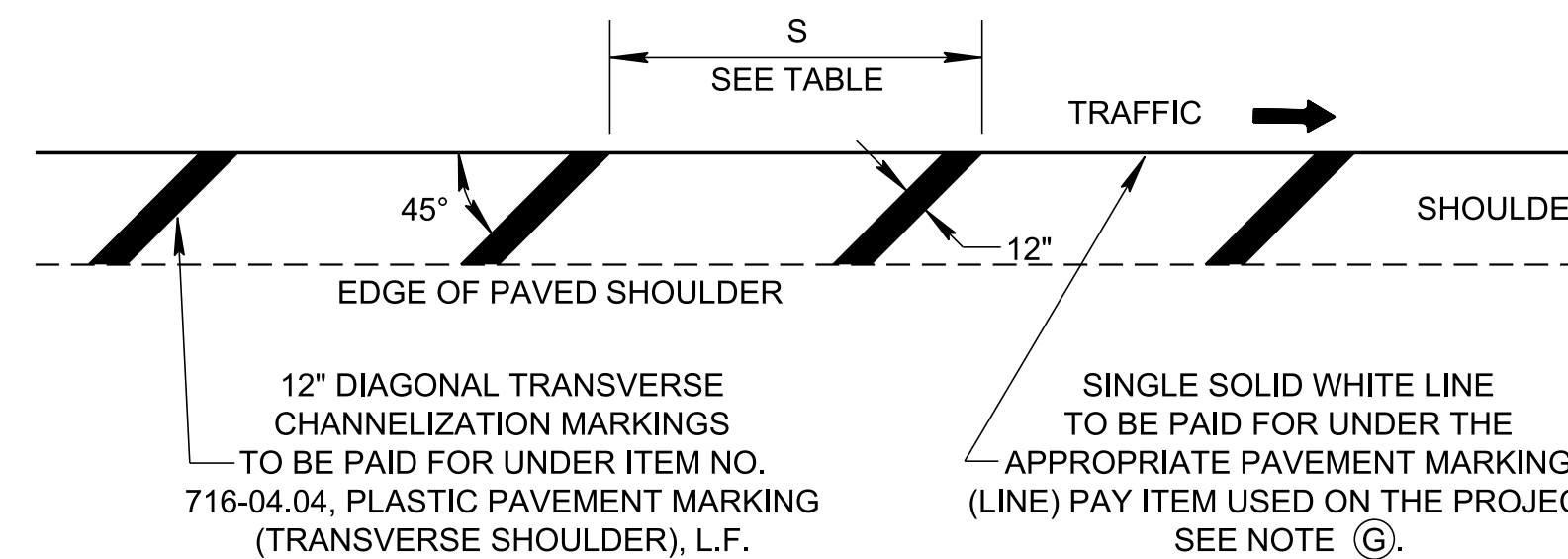
**MARKED ISLAND
AREA EQUAL TO OR LESS THAN 400 SQUARE FEET
(SEE NOTE (E))**

TRAFFIC ISLANDS

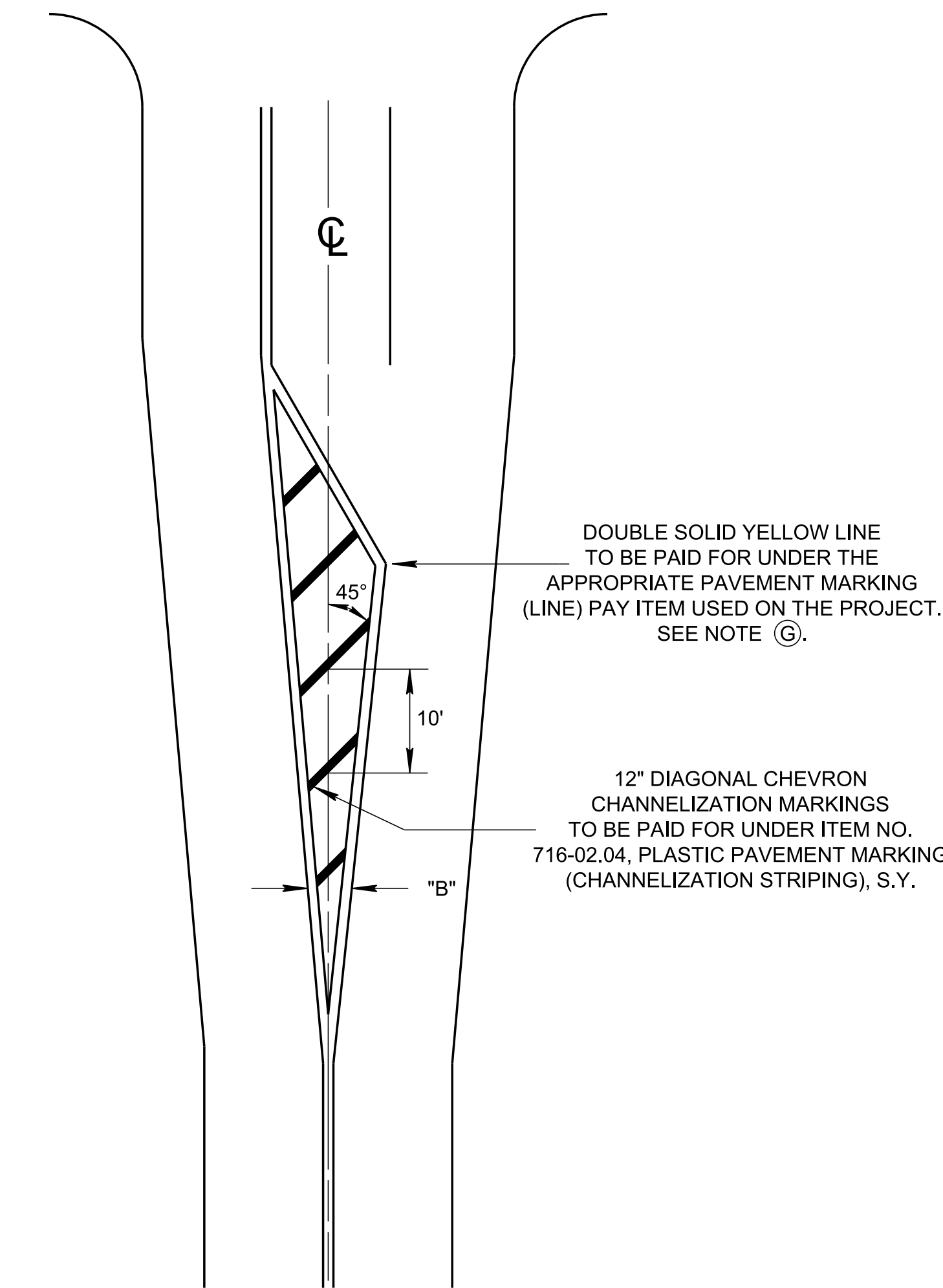


FOR MEDIAN WIDTH LESS THAN 6' NO DIAGONAL MARKING WILL BE REQUIRED (MEASURED OUTSIDE OF BOUNDARY LINES).

**MARKED MEDIAN ISLAND
AND OBSTRUCTION APPROACH**



TRANSVERSE SHOULDER MARKING

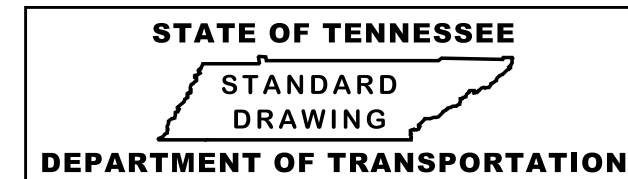


**LEFT TURN CHANNELIZATION ISLAND
WHEN WIDTH "B" IS LESS THAN 6'
(MEASURED PERPENDICULAR TO THE ☐)
NO DIAGONAL MARKING WILL BE REQUIRED.**

TABLE FOR SPACING OF DIAGONAL LINES 'S'		
POSTED SPEED	SHOULDER AND MARKED MEDIANS	OBSTRUCTION APPROACH
40 MPH OR LESS	50'	10'
45 MPH OR GREATER	100'	20'

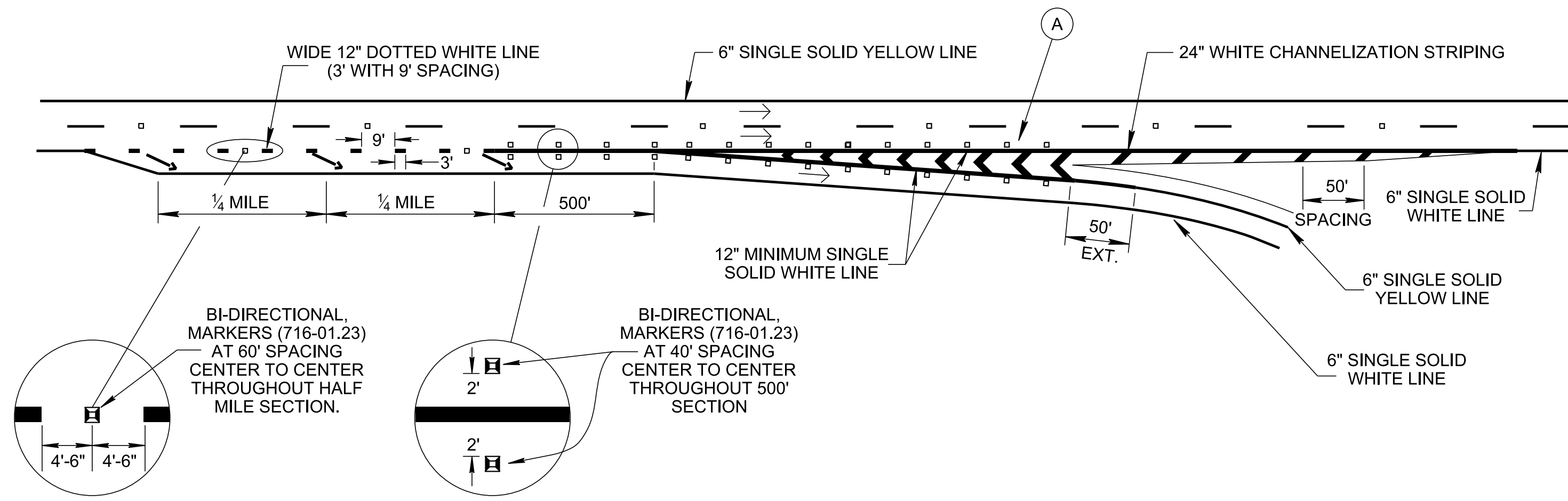
- GENERAL NOTES**
- (A) TO SEPARATE TRAFFIC MOVEMENT IN THE SAME DIRECTION, DIAGONAL MARKING SHALL BE WHITE (HWL) WITH AN 8 INCH SSWL BOUNDARY.
 - (B) TO SEPARATE OPPOSING LANES OF TRAFFIC, DIAGONAL MARKING SHALL BE YELLOW (HYL) WITH DSYL BOUNDARY.
 - (C) ALL DIAGONAL MARKINGS SHALL BE 12 INCHES IN WIDTH MARKED AT 45 DEGREES TO MARKINGS OUTLINING RESTRICTED AREA OR TO CENTERLINE TO ROADWAY.
 - (D) THERE SHALL BE A MINIMUM OF THREE DIAGONAL MARKINGS AT THE REQUIRED SPACING. OTHERWISE, NO DIAGONAL MARKING SHALL BE USED.
 - (E) MARKED TRAFFIC ISLANDS SHOULD BE A MINIMUM OF 75 SQUARE FEET.
 - (F) THE RECOMMENDED SPACING IS MEASURED PARALLEL TO THE CENTERLINE OF THE MAIN TRAVELWAY.
 - (G) 6" PAVEMENT MARKING WILL BE USED FOR ALL CENTER LINE, LANE LINES AND EDGE LINES ON ALL ROADS EXCEPT WHERE AS SHOWN ON STANDARD DRAWINGS.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED

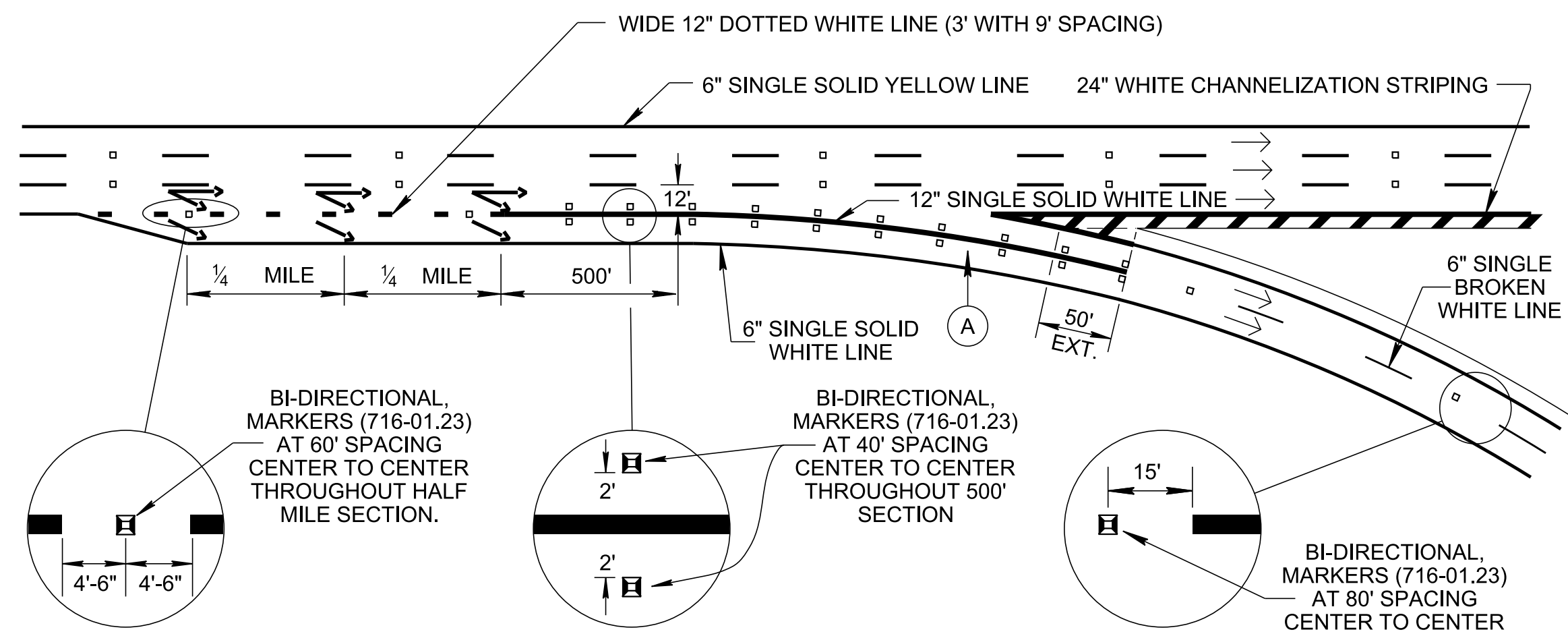


**MARKING STANDARDS
FOR TRAFFIC ISLANDS,
PAVED SHOULDER
AND MEDIANS FOR
CONVENTIONAL ROADS**

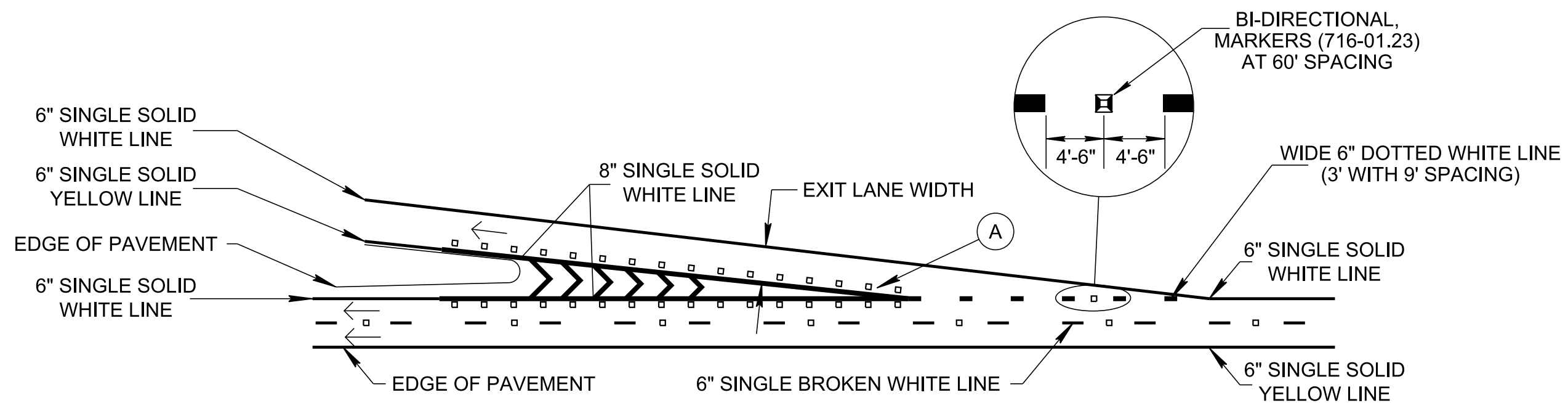
REV. 06-20-83: GENERAL REVISIONS.
REV. 03-22-85: ADDED NOTE 'SAME FOR DEPRESSED ISLAND' TO MARKING FOR RAISED ISLAND.
REV. 2-22-88: CHANGED MINIMUM "B" DIMENSION TO 6'. CHANGED DWG. NO. FROM T-M-10 TO T-M-3. REVISED GENERAL NOTE (D). CHANGED MINIMUM "A" DIMENSION TO 6'.
REV. 03-20-91: REDREW AND REORGANIZED SHEET.
REV. 09-19-91: GENERAL REVISION.
REV. 07-24-14: ADDED GENERAL NOTE (G).
REV. 06-28-19: REMOVED FOOTNOTE (D). REVISED GENERAL NOTE (G) AND REDREW SHEET.



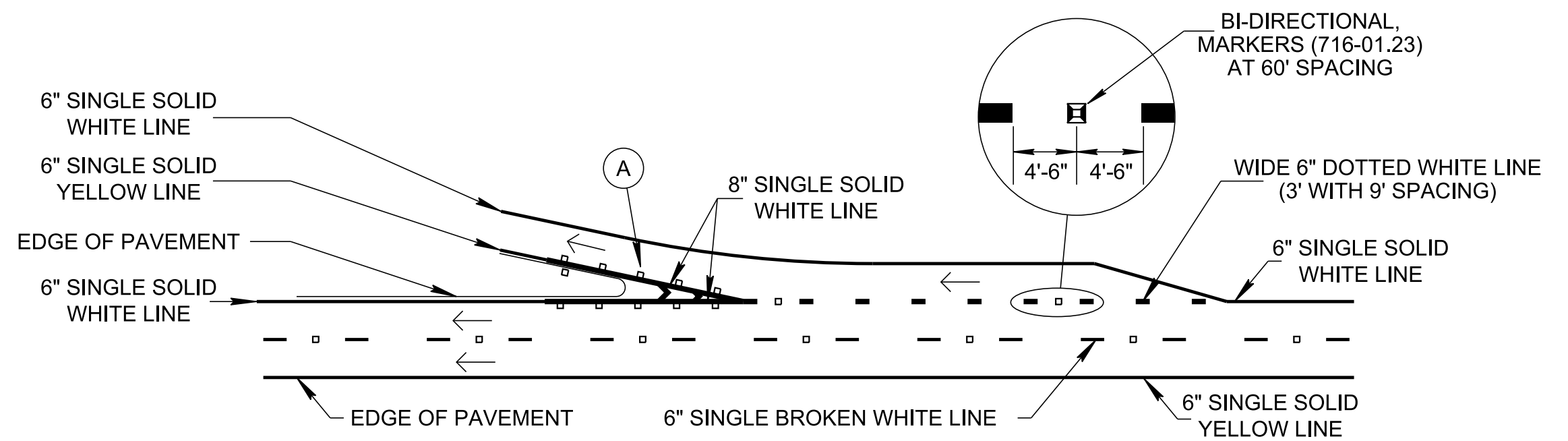
EXIT ONLY LANE



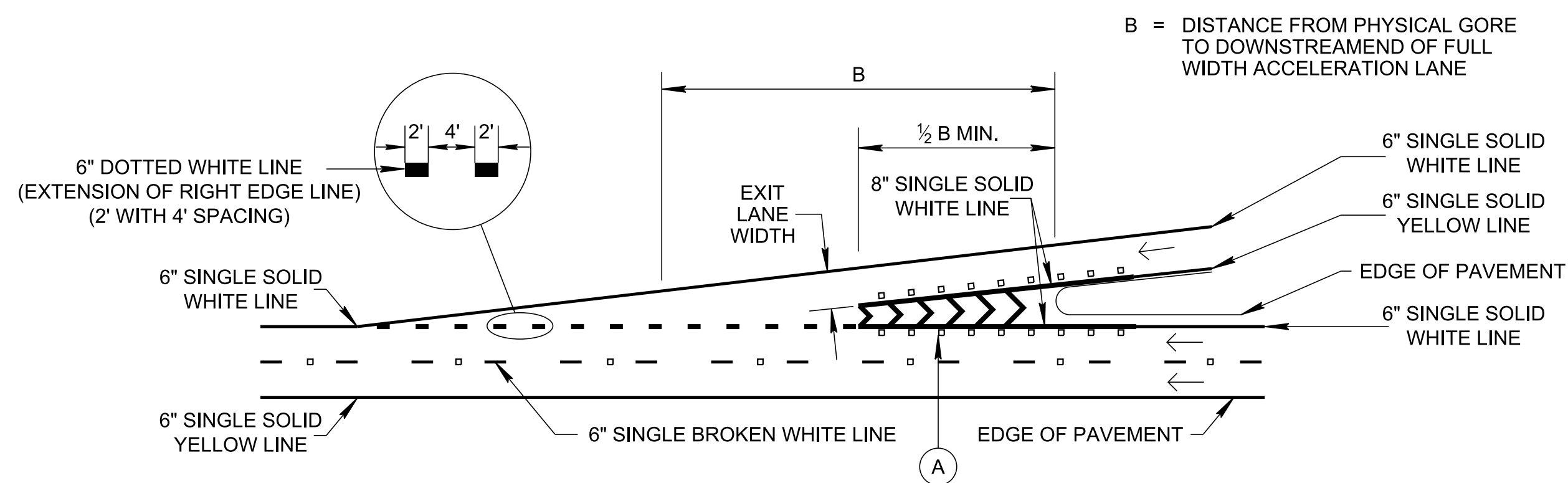
EXIT ONLY LANE WITH OPTIONAL LANE



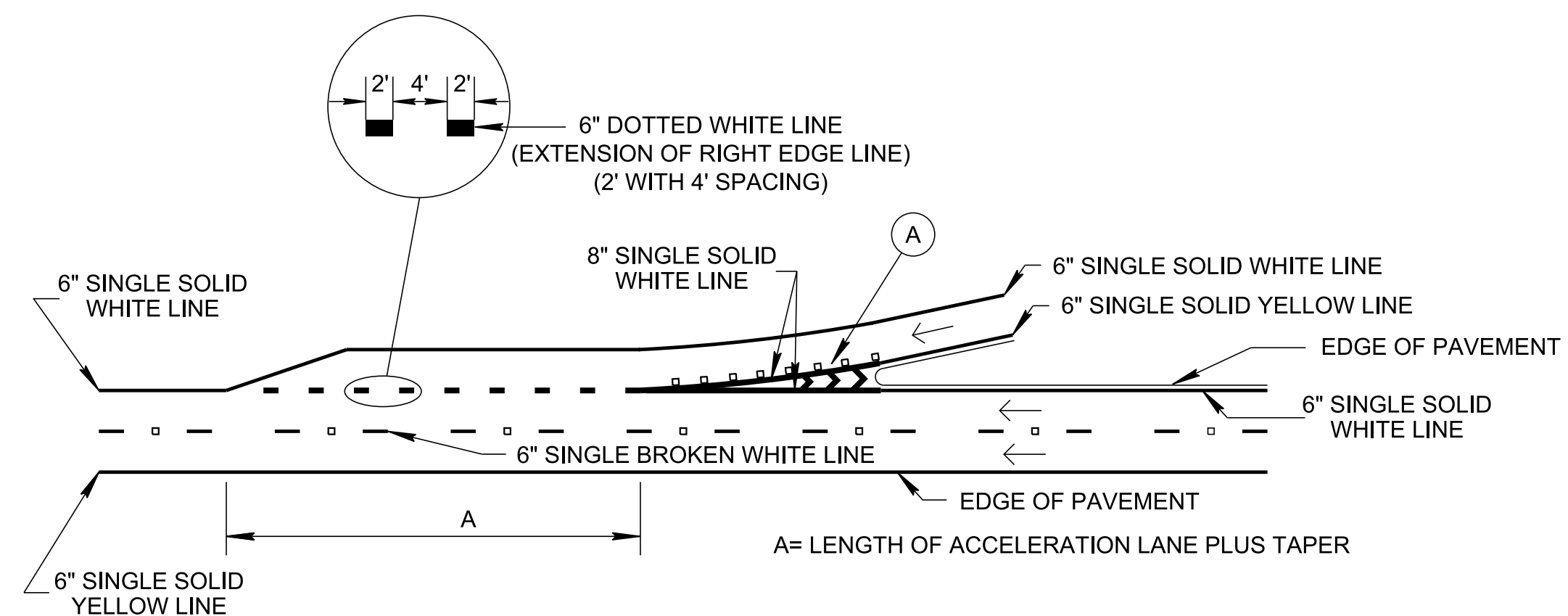
**TAPERED DECELERATION LANE
EXIT RAMP**



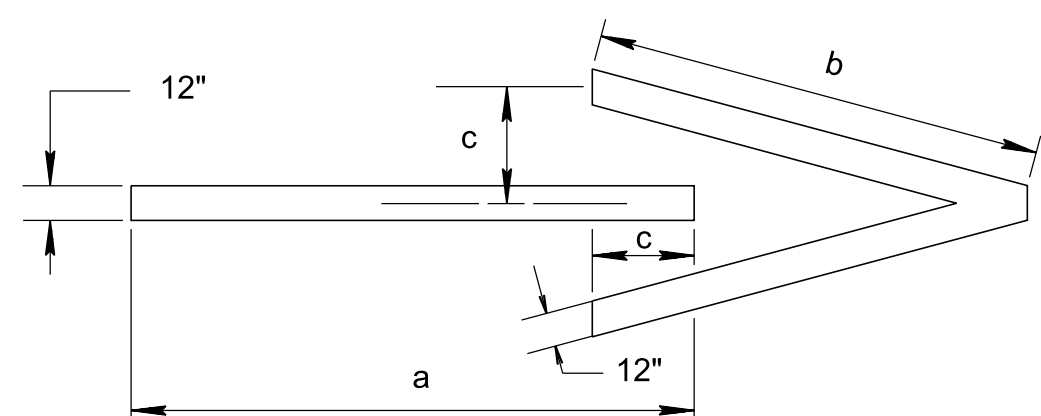
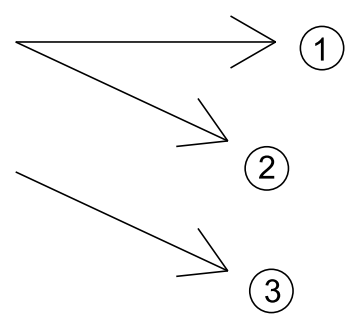
PARALLEL DECELERATION LANE



**TAPERED ACCELERATION LANE
ENTRANCE RAMP**



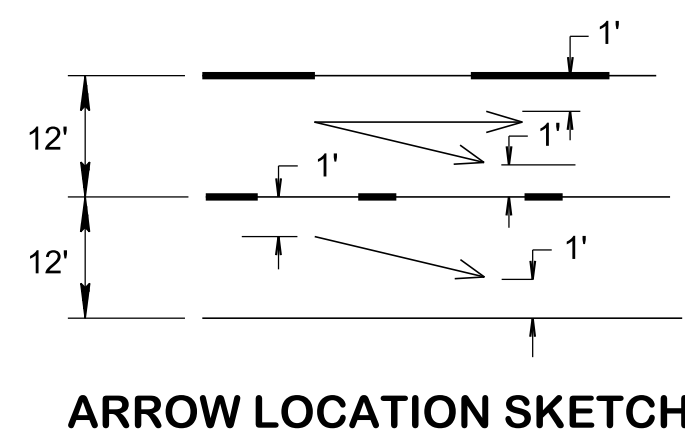
PARALLEL ACCELERATION LANE



DIMENSIONS			
ARROW	a	b	c
①	14'-0"	8'-6"	2'-2"
②	10'-4"	8'-6"	2'-2"
③	16'-6"	10'-0"	2'-6"

**DETAILS FOR EXIT PAVEMENT ARROWS
AT 1/4 MILE SPACING**

PAY ITEM NOS.:
 716-04.01, PLASTIC PAVEMENT MARKING (STRAIGHT-TURN ARROW), EACH
 716-04.05, PLASTIC PAVEMENT MARKING (STRAIGHT ARROW), EACH
 716-04.07, PLASTIC PAVEMENT MARKING (EXIT ONLY ARROW), EACH



ARROW LOCATION SKETCH

- LEGEND**
- ← TRAFFIC FLOW ARROW
 - ↘ PLASTIC PAVEMENT MARKING ARROW

FOOTNOTE

Ⓐ SEE STANDARD DRAWING NO. T-M-7 FOR GORE MARKING DETAILS.

- REV. 2-22-88: ADDED DETAIL FOR "EXIT ONLY" AND FOR PARALLEL ACCELERATION LANE MARKING. CHANGED SHEET TITLE AND DWG. NO. FROM T-M-3 TO T-M-6. ADDED NOTES. ADDED DETAILS FOR TWO LANE EXIT AND PAVEMENT ARROWS. ADDED DOTTED LINES AT EXIT RAMP.
- REV. 10-30-90: REDREW AND REORGANIZED SHEET, CHANGED WIDTH OF EXIT PAVEMENT ARROWS TO 12".
- REV. 03-20-91: ADDED MONO-DIRECTIONAL PAVEMENT MARKERS (CLEAR) TO EXIT ONLY LANE DETAIL AND TWO LANE EXIT WITH OPTIONAL LANE DETAIL. CHANGED GENERAL NOTES. ON REMAINDER OF SHEET CHANGED TYPE 2 PAVEMENT MARKERS (CLEAR) TO MONO-DIRECTIONAL PAVEMENT MARKERS (CLEAR).
- REV. 10-26-92: ADDED GENERAL NOTE (B).
- REV. 12-18-92: MOVED MONO-DIRECTIONAL PAVEMENT MARKERS (CLEAR) FROM INSIDE OF CHANNELIZATION MARKING TO OUTSIDE OF CHANNELIZATION MARKING.
- REV. 01-19-94: IN DETAIL FOR TWO LANE EXIT WITH OPTIONAL LANE, EXTEND RAMP AND ADD PAVEMENT MARKERS.
- REV. 07-29-98: CHANGED WIDTH OF CENTERLINES, EDGELINES AND DOTTED WHITE LANE LINES FROM 4 TO 6 INCHES. CHANGED USE OF DOTTED WHITE LANE LINES IN PARALLEL AND TAPERED ACCELERATION AND DECELERATION DETAILS.
- REV. 09-01-09: ADDED 6" BROKEN WHITE LINE TO PARALLEL ACCELERATION LANE.
- REV. 11-01-11: REVISED PAVEMENT MARKINGS FOR EXIT ONLY LANE DETAIL, EXIT ONLY WITH OPTIONAL LANE DETAIL, TAPERED ACCELERATION LANE DETAIL AND PARALLEL ACCELERATION LANE DETAIL. DELETED GENERAL NOTE (B).
- REV. 01-12-12: CHANGED SNOW PLOWABLE MARKERS FROM MONO-DIRECTIONAL TO BI-DIRECTIONAL 2-COLOR.
- REV. 05-24-12: REVISED PAVEMENT MARKINGS FOR TAPERED ENTRANCE AND EXIT AND PARALLEL ENTRANCE AND EXIT RAMP.
- REV. 06-22-12: REVISED SPACING FOR SNOW PLOWABLE MARKINGS IN EXIT ONLY DETAILS.
- REV. 01-07-19: REVISED DETAILS TAPERED ACCELERATION LANE ENTRANCE RAMP AND PARALLEL ACCELERATION LANE.
- REV. 06-28-19: REVISED SPACING FOR 6" DOTTED WHITE LINE ON DETAIL FOR TAPERED ACCELERATION LANE ENTRANCE RAMP AND PARALLEL ACCELERATION LANE. REDREW SHEET.

□ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED

STATE OF TENNESSEE
 STANDARD DRAWING
 DEPARTMENT OF TRANSPORTATION

**MARKING DETAIL
 FOR
 EXPRESSWAY AND
 FREEWAY
 INTERCHANGES**

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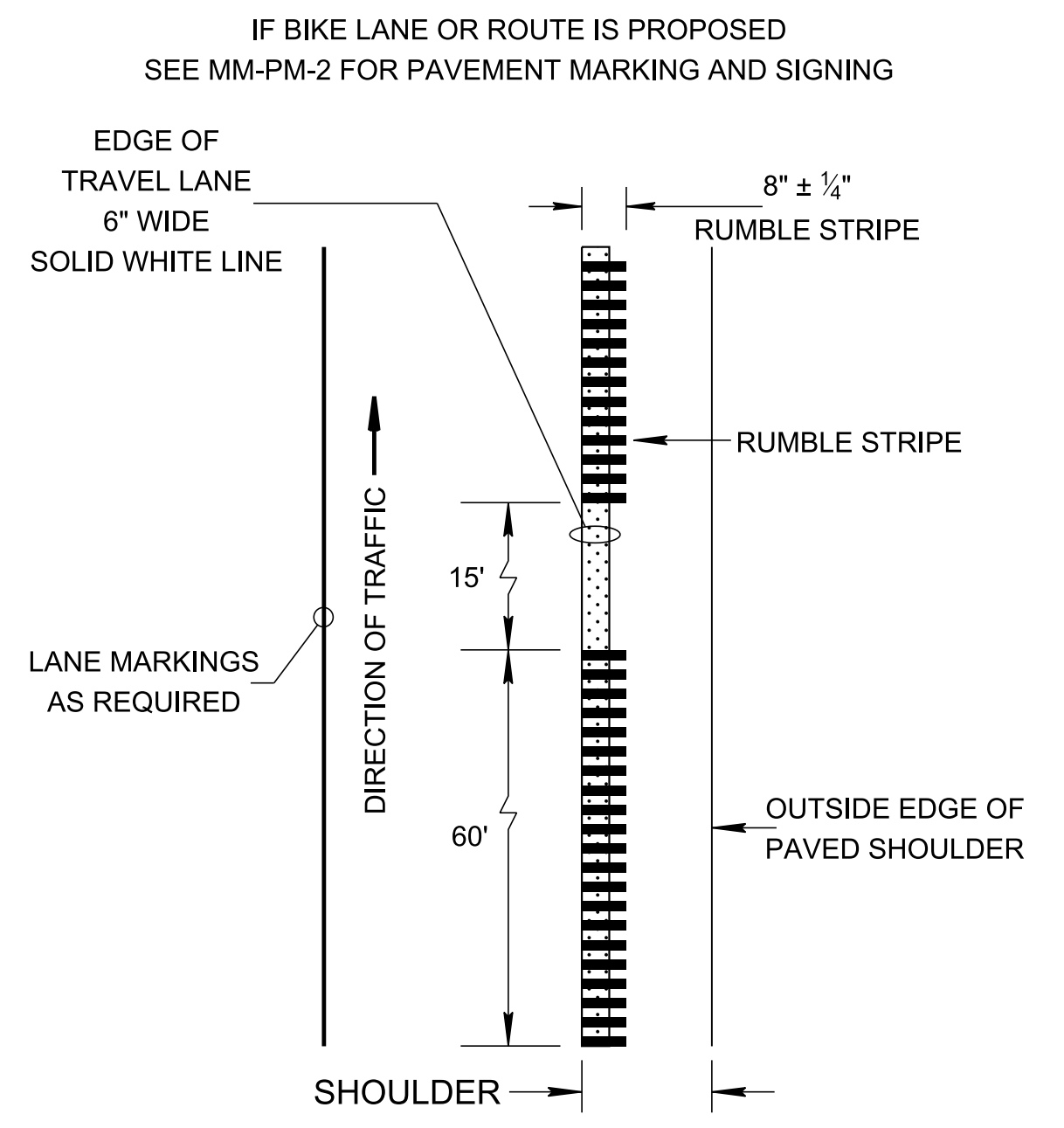
TYPICAL RUMBLE STRIPE INSTALLATION DETAILS FOR NON-ACCESS CONTROLLED RURAL ROUTES

REV. 11-1-11: CHANGED GENERAL NOTES (E), (F), AND (G). DELETED T-M-11A. ADDED BIKE SYMBOL/ARROW SHARED LANE MARKING DETAILS AND ADDED GENERAL NOTE (H) AND (I).

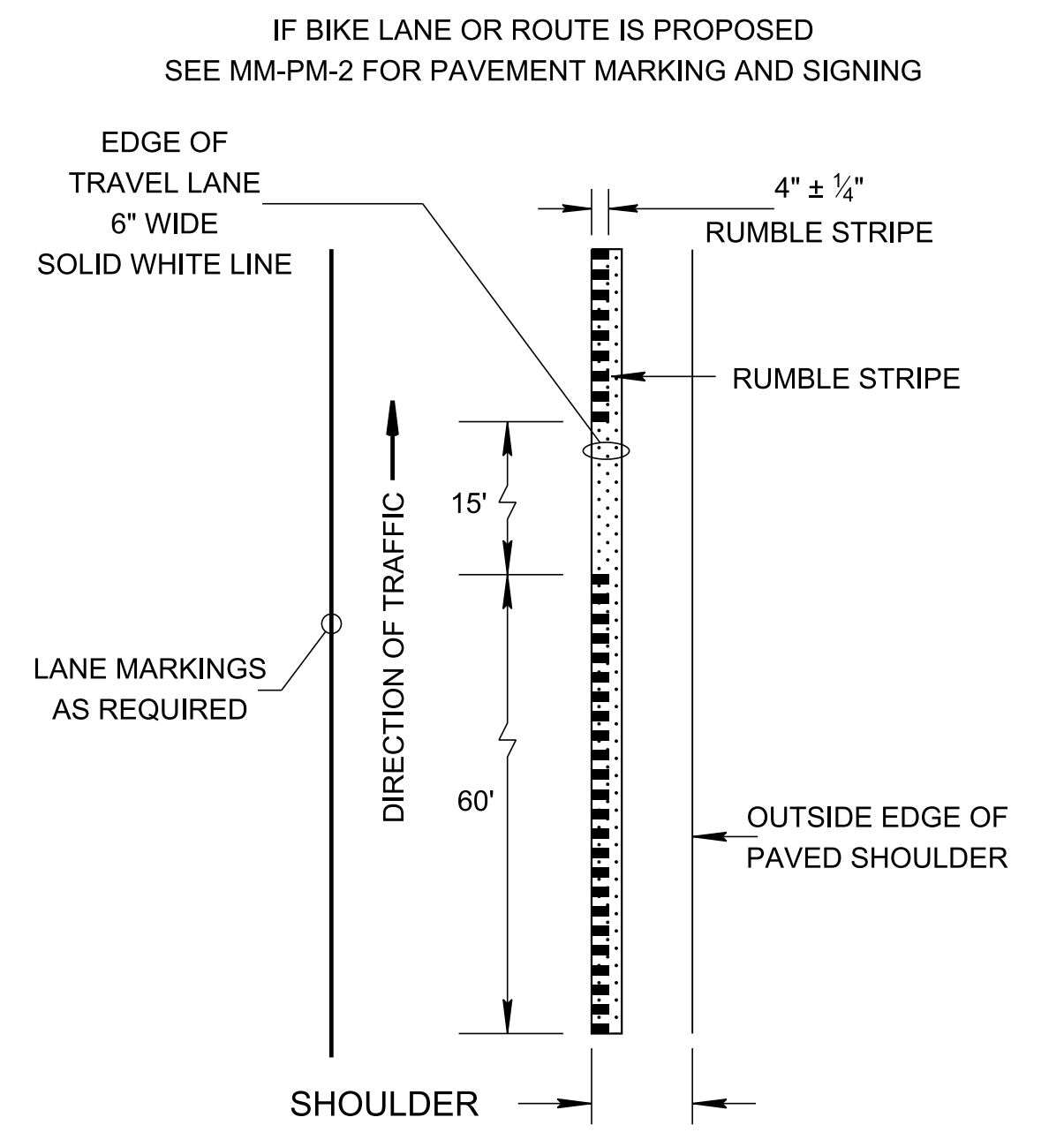
REV. 12-1-14: REVISED RUMBLE STRIPE SPACING ADDED REFERENCE TO T-M-11.

REV. 08-02-18: CHANGED THE SHOULDER WIDTH FROM "2' OR GREATER" TO "2' - 8'" FOR THE 8" WIDE RUMBLE STRIPE. ADDED PAVEMENT MARKING PAY ITEM NUMBERS TO NOTE (F). ADDED NOTE (H), (I), AND (J). REDREW SHEET.

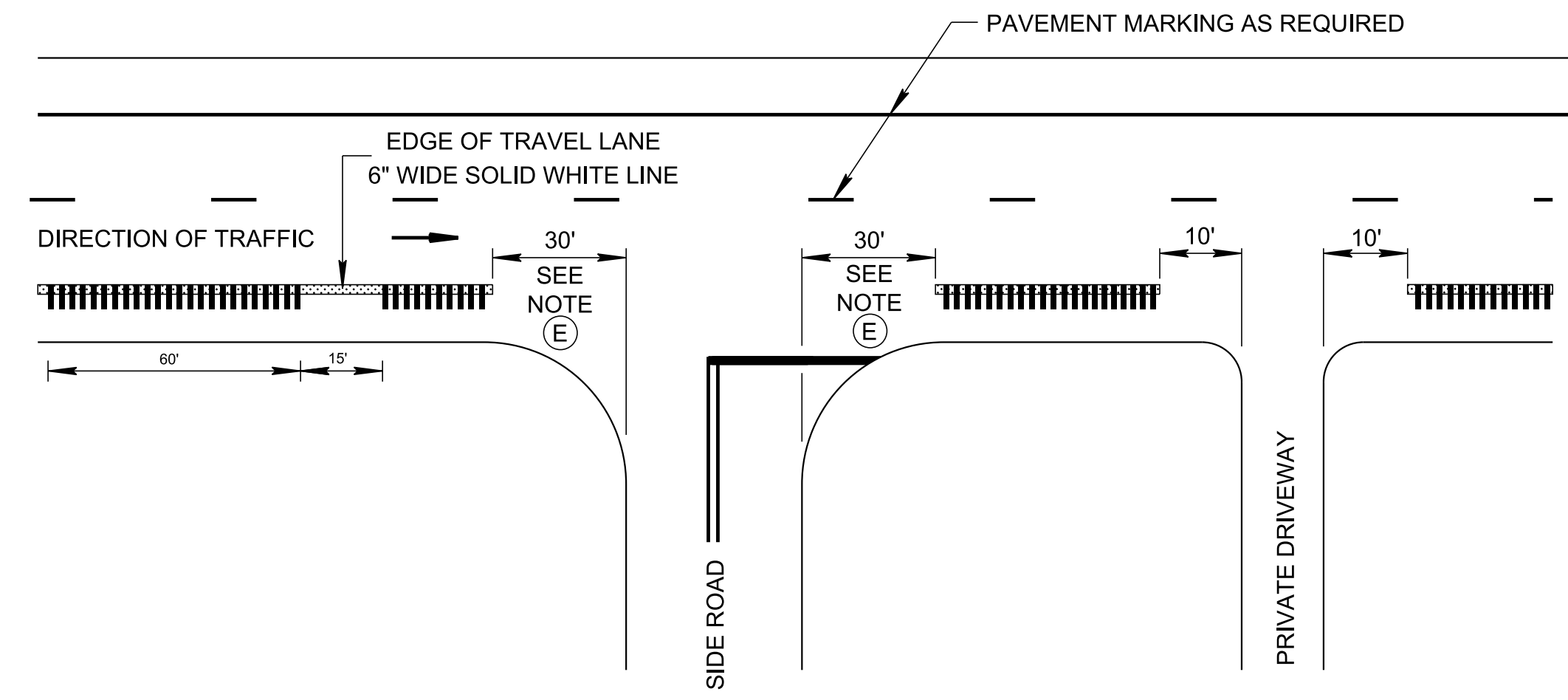
REV. 06-28-19: REMOVED 4" PAVEMENT MARKING. REDREW SHEET.



AVAILABLE PAVED SHOULDER WIDTH 2' - 8'
EXISTING PAVED SHOULDER MAY ACCOMMODATE BIKE LANE ON SHOULDER 4' OR WIDER. SEE TDOT ROADWAY DESIGN GUIDELINES AND STD. DWG. MM-PM-2.

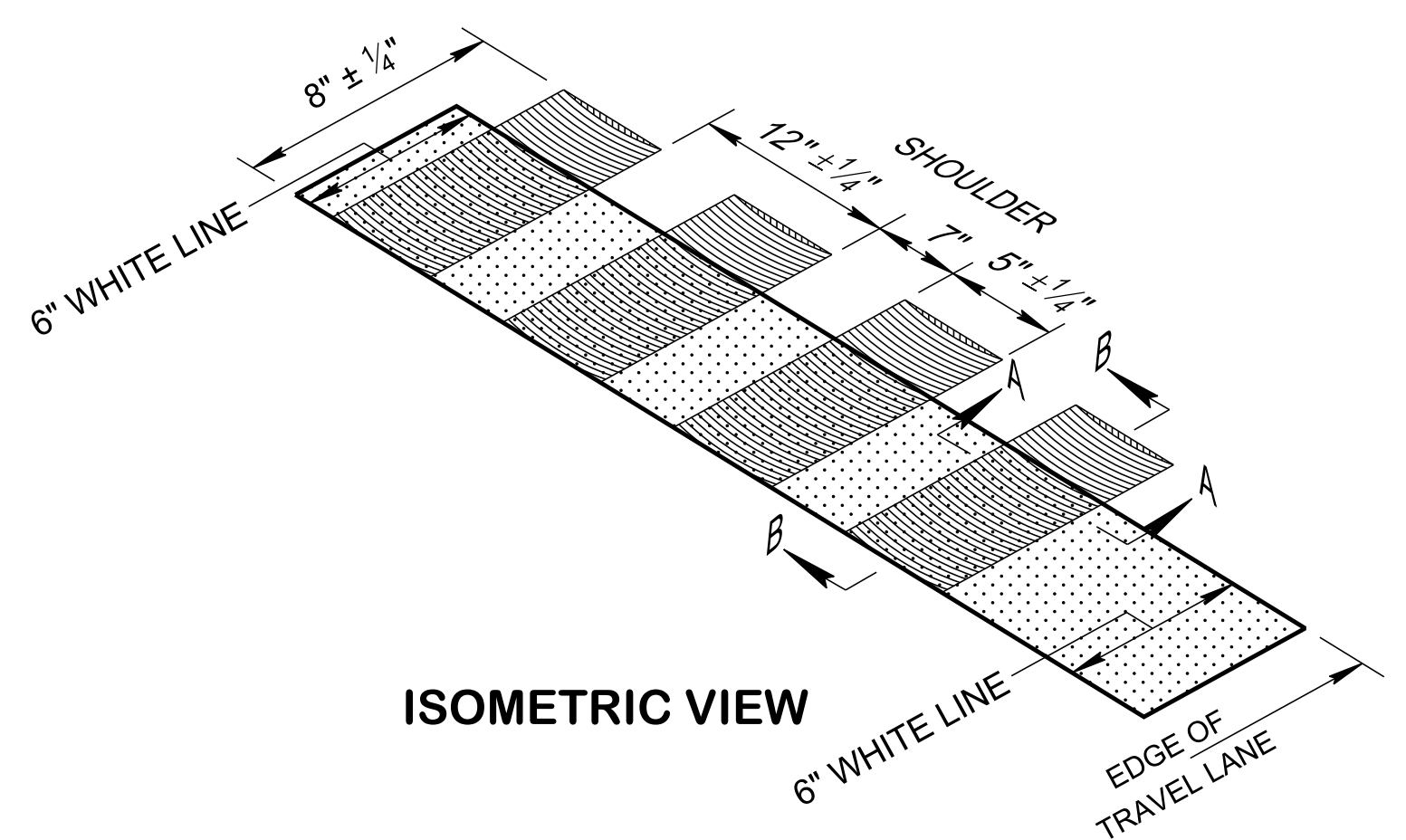


AVAILABLE PAVED SHOULDER WIDTH 0' - 2'
EXISTING ROADWAY MAY ACCOMMODATE BIKE ROUTE IF POSTED SPEED IS JUSTIFIED. SEE TDOT ROADWAY DESIGN GUIDELINES AND STD. DWG. MM-PM-2.

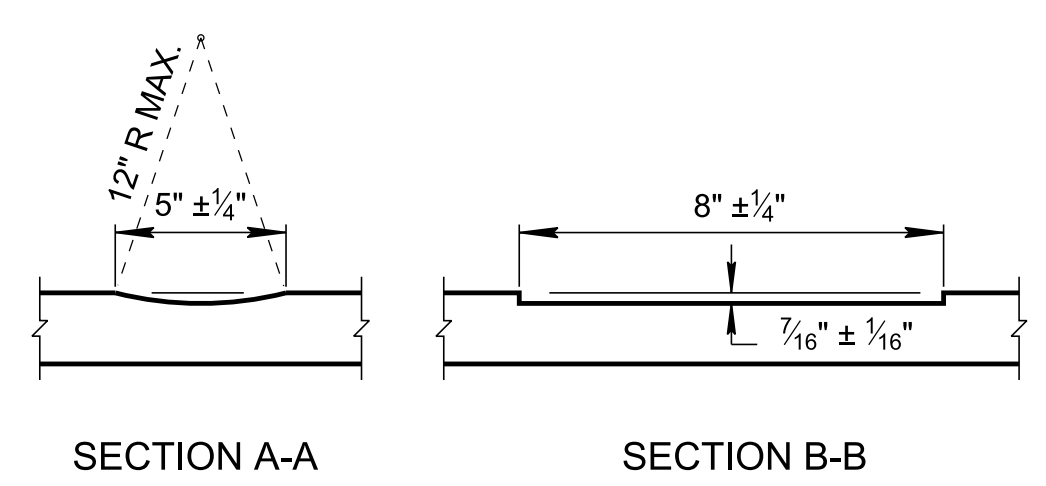


SIDE ROAD AND DRIVEWAY RUMBLE STRIPE INSTALLATION DETAILS

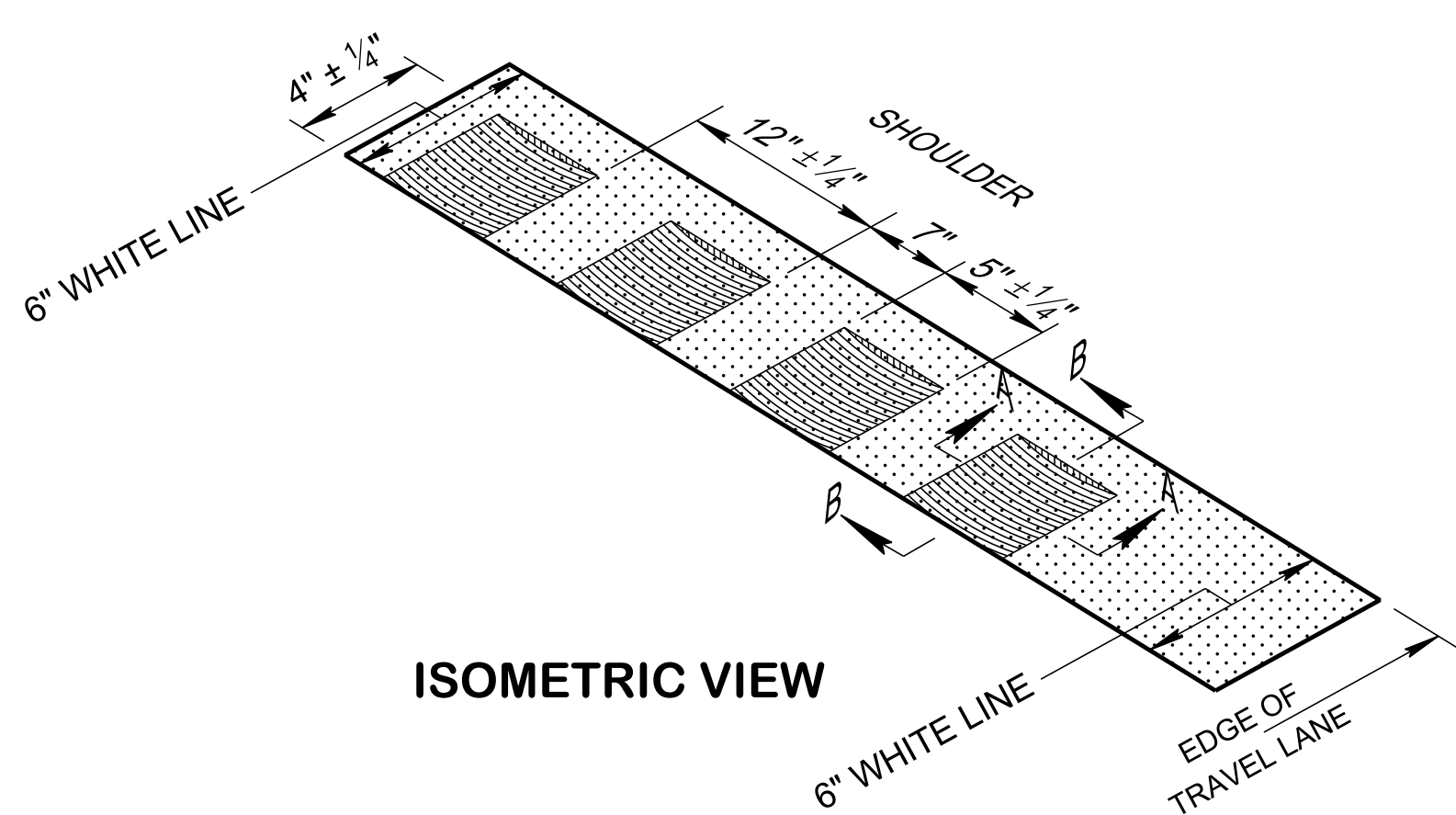
IF BIKE LANE OR ROUTE IS PROPOSED
SEE MM-PM-2 FOR PAVEMENT MARKING AND SIGNING



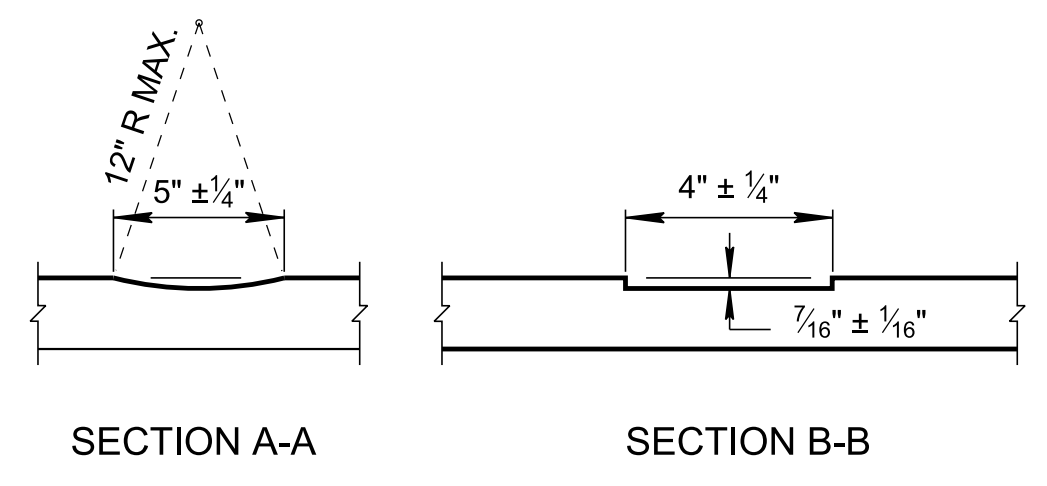
ISOMETRIC VIEW



TYPICAL 8" WIDE RUMBLE STRIPE INSTALLATION



ISOMETRIC VIEW



TYPICAL 4" WIDE RUMBLE STRIPE INSTALLATION

NOTE: 4" WIDE RUMBLE STRIPE IS NOT A PREFERRED APPLICATION. IT SHOULD BE USED IN LOCATIONS WHERE NO SHOULDER IS AVAILABLE AND RUMBLE STRIPE IS REQUIRED FOR A SAFETY UPGRADE. PROFILE THERMOPLASTIC MAY BE USED AS AN ALTERNATE AT LOCATIONS WHERE PAVEMENT SCHEDULE LIMITS USE OF RUMBLES.

RUMBLE STRIPE GENERAL NOTES

- (A) WHEN RUMBLE STRIPES ARE USED ON NON-ACCESS CONTROLLED FACILITIES, THEY SHOULD BE DISCONTINUED IN ADVANCE OF DRIVEWAYS, INTERSECTIONS, AND MEDIAN OPENINGS.
 - (B) MILLED-IN RUMBLE STRIPE WITH 5" ± 1/4" GROOVES, 7/16" ± 1/16" DEEP, ON 12" ± 1/4" SPACING.
 - (C) WHEN RUMBLE STRIPES ARE INSTALLED ON ACCESS CONTROLLED ROUTES, THE RUMBLE STRIPE IS TO BE INSTALLED CONTINUOUSLY WITHOUT THE 15' GAP. RUMBLE STRIPE WIDTH SHALL BE 16" WIDE AS DETAILED ON STD. DWG. T-M-15.
 - (D) A 15' LONG GAP BETWEEN 60' LONG SECTIONS OF RUMBLE STRIPES ARE REQUIRED TO ACCOMMODATE BICYCLES.
 - (E) WHEN THE SIDE ROAD RADIUS IS GREATER THAN 30', RUMBLE STRIPE APPLICATION SHOULD BE DISCONTINUED 50' IN ADVANCE.
 - (F) RUMBLE STRIPE, ALL COST OF INSTALLATION SHALL BE INCLUDED IN ITEM NOS:
411-12.03 SCORING FOR RUMBLE STRIPE (NON-CONTINUOUS) (8IN WIDTH), PER L.M.
411-12.04 SCORING FOR RUMBLE STRIPE (NON-CONTINUOUS) (4IN WIDTH), PER L.M.
 - PAVEMENT MARKINGS, ALL COST OF INSTALLATION SHALL BE INCLUDED IN ITEM NOS:
716-13.02 SPRAY THERMO PVMT MRKNG (60 mil) (6IN LINE), PER L.M.
 - (G) THE COLOR OF AN EDGE LINE OR CENTER LINE ASSOCIATED WITH LONGITUDINAL RUMBLE STRIPE SHALL BE IN ACCORDANCE WITH SECTION 3A.05 OF THE MUTCD.
 - (H) APPLICATIONS OF RUMBLE STRIPE SHOWN ON THIS DRAWING ARE TO ACCOMMODATE BICYCLES TO THE MAXIMUM EXTENT ON THE ROADWAY OR SHOULDER.
 - (I) RUMBLES SHOULD NOT TYPICALLY BE INSTALLED AT DESIGN SPEED < 45 MPH.
 - (J) THE DESIGNER OR THE FIELD ENGINEER MAY CHOOSE TO ALTERNATE RUMBLE STRIPE WITH PROFILED THERMOPLASTIC PAVEMENT MARKING WHEN THE FOLLOWING CONDITIONS EXIST:
 - 1) WHEN IT IS NOT PRACTICAL OR DESIRABLE TO INSTALL MILLED-IN RUMBLE STRIPES FOR INSIDE AND OUTSIDE EDGE LINE PAVEMENT MARKINGS ON ROADWAYS WITH RIGID PAVEMENT SHOULDERS.
 - 2) WHEN EDGE LINES ON TWO - LANE ROADWAYS THAT DO NOT HAVE PAVED SHOULDERS.
 - 3) WHEN EDGE LINES ON BRIDGES WITH NARROW SHOULDERS, AS A SAFETY COUNTERMEASURE FOR BRIDGE PARAPET IMPACTS.
- ALL COST OF INSTALLATION SHALL BE INCLUDED IN ITEM NOS:
716-14.02 PROFILED THERMO PVMT MRKNG AUDIBLE (6IN), PER L.M.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED

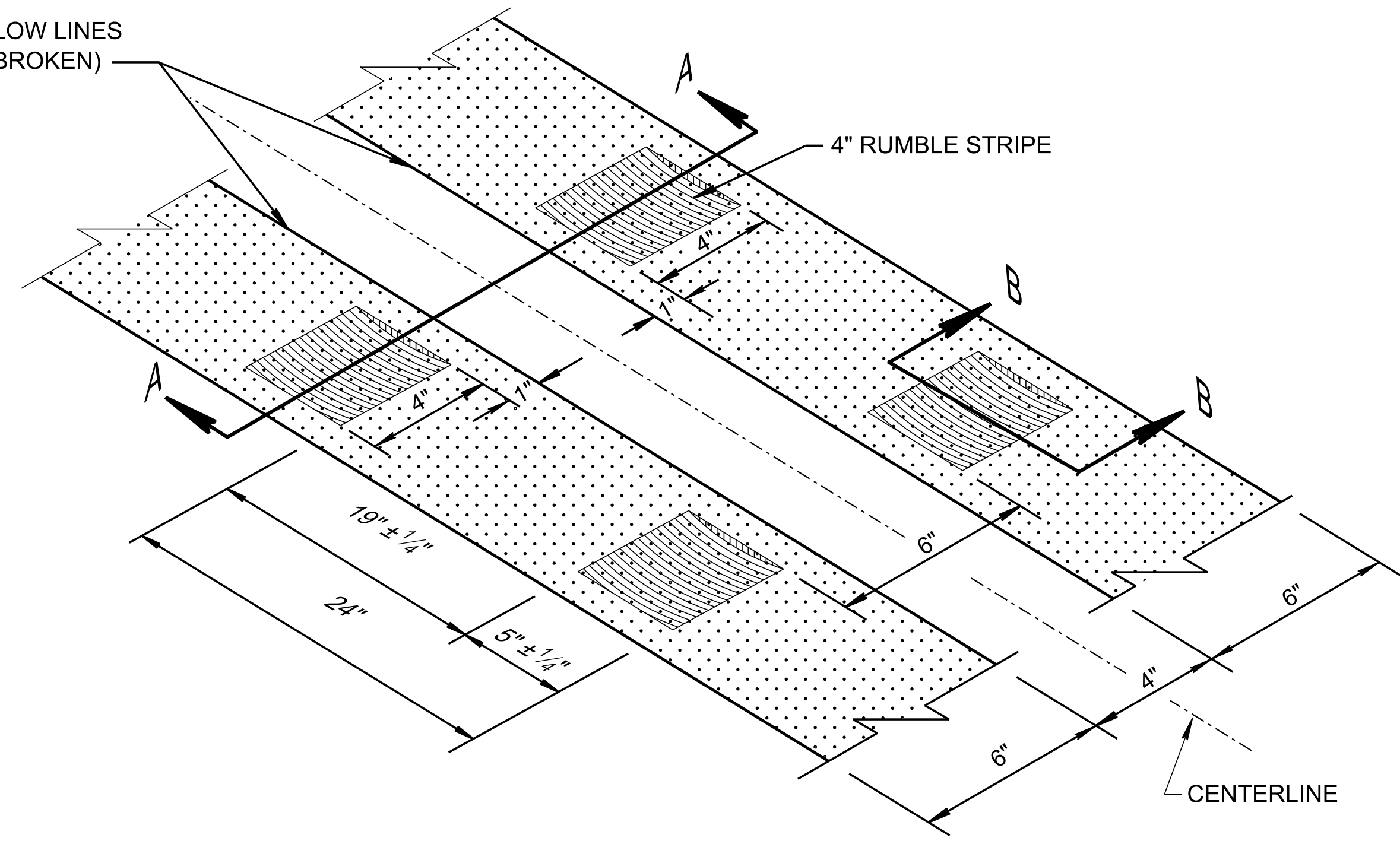
STATE OF TENNESSEE
STANDARD DRAWING
DEPARTMENT OF TRANSPORTATION

ASPHALT SHOULDER RUMBLE STRIPE INSTALLATION DETAILS FOR NON-ACCESS CONTROLLED RURAL ROUTES

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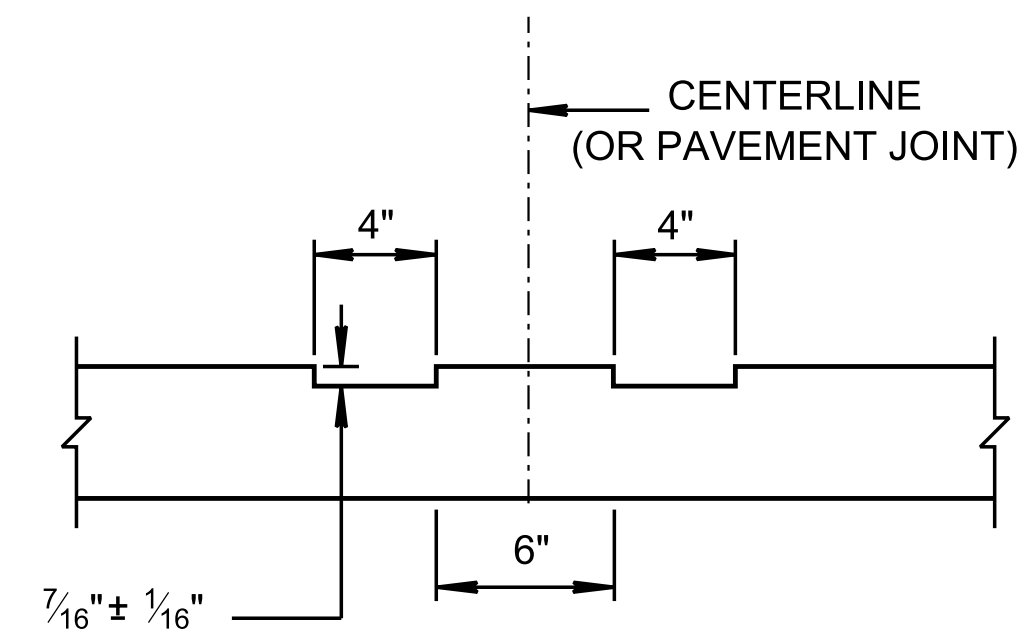
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DOUBLE YELLOW LINES
(SOLID OR BROKEN)

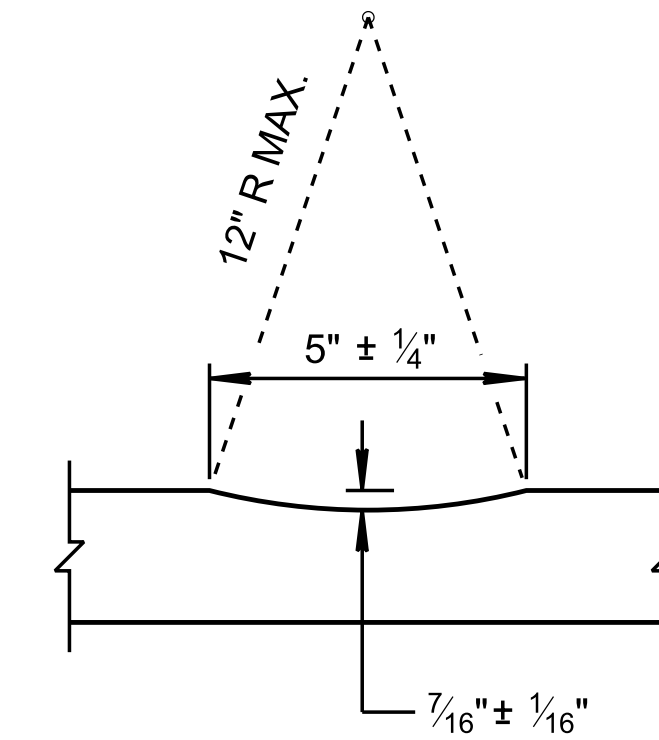


ISOMETRIC VIEW

FOR NO PASSING ZONES OR ONE WAY PASSING ZONES



SECTION A-A



SECTION B-B

REV. 4-21-14: REMOVED TWO WAY PASSING ZONE OPTION. MODIFIED NOTES (A) AND (B).
 REV. 7-24-14: CHANGED STRIPE WIDTH.
 REV. 08-02-18: CHANGED PAY ITEM NUMBER IN NOTE (B). MODIFIED NOTE (C). CHANGED LENGTH OF RUMBLE STRIPE GROOVE FROM 7" TO 5". CHANGED DISTANCE BETWEEN GROOVES FROM 17" TO 19". ADDED ± TO BOTH THESE DIMENSIONS. ADDED GENERAL NOTE (I) REDREW SHEET.
 REV. 06-28-19: REMOVED 4" PAVEMENT MARKING FROM DRAWING AND REDREW SHEET.

RUMBLE STRIPE GENERAL NOTES

- (A) FOR IMPROVEMENTS OR RECONSTRUCTION OF EXISTING ROADS, RUMBLE STRIPES MAY BE USED AS NEEDED DUE TO CRASH HISTORY. FOR NEW CONSTRUCTION, CENTERLINE RUMBLE STRIPES MAY BE SPECIFIED IF THE FOLLOWING CONDITIONS EXIST:
 - 1) DESIGN SPEED > 45 MPH
 - 2) ADT OF 1500 OR MORE
 - 3) LANE WIDTH 12' MINIMUM
 - 4) ROAD SEGMENT IS A TWO OR FOUR LANE UNDIVIDED SECTION
 - 5) ROAD SEGMENT IS A NO PASSING OR ONE WAY PASSING ZONE
 - (B) WHEN RUMBLE STRIPES ARE SPECIFIED, PAVEMENT MARKING ITEM NUMBER SHALL BE:
716-12.02 ENHANCED FLATLINE THERMO PVMT MRKNG (6IN LINE) PER L.M.
 - (C) CENTERLINE RUMBLE STRIPES SHALL NOT BE USED ON BRIDGES.
 - (D) THE PAVEMENT JOINT SHALL NOT BE MILLED.
 - (E) RUMBLE STRIPE SHALL BE DISCONTINUED WHENEVER THE CENTERLINE MARKING IS ALSO DISCONTINUED.
 - (F) RUMBLE STRIPE SHOULD NOT BE USED IN RESIDENTIAL OR COMMERCIAL AREAS.
 - (G) SCORING FOR RUMBLE STRIPES TO BE PAID FOR UNDER ITEM NUMBER:
411-12.05 SCORING FOR CENTERLINE RUMBLE (4IN WIDTH-24IN SPACING), PER L.M.
(INCLUDES BOTH LEFT AND RIGHT SIDE PER LINEAR MILE).
 - (H) FOR RAISED PAVEMENT MARKINGS SPACING, SEE STD. DWG. T-M-1. IN LOCATIONS WHERE RPMS ARE PRESENT, STAGGER RUMBLES SUCH THAT RPMS ARE CENTERED BETWEEN RUMBLES.
 - (I) THE DESIGNER OR THE FIELD ENGINEER MAY CHOOSE TO ALTERNATE RUMBLE STRIPE WITH PROFILED THERMOPLASTIC PAVEMENT MARKING WHEN THE FOLLOWING CONDITIONS EXIST:
 - 1) WHEN IT IS NOT PRACTICAL OR DESIRABLE TO INSTALL MILLED-IN RUMBLE STRIPES FOR INSIDE AND OUTSIDE EDGE LINE PAVEMENT MARKINGS ON ROADWAYS WITH RIGID PAVEMENT SHOULDERS.
 - 2) WHEN THERE ARE EDGE LINES ON TWO - LANE ROADWAYS THAT DO NOT HAVE PAVED SHOULDERS.
 - 3) WHEN THERE ARE EDGE LINES ON BRIDGES WITH NARROW SHOULDERS, AS A SAFETY COUNTERMEASURE FOR BRIDGE PARAPET IMPACTS.
- ALL COST OF INSTALLATION SHALL BE INCLUDED IN ITEM NOS:
716-14.02, PROFILED THERMO PVMT MRKNG AUDIBLE (6IN), PER L.M.

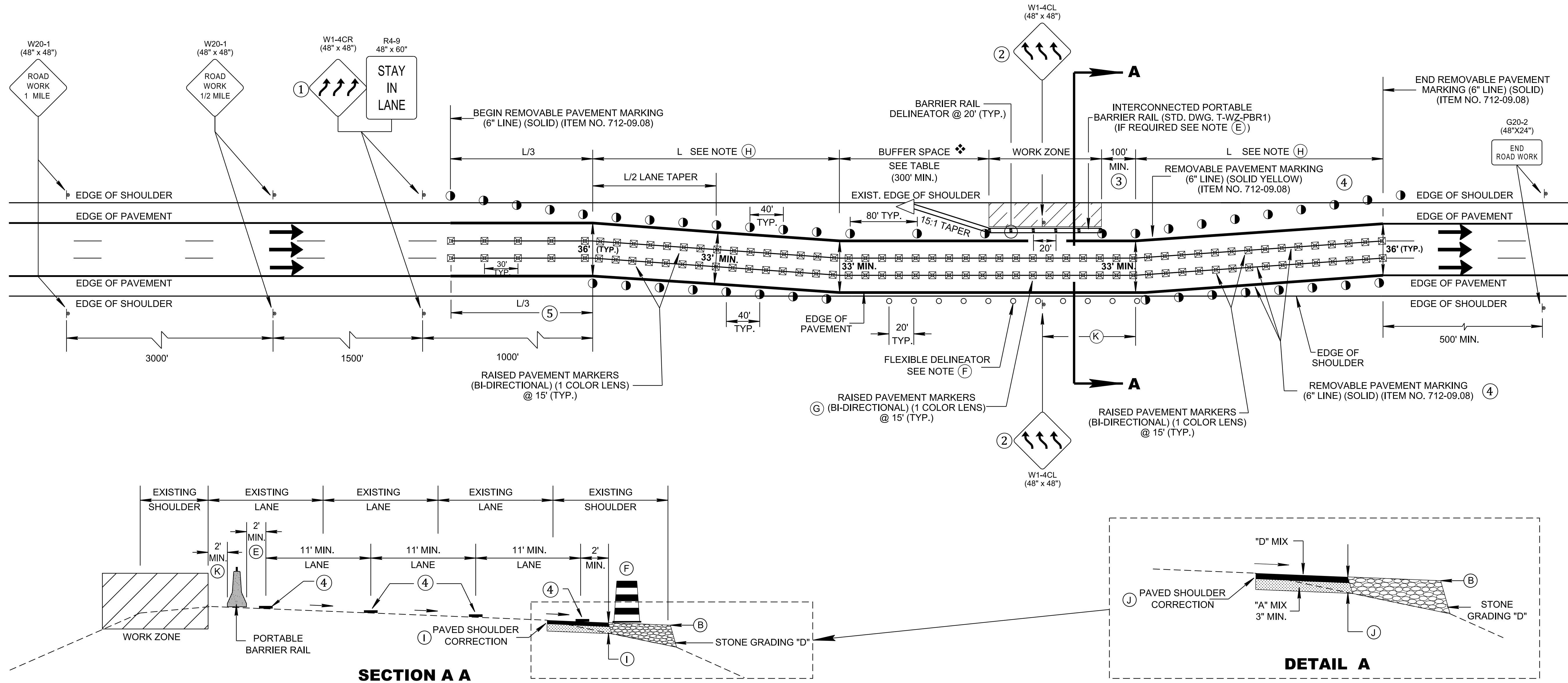
MINOR REVISION -- FHWA APPROVAL NOT REQUIRED

STATE OF TENNESSEE
 STANDARD DRAWING
 DEPARTMENT OF TRANSPORTATION

ASPHALT
 CENTERLINE
 RUMBLE STRIPE

TEMPORARY TRAFFIC CONTROL TYPICAL LANE SHIFT APPLICATION (A)

(SHOWING LANE SHIFT USING EXISTING SHOULDER)



- REV. 4-15-99: MODIFIED CHANNELIZATION DEVICE LEGEND.
- REV. 12-18-99: CHANGED OUT FLEXIBLE DRUMS FOR VERTICAL PANELS ALONG OUTSIDE SHOULDER IN WORK ZONE AREA. MODIFIED GENERAL NOTE (D).
- REV. 7-29-03: CHANGED GENERAL NOTE (D).
- REV. 4-15-04: CHANGED GENERAL NOTE (B) TO COMPLY WITH 2003 MUTCD.
- REV. 9-1-05: REMOVED TYPE "C" WARNING LIGHTS FROM FLEXIBLE DRUMS IN TAPER.
- REV. 5-12-06: REPLACED VERTICAL PANEL WITH BARRIER RAIL DELINEATORS. ADDED GENERAL NOTES (E) & (F).
- REV. 10-06-06: REPLACED VERTICAL PANELS WITH GROUND MOUNTED FLEXIBLE DELINEATOR. ADDED GENERAL NOTE (E) AND (H). CHANGED GENERAL NOTE (I) AND ADD GENERAL NOTE (I) DELETED "FOR LANE SHIFTS EQUAL TO OR LESS THAN 2000' IN LENGTH". ALSO STD.DWG. T-WZ-17 DELETED.
- REV. 03-13-09: CHANGED GENERAL NOTE (D) AND ATTENUATOR LEGEND DESCRIPTION.
- REV. 03-05-17: ADDED ITEM NO. 716-05.02 OR 712-09.02.
- REV. 06-28-19: REVISED ALL NOTES. COMPUTATION FOR DISTANCE L BLOCK. ADDED SECTION A A AND DETAIL A. ADDED SIGNS NOS. W-20-1 & R4-9. RENAMED AND REDREW SHEET.

SPECIAL NOTES

WHEN PERFORMING A SHIFTING TAPER THE LANE WIDTHS SHOULD BE A MINIMUM 11 FT. WIDE WITH 2 FT. SHOULDERS. WHEN EXISTING ROADWAY HORIZONTAL ALIGNMENT IS IN A CURVE AND THE RADIUS IS LESS THAN 2500 FT. THE LANE WIDTHS FOR THE SHIFTING TAPER MUST BE AT LEAST 12 FT. WIDE WITH 2 FT. SHOULDERS.

CHANNELIZATION DEVICE LEGEND

- FLEXIBLE DRUMS (ITEM NO. 712-04.01, PER EACH)
- GROUND OR SURFACE MOUNTED FLEXIBLE DELINEATOR (ITEM NO. 713-02.14, PER EACH)
- SIGN SUPPORT
- DIRECTION OF TRAFFIC
- WORK ZONE
- BARRIER RAIL DELINEATOR (ITEM NO. 712-04.50, PER EACH)
- ATTENUATOR SEE STD. DWG. S-CC-1 (ITEM NO. 705-20.25, PER EACH)
- RAISED PAVEMENT MARKERS (BI-DIRECTIONAL) (1 COLOR LENS) (ITEM NO. 716-01.11, PER EACH) (SEE QUALIFIED PRODUCT LIST)

FOOTNOTES

- (1) FOR LANE SHIFTS TO THE RIGHT USE W1-4BR FOR 2 LANES, W1-4CR FOR 3 LANES, AND W1-4DR FOR 4 LANES.
- (2) FOR LANE SHIFTS TO THE LEFT USE W1-4BL FOR 2 LANES, W1-4CL FOR 3 LANES, AND W1-4DL FOR 4 LANES.
- (3) 100' MIN REQUIRED AFTER WORK SITE BEFORE TAPER FOR LANE SHIFT.
- (4) REMOVABLE PAVEMENT MARKING (6" LINE) (SOLID) (ITEM NO. 712-09.08)
- (5) RAISED TRANSVERSE RUMBLE STRIP FOR SPEED CONTROL AS NEEDED. SEE STANDARD DRAWING T-WZ-56.

BUFFER SPACE BASED ON PRE-CONSTRUCTION POSTED SPEED	
SPEED	DISTANCE
45	360
50	425
55	495
60	570
65	645
70	730
75	820

COMPUTATION FOR DISTANCE L

$L = W \times S$

L = TAPER LENGTH IN FEET
 W = WIDTH OF OFFSET IN FEET
 S = 10 MPH OVER EXISTING POSTED SPEED LIMIT

GENERAL NOTES

- (A) LANE SHIFT SHOW IS GENERALLY INTENDED FOR HIGH SPEED RURAL SETTINGS, OR URBAN SETTINGS WHERE ALL DESIGN ELEMENTS CAN BE ACHIEVED. WHERE ROADWAY FEATURES (GEOMETRICS, INTERCHANGES, ETC.) DO NOT PERMIT ALL DESIGN FEATURES TO BE ACHIEVED, DETAILED TRAFFIC CONTROL PLANS MAY BE REQUIRED.
- (B) PORTABLE BARRIER RAIL WILL BE REQUIRED WHERE DROP OFFS EXCEED 18 INCHES. PORTABLE BARRIER RAIL MAY BE USED WHERE DROP OFFS EXCEED 6 INCHES. FOR MORE SPECIFIC INFORMATION SEE TDOT DROP-OFF POLICY.
- (C) TAPER LENGTH SHOWN FOR THE PORTABLE BARRIER RAIL IS A MINIMUM. PORTABLE BARRIER RAIL SHOULD BE EXTENDED BEYOND THE CLEAR ZONE OR BE SHIELDED WITH A CRASH CUSHION WHEN IT IS NOT FEASIBLE TO EXTEND THE PORTABLE BARRIER RAIL. SEE STANDARD DRAWING S-CZ-1 FOR CLEAR ZONE DISTANCE.
- (D) BARRIER RAIL DELINEATORS (ITEM NO. 712-04.50) SHOULD BE USED ON PORTABLE BARRIER RAIL. REFER TO THE QUALIFIED PRODUCTS LIST FOR APPROVED BARRIER RAIL DELINEATORS. DIFFERENT TYPES OF BARRIER RAIL DELINEATORS SHOULD NOT BE MIXED IN THE SAME LINE.
- (E) MINIMUM TWO FEET (2') OFFSET BETWEEN TRAVEL LANE AND PORTABLE BARRIER MUST BE OBTAINED. A 2' MINIMUM OFFSET IS REQUIRED BETWEEN THE TRAVELLED LANE AND BRIDGE PARAPET, PORTABLE BARRIER RAIL, CONCRETE MEDIAN BARRIERS, ETC. EVEN THOUGH MUTCD RECOMMENDS THE TWO FOOT OFFSET, TDOT'S POLICY REQUIRES THE OFFSET. 2' MINIMAL OFFSET IS REQUIRED BETWEEN THE WORK ZONE AND PORTABLE BARRIER RAIL IF RAIL IS UNPINNED.
- (F) FLEXIBLE DRUMS, CONCRETE BARRIER RAIL OR GROUND MOUNTED FLEXIBLE DELINEATORS MAY BE USED AS NEEDED. SEE STANDARD DRAWING T-WZ-PBR2 FOR GROUND MOUNTED FLEXIBLE DELINEATORS (ITEM NO. 713-02.14). REFER TO THE QPL FOR APPROVED FLEXIBLE DELINEATORS.
- (G) RAISED PAVEMENT MARKERS SHOULD NOT BE USED ON THE LEFT OR RIGHT EDGE LINE.
- (H) WHILE THE MUTCD USES L/2, TDOT USES L FOR THE SHIFTING LANE LENGTH.
- (I) THE EXISTING SHOULDER MAY BE BUILT UP SO THAT IT MATCHES THE EXISTING ADJACENT LANE CROSS SLOPE. THIS CAN BE ACCOMPLISHED BY USING ASPHALT CONCRETE MIX (BPMB-HM) GRADING D MIX IF THE DROP-OFF DOES NOT EXCEED 3". IF THE DROP OFF EXCEEDS 3" THEN ASPHALT CONCRETE MIX (BPMB-HM) GRADING A MIX MUST BE USED IN CONJUNCTION WITH D MIX. SEE DETAIL A FOR DETAILS.
- (J) THIS DRAWING IS BASED ON THE MUTCD DRAWING FOR LANE SHIFT ON A FREEWAY (TA-36).
- (K) THE SIGNS W1-4CL, 4BL OR 4DL SHALL BE LOCATED WITHIN THE TANGENT SECTION OF THE LANE SHIFT, AT A DISTANCE OF APPROX. 1000 FT. FROM THE END OF THE TANGENT SECTION.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED

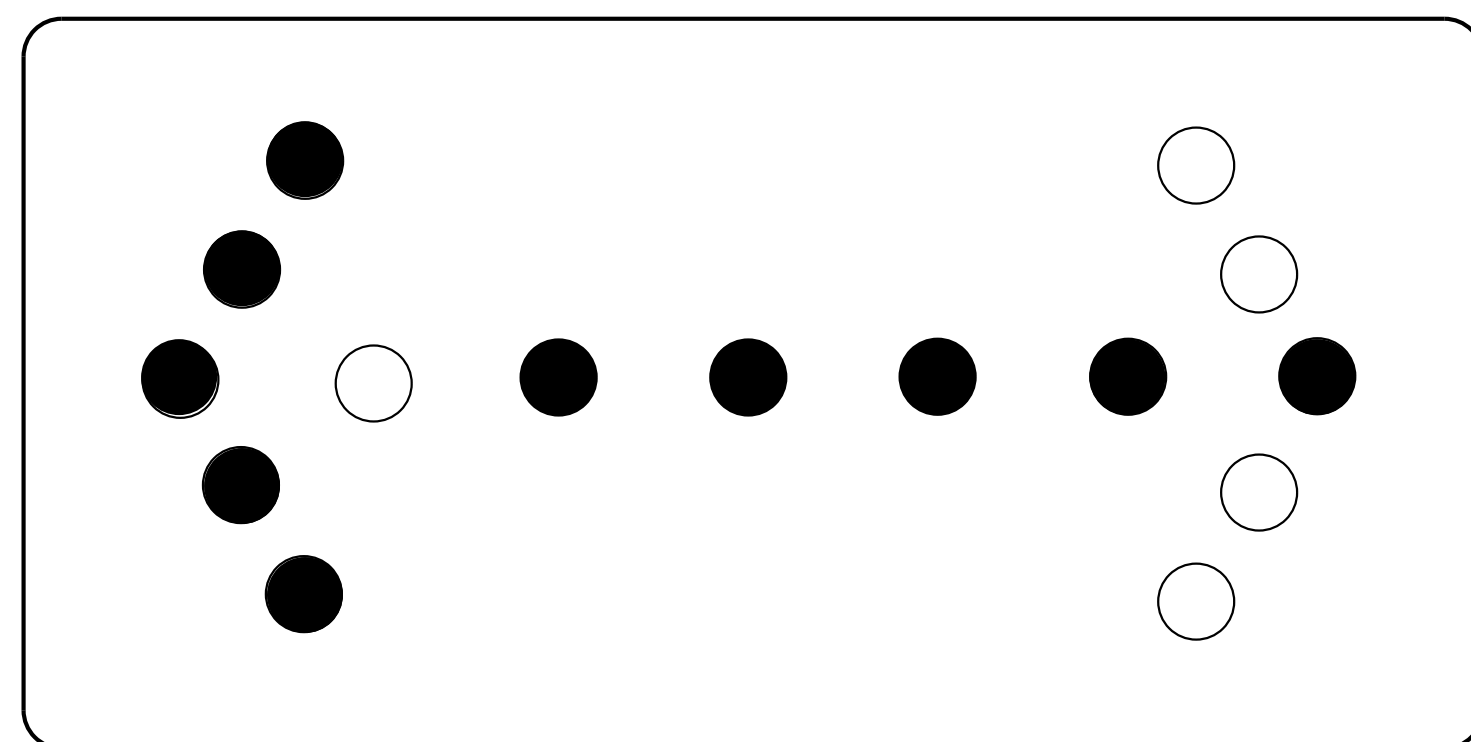
STATE OF TENNESSEE
 STANDARD DRAWING
 DEPARTMENT OF TRANSPORTATION

LANE SHIFT FOR DIVIDED HIGHWAYS AND FREEWAYS

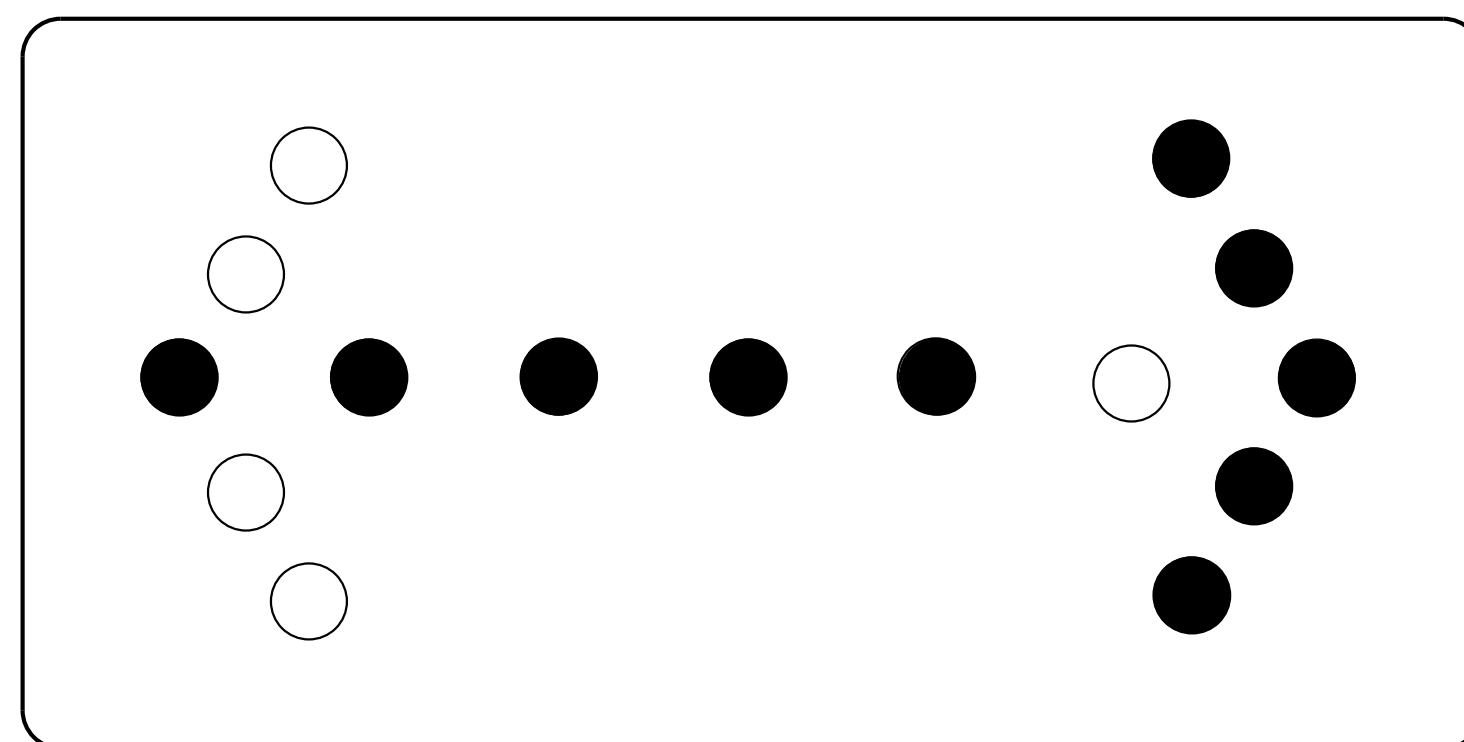
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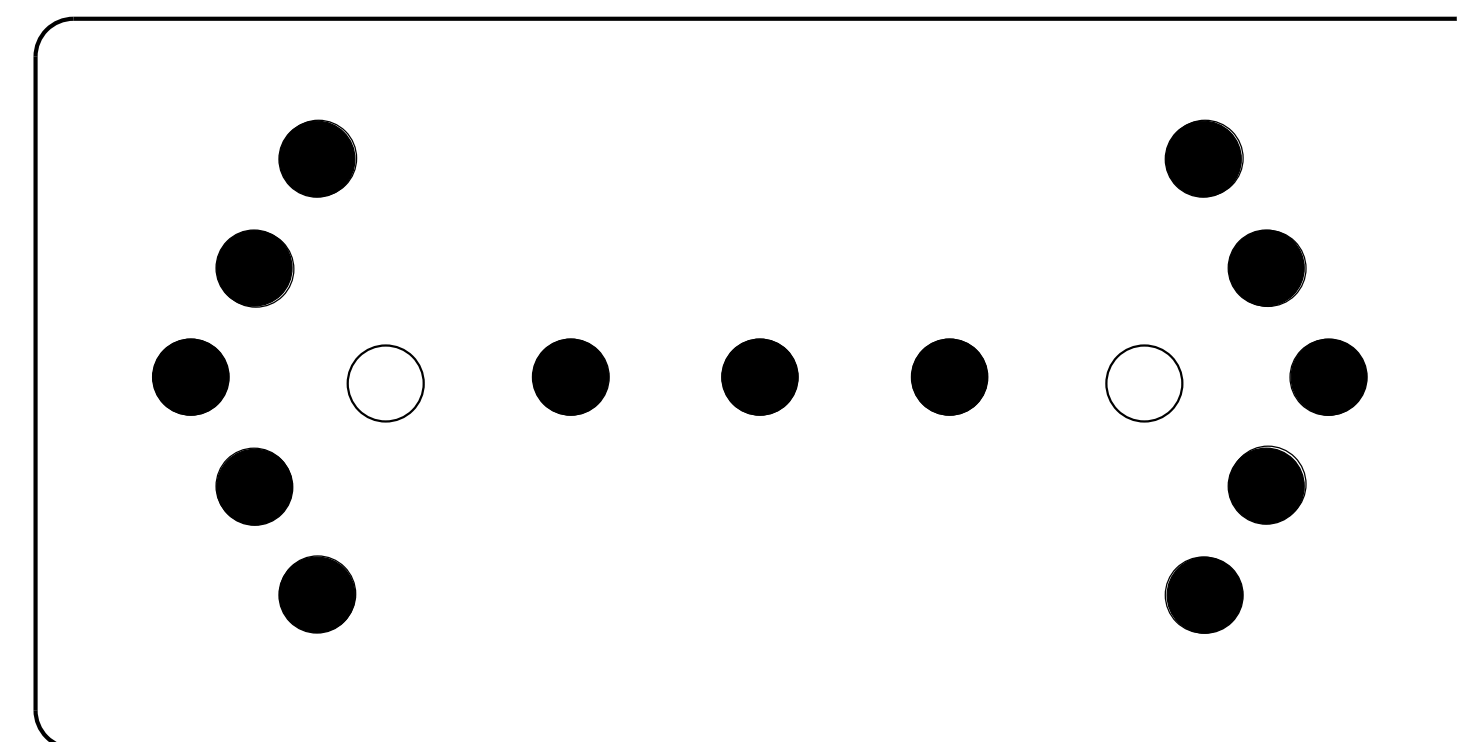
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LEFT ARROW

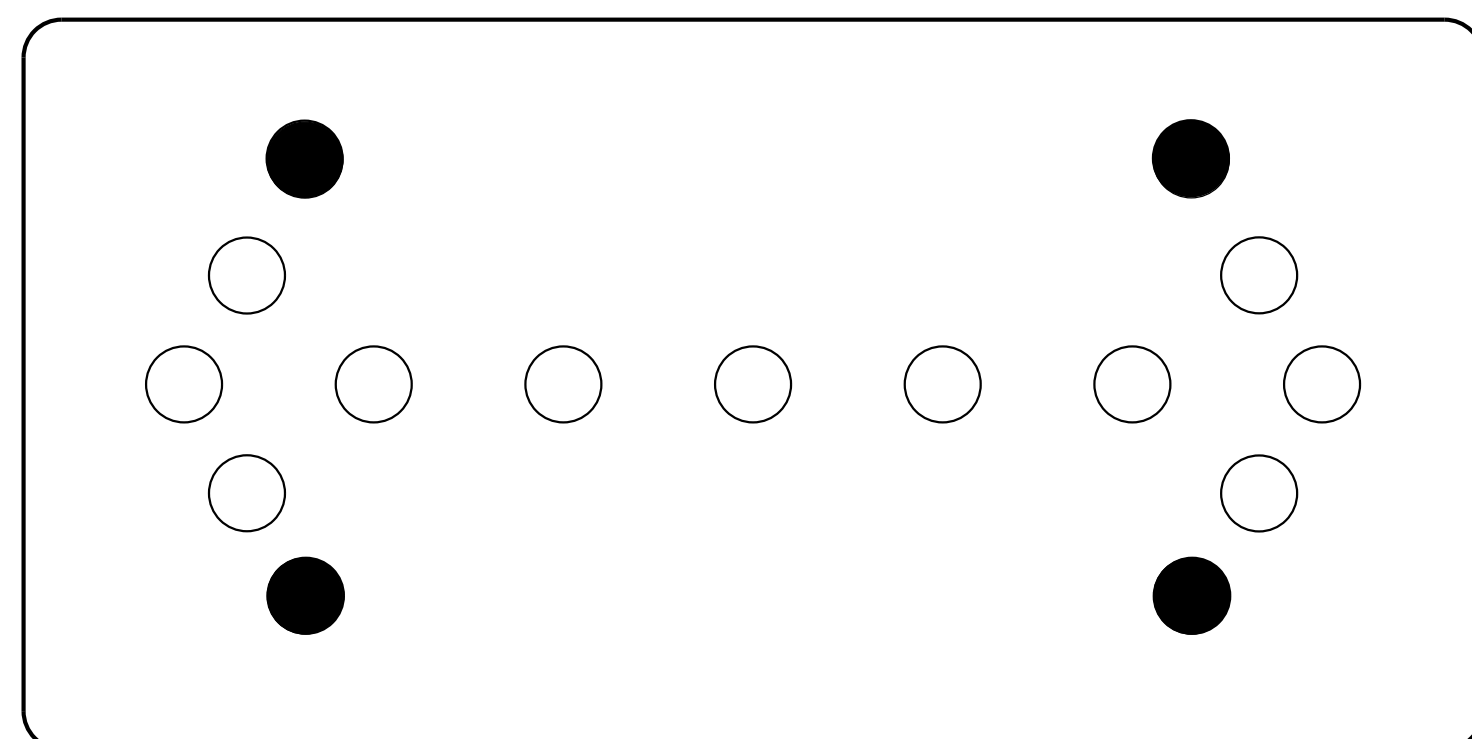


RIGHT ARROW



DOUBLE ARROW

ARROW CONFIGURATIONS



WARNING CONFIGURATION

7'-0" MINIMUM
VERTICAL CLEARANCE
(TYPICAL FOR ALL ARROW BOARDS)

PAVEMENT

DESCRIPTION	
(A)	THE FLASHING YELLOW ARROW BOARD SHALL BE USED TO SIGNAL, CONTROL, AND DIRECT VEHICULAR TRAFFIC BOTH DAY AND NIGHT FOR EXTENDED PERIODS OF TIME.
(B)	THE 48" x 96" SIGN PANEL SHALL CONTAIN 15 HOODED LAMPS. THE SIGN PANEL SHALL BE CAPABLE OF DISPLAYING THE FOLLOWING ACTUATED ARROW CONFIGURATIONS: RIGHT ARROW; 10 LAMPS FLASHING IN UNISON. LEFT ARROW; 10 LAMPS FLASHING IN UNISON. DOUBLE ARROW; 5 LAMPS IN EACH ARROW HEAD AND 3 LAMPS IN A COMMON SHAFT ALL FLASHING IN UNISON. SEQUENTIAL ARROW CONFIGURATIONS AND CHEVRON ARROW CONFIGURATIONS ARE NOT ALLOWABLE DISPLAYS.
(C)	ARROW CONFIGURATIONS ARE USED FOR LANE CLOSURE SITUATIONS ONLY. THE WARNING CONFIGURATION SHALL BE FOUR CORNER LAMPS FLASHING IN UNISON. A HORIZONTAL BAR CONFIGURATION IS NOT AN ALLOWABLE DISPLAY.

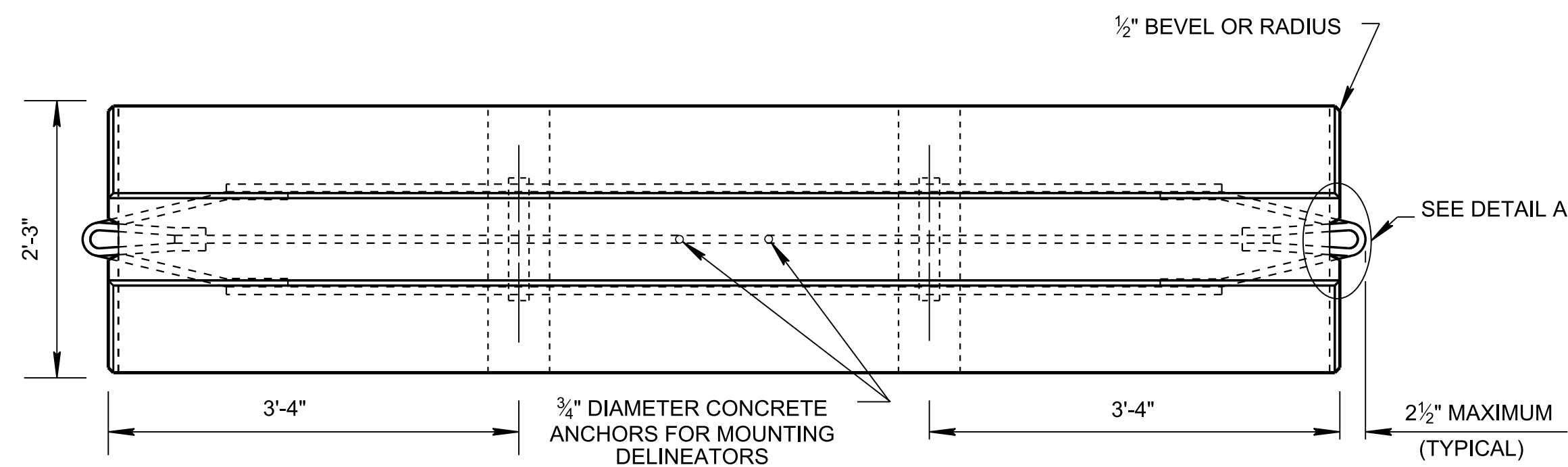
SPECIFICATIONS	
SIGN PANEL	
(1)	THE SIGN PANEL SIZE SHALL BE 48" HIGH x 96" LONG.
(2)	THE YELLOW LAMPS SHALL BE FIVE INCH.
(3)	EACH LAMP SHALL CONTAIN A HOOD.
(4)	THE FINISH SHALL BE NON-REFLECTIVE BLACK.
CONTROL SYSTEM	
(1)	THE CONTROL SYSTEM SHALL CONTAIN THREE FLASHERS, THREE VOLTAGE DROPPING RESISTORS, AND THREE MODE (BRIGHT, DIM & AUTO) SELECTOR SWITCHES. THE PHOTO-CONTROLLED TRANSFER RELAY SHALL AUTOMATICALLY DIM ALL OPERATING LAMPS A MINIMUM OF 50% FROM THEIR RATED LAMP VOLTAGE WHEN AMBIENT LIGHT LEVEL DROPS BELOW 5 FOOT CANDLES AND AUTOMATICALLY INCREASE LAMP AND BRIGHTNESS AGAIN WHEN AMBIENT LIGHT LEVEL INCREASES TO 5 FOOT CANDLES.
(2)	FLASH RATE 25 TO 40 FLASHES PER MINUTE.
(3)	"ON" TIME - 50% OF CYCLE.
POWER SUPPLY	
(1)	THE POWER SUPPLY SHALL BE SUFFICIENT TO ADEQUATELY MEET THE POWER REQUIREMENTS OF THE SYSTEM AT ALL TIMES DURING OPERATION.
(2)	DIESEL/GENERATOR POWERED UNITS SHALL INCLUDE A DRIP PAN OR SIMILAR UTENSIL GASOLINE POWERED UNITS ARE NOT ALLOWED.

(Replaced Std Dwg T-FAB-1)

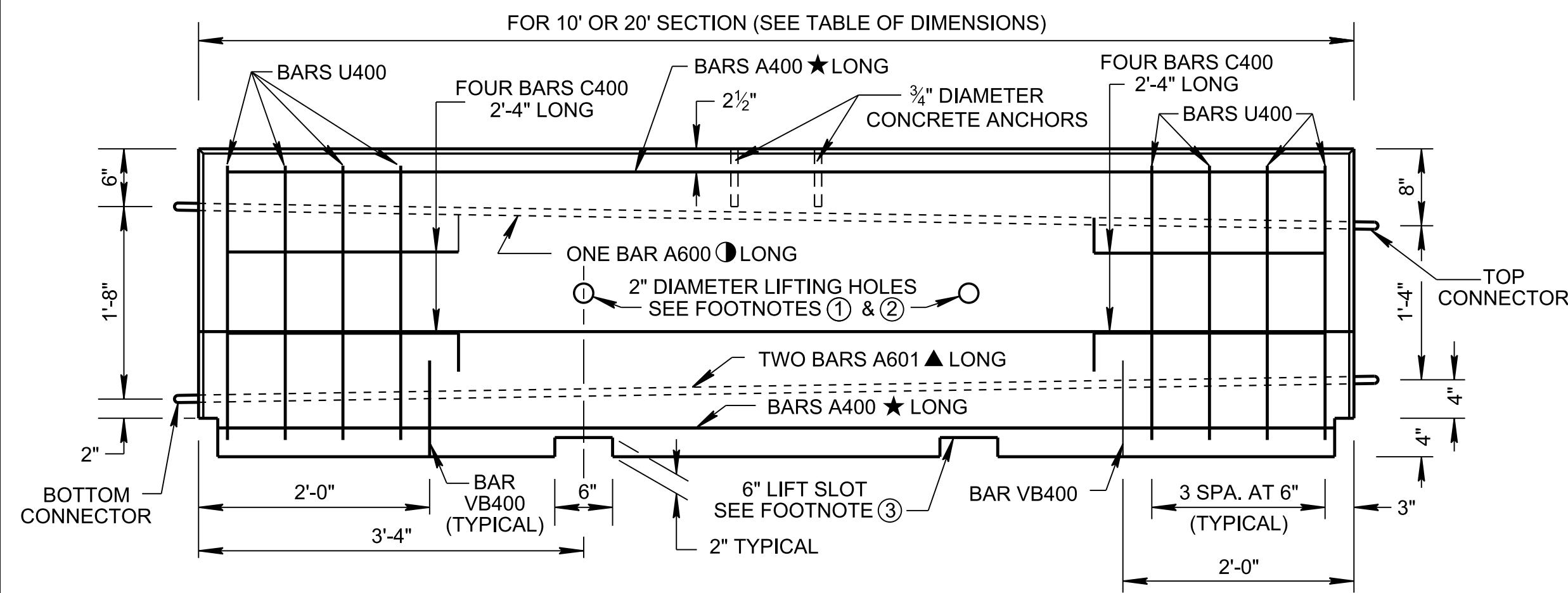
STATE OF TENNESSEE
STANDARD
DRAWING
DEPARTMENT OF TRANSPORTATION

FLASHING
YELLOW
ARROW BOARD

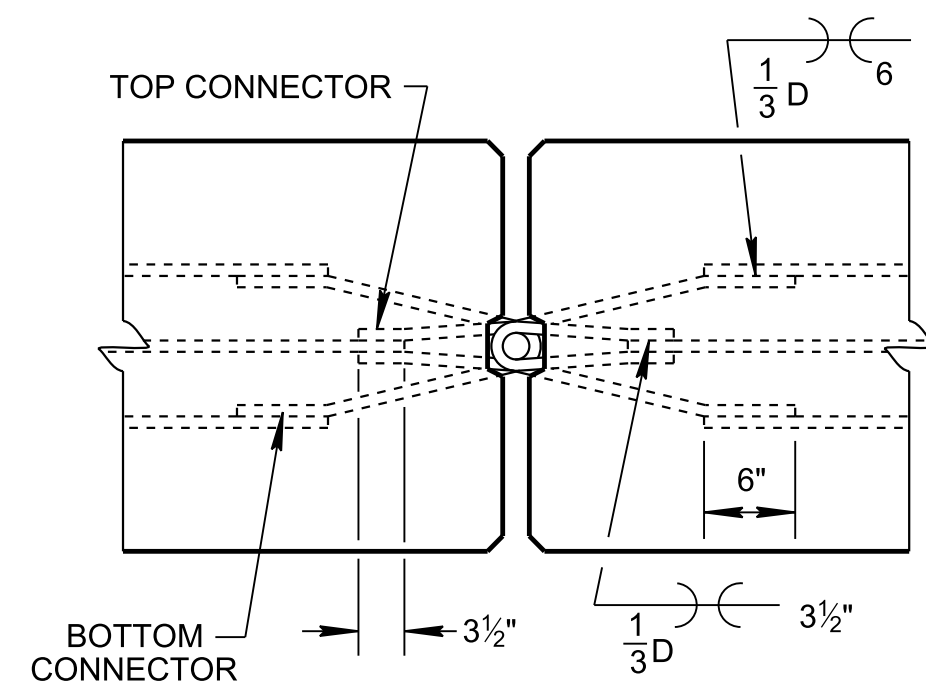
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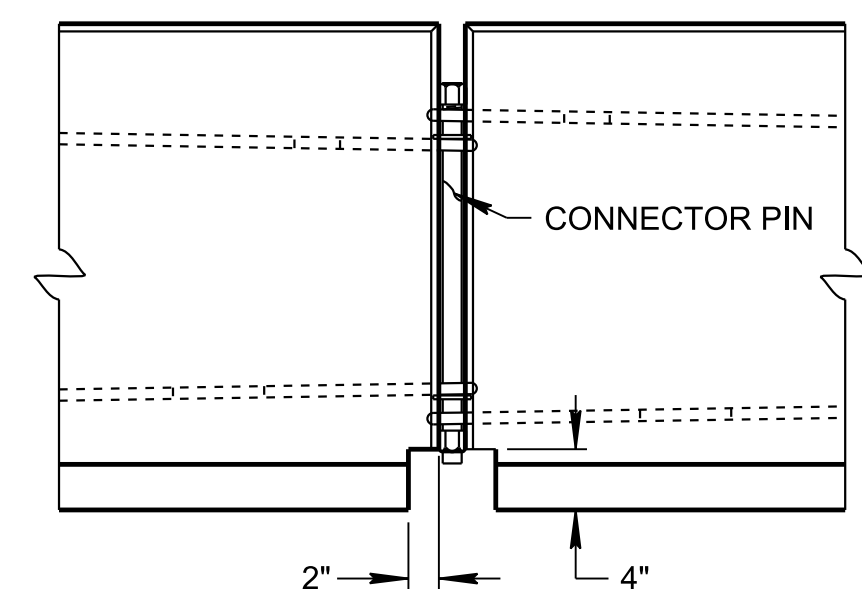
PLAN



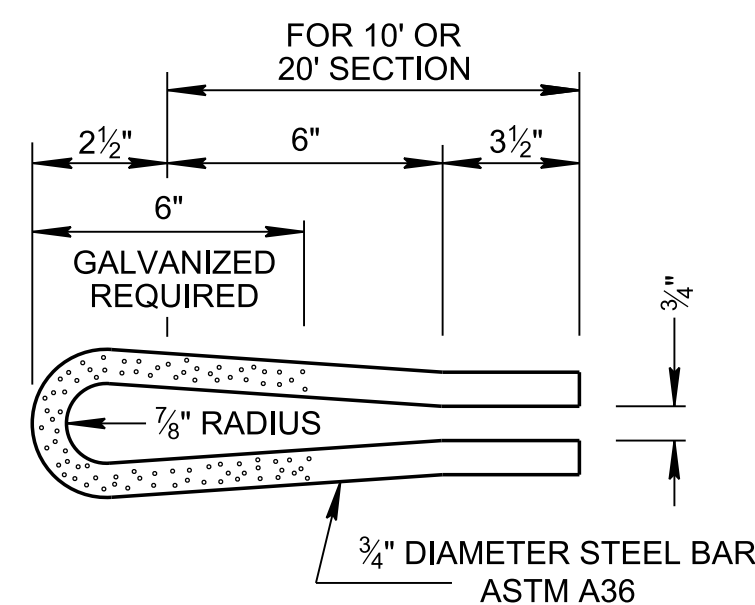
ELEVATION



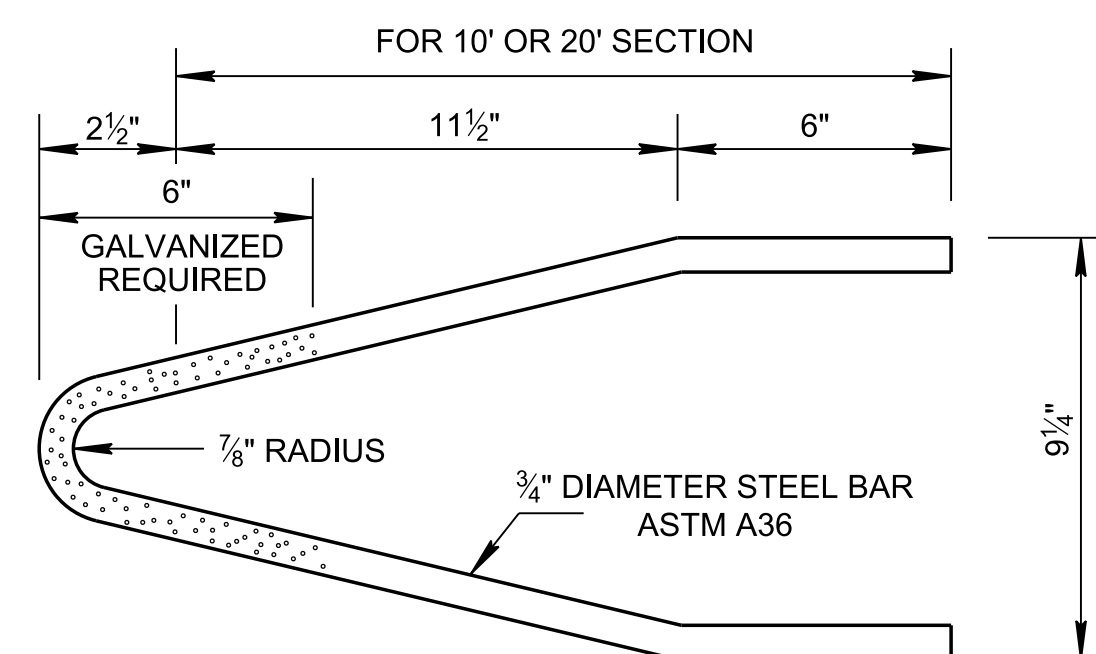
PLAN OF CONNECTION DETAIL



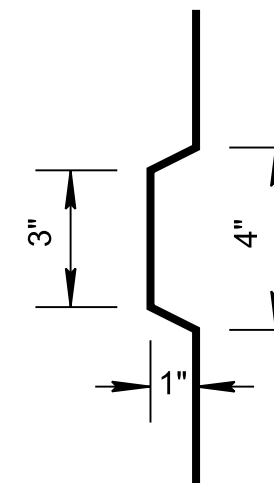
ELEVATION OF CONNECTION DETAIL



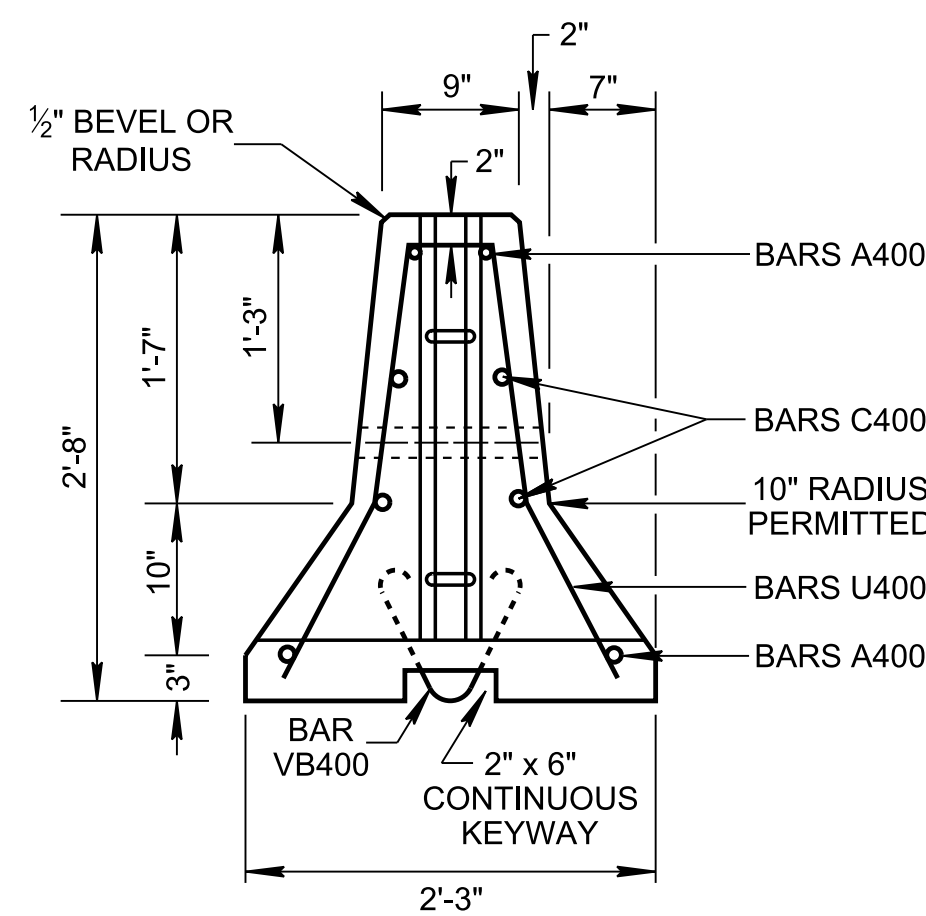
TOP CONNECTOR
(GALVANIZE AFTER FORMING)



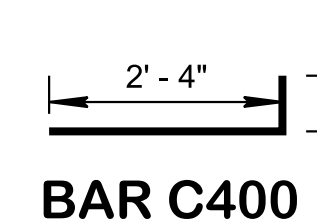
BOTTOM CONNECTOR
(GALVANIZE AFTER FORMING)



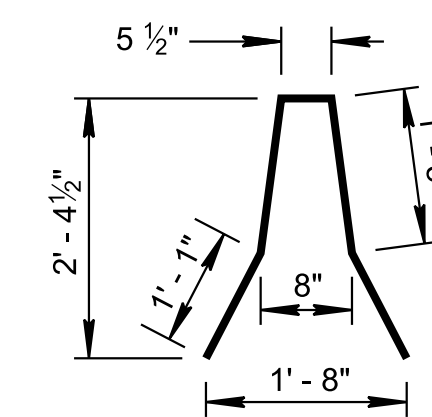
DETAIL 'A'
(TOP & BOTTOM CONNECTOR NOT SHOWN)



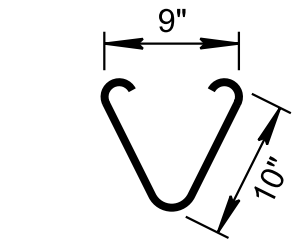
END ELEVATION



BAR C400



BAR U400



BAR VB400

(SEE GENERAL NOTE (C))

APPROXIMATE WEIGHT AND QUANTITIES			
SECTION LENGTH (FT.)	WEIGHT (LB.)	REINFORCING STEEL (LB.)	CONCRETE (C. Y.)
10	4,860	108	1.2
20	9,720	180	2.4

BILL OF STEEL				
BAR	SIZE	NUMBER REQUIRED	LENGTH	
			10'	20'
A400	4	4	9'-6"	19'-6" ★
A600	6	1	9'-0"	19'-0" ○
A601	6	2	8'-1"	18'-1" ▲
C400	4	8	2'-8"	2'-8"
U400	4	8	5'-6"	5'-6"
VB400	4	2	2'-1"	2'-1"

GENERAL NOTES

- (A) PRECAST CONCRETE BARRIER SHALL BE CONSTRUCTED WITH CLASS 'A' CONCRETE MANUFACTURED IN ACCORDANCE WITH SECTION 604 OF THE STANDARD SPECIFICATIONS.
- (B) REINFORCING STEEL: TO BE ASTM A615.
- (C) THE CONNECTOR PIN, 1 1/4" X 25 1/8" THREADED ROD OR 1 1/4" X 25 1/8" BOLT SHALL HAVE A MINIMUM OF 50,000 POUNDS TENSILE STRENGTH. THE HEAVY HEX NUTS AND THE TWO HEAVY FLAT WASHERS SHALL MEET ASTM A-325. THE CONNECTOR PIN, TOP CONNECTOR, BOTTOM CONNECTOR, NUTS AND WASHERS SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M-111.
- (D) PLACE ALL STEEL REINFORCEMENT 2" MINIMUM FROM OUTSIDE FACE OF WALL, EXCEPT AS OTHERWISE SHOWN.
- (E) ANY SALVABLE VALUE OF THE PORTABLE BARRIER RAIL WILL BECOME THE PROPERTY OF THE CONTRACTOR. THE PORTABLE BARRIER RAIL SHALL BE MOVED OFF THE PROJECT.
- (F) WHEN INTERCONNECTED PORTABLE BARRIER RAIL IS CONSTRUCTED IN THE UPRIGHT POSITION AS SHOWN ON THIS DRAWING THE VB400 BAR WILL BECOME OPTIONAL AND MAYBE OMITTED FROM THE INSTALLATION.
- (G) ALTERNATE PRECAST BARRIERS OF THE SAME EXACT CROSS-SECTION HAVING EQUIVALENT REINFORCEMENT, BUT EQUIPPED WITH OTHER FEDERALLY APPROVED, CRASH TESTED INTERCONNECTING HARDWARE MEETING TL-3 EVALUATION CRITERIA SPECIFIED IN NCHRP REPORT 350 MAY BE SUBMITTED TO THE DIVISION OF STRUCTURES FOR AN APPROVAL. IF APPROVED, THE ALTERNATE WILL BE ADDED TO THE TDOT APPROVED QUALIFIED PRODUCT LISTS FOR ACCEPTABLE PRODUCTS.
- (H) THE CONTRACTORS, IF THEY WISH TO USE AN ALTERNATE, SHOULD CONSULT THE TDOT APPROVED QUALIFIED PRODUCT LISTS FOR ALTERNATES TO THE INTERCONNECTED PORTABLE BARRIER RAIL SHOWN ON THIS STANDARD DRAWING. THE DIVISION OF MATERIALS AND TESTS SHOULD BE CONTACTED FOR THIS LIST.
- (I) DIFFERENT SECTION LENGTHS AND DIFFERENT APPROVED CONNECTIONS CAN BE USED ON A SPECIFIC PROJECT (REFER TO GENERAL NOTES H AND I ABOVE), ONLY ONE SECTION LENGTH AND CONNECTION TYPE SHALL BE USED IN A SINGLE RUN OF INTERCONNECTED PORTABLE BARRIER RAIL.
- (J) IT IS IMPORTANT TO PROVIDE MIN. 4' DEFLECTION ZONE BEHIND THE BARRIER RAIL.
- (K) A 3" x 4" DELINEATOR SHALL BE INSTALLED ON EACH BARRIER WALL. SEE STANDARD DRAWING T-WZ-PBR2.
- (L) WHEN A 2' OFFSET BETWEEN THE TRAVELED WAY AND BARRIER IS NOT FEASIBLE, MOUNT A DELINEATOR AS SHOWN ON T-WZ-PBR2 AT EVERY 50'.
- (M) INTERCONNECTED PORTABLE BARRIER RAIL TO BE PAID FOR UNDER ITEM NUMBER: 712-02.02, INTERCONNECTED PORTABLE BARRIER RAIL, PER L.F.
- (N) ONLY PRODUCTS LISTED ON THE DEPARTMENT'S QPL SHALL BE USED.

LIFTING HOLE AND SLOT FOOTNOTES

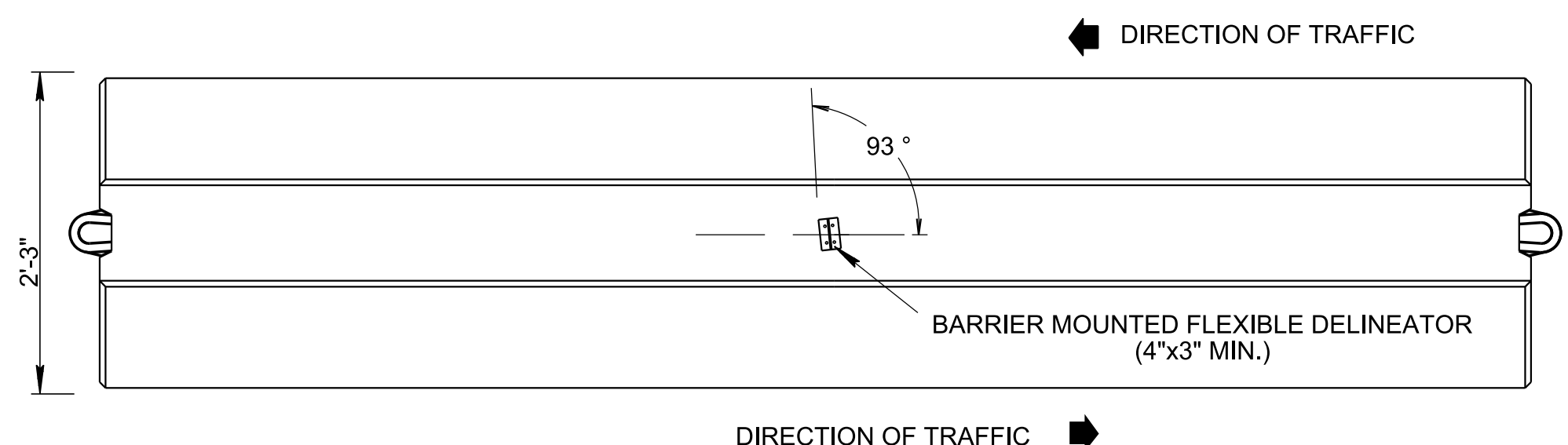
- ① 2" DIAMETER LIFTING HOLE - 2 REQUIRED FOR EACH SECTION TO BE PLACED 3'-4" FROM EITHER END OF THE BARRIER WALL. ADDITIONAL HOLES MAY BE ADDED TO 20 FOOT SECTION LENGTHS, PLACEMENT OF ADDITIONAL HOLES TO BE AT THE DISCRETION OF THE FABRICATOR. FORMED WITH 2" PVC PIPE OR EQUAL.
- ② LIFTING BARS SHALL BE REQUIRED TO PREVENT SPALLING OF CONCRETE AROUND HOLES.
- ③ 6" LIFT SLOTS PROVIDES DRAINAGE FOR PAVEMENT DO NOT BLOCK THE OPENINGS.

(Replaced Std Dwg T-PBR-1)

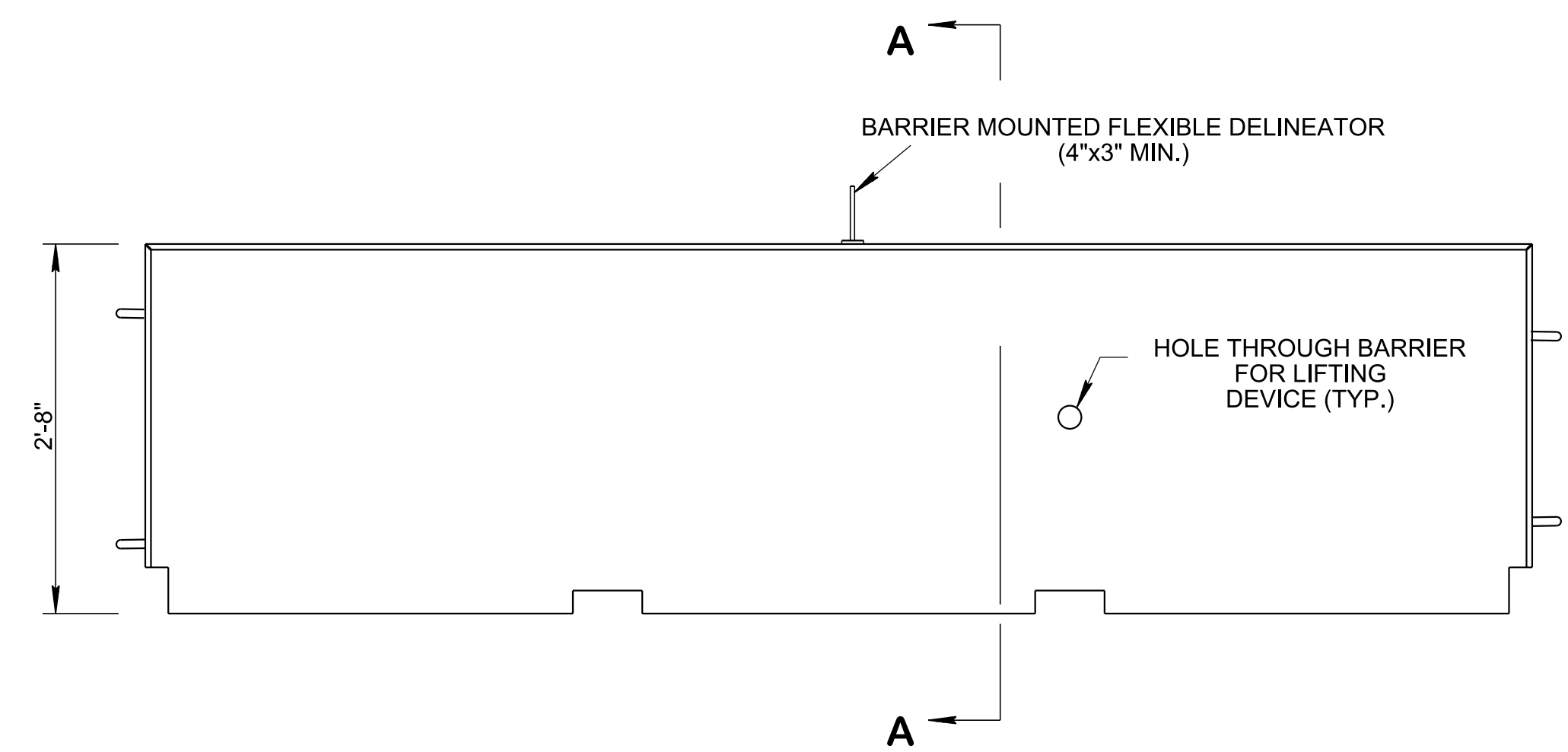
STATE OF TENNESSEE
STANDARD DRAWING
DEPARTMENT OF TRANSPORTATION

INTERCONNECTED PORTABLE BARRIER RAIL

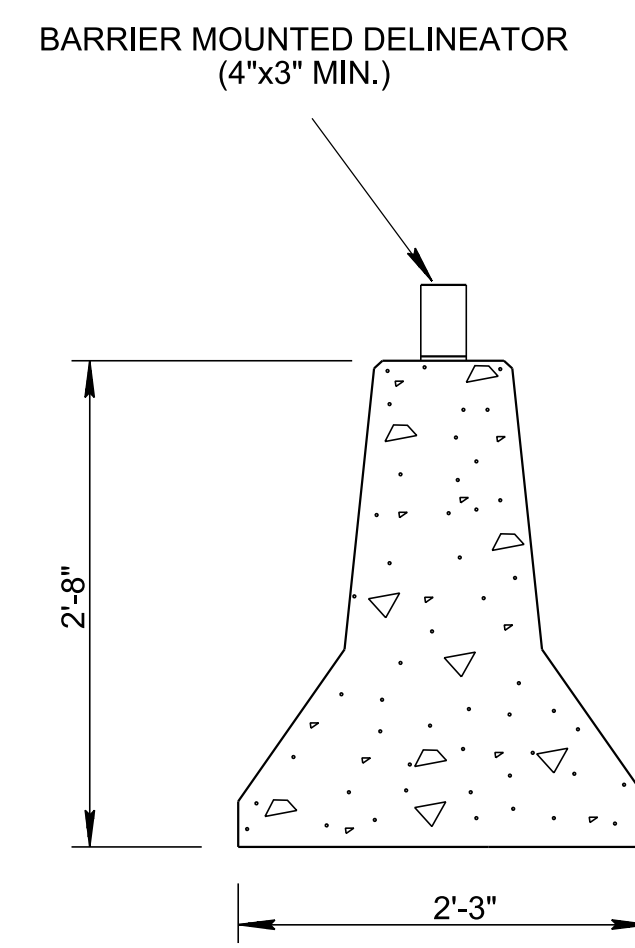
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PLAN VIEW

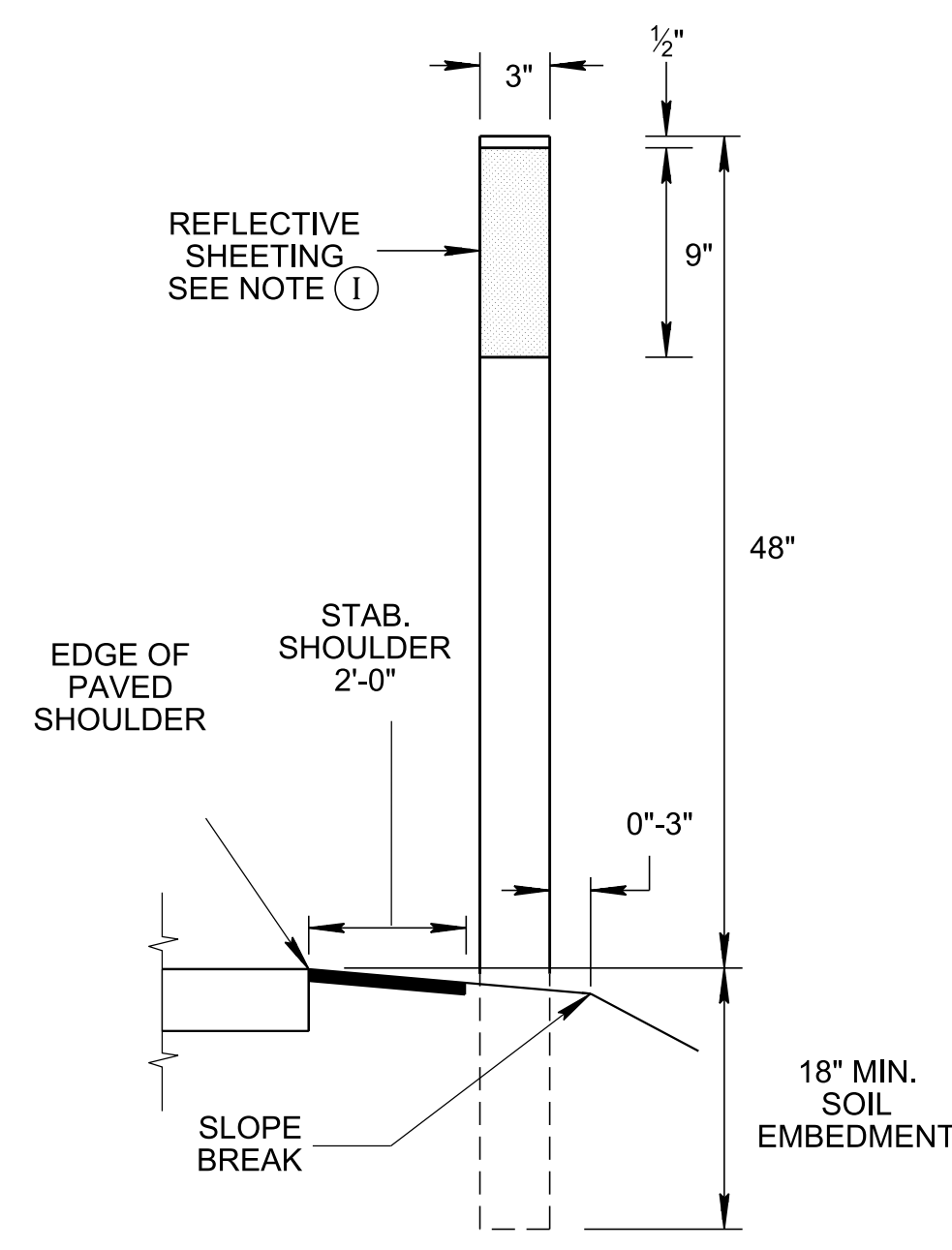


ELEVATION VIEW

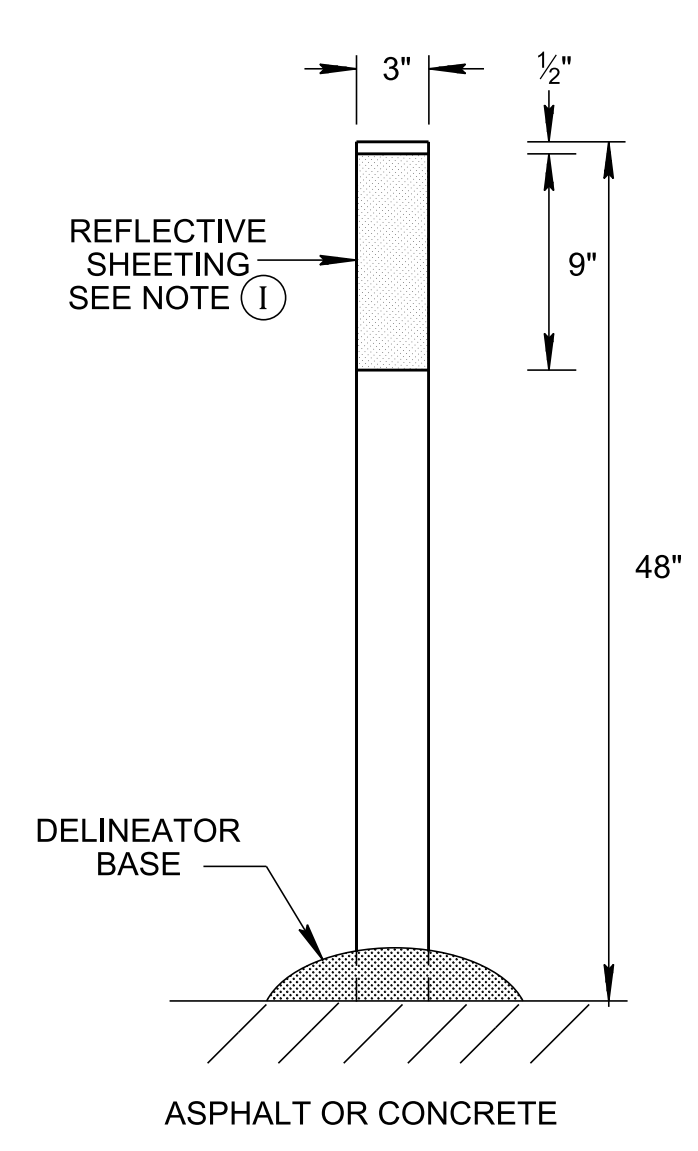


SECTION A-A

DELINEATOR MOUNTED ON INTERCONNECTED TEMPORARY PORTABLE CONCRETE BARRIER RAIL
(SEE T-WZ-PBR1 FOR DETAILS REGARDING INTERCONNECTED PORTABLE BARRIER RAIL)



GROUND MOUNTED FLEXIBLE DELINEATOR



SURFACE MOUNTED FLEXIBLE DELINEATOR

GENERAL NOTES

- BARRIER MOUNTED DELINEATOR**
- (A) SPACING FOR DELINEATORS NOT IN A TAPER SHOULD BE A DISTANCE IN FEET APPROXIMATELY EQUAL TO TWO TIMES THE POSTED SPEED LIMIT IN MILES PER HOUR. THE MAXIMUM SPACING IN FEET BETWEEN DELINEATORS IN A TAPER SHOULD BE APPROXIMATELY EQUAL TO THE POSTED SPEED IN MILES PER HOUR, BUT WILL NOT EXCEED ONE HALF THE SPACING OF THE DELINEATORS NOT IN A TAPER.
 - (B) IF USED FOR TRAFFIC IN TWO DIRECTIONS, TWO SIDED DELINEATORS SHALL BE USED.
 - (C) THE BARRIER MOUNTED FLEXIBLE DELINEATORS FACE, SUPPORT, INSTALLATION AND HARDWARE ARE TO BE PAID FOR UNDER THE PRICE BID FOR ITEM NO.:
712-04.50, BARRIER RAIL DELINEATOR, PER EACH
 - (D) BARRIER MOUNTED FLEXIBLE DELINEATORS SHALL BE 3" WIDTH MINIMUM X 4" HEIGHT MINIMUM.
 - (E) ONLY PRODUCTS LISTED ON THE DEPARTMENT'S QPL SHALL BE USED.
 - (F) BARRIER MOUNTED FLEXIBLE DELINEATORS SHALL BE INSTALLED PER MANUFACTURER'S INSTRUCTIONS.
- GROUND MOUNTED AND SURFACE MOUNTED FLEXIBLE DELINEATOR**
- (G) THE REFLECTIVE SHEETING SHALL MEET THE REQUIREMENTS OF AASHTO M268, TYPE III OR HIGHER RETROREFLECTION PERFORMANCE LEVEL.
 - (H) THE REFLECTIVE SHEETING STRIP ON THE DELINEATORS SHALL BE MIN. 9 INCHES IN LENGTH AND SUFFICIENT WIDTH TO PROVIDE A MIN. 3 INCHES WIDE PROFILE FACING APPROACHING TRAFFIC. THE VARIATIONS IN REFLECTIVE SHEETING DIMENSION SHOULD NOT EXCEED ± 10%.
 - (I) THE CONTRACTOR SHALL SELECT MATERIAL FROM THE DEPARTMENT'S QPL.
 - (J) THE COLOR OF THE DELINEATOR POST SHALL BE WHITE UNLESS OTHERWISE NOTED ON THE PLANS.
 - (K) THE COLOR OF THE REFLECTIVE SHEETING SHALL CONFORM TO THE COLOR OF EDGE LINES STIPULATED IN SUBSECTION 3B-6 (PAGE 3B-8 AND 3B-11) OF THE CURRENT EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
 - (L) PAYMENT FOR GROUND MOUNTED FLEXIBLE DELINEATORS WILL BE MADE AS FOLLOWS ITEM NO'S.:
713-02.14, FLEXIBLE DELINEATOR (WHITE), PER EACH.
713-02.15, FLEXIBLE DELINEATOR (YELLOW), PER EACH.
713-02.16, FLEXIBLE TYPE II, OBJECT MARKER, PER EACH.
713-02.33, FLEXIBLE DELINEATOR (RED), PER EACH.
 - (M) PAYMENT FOR SURFACE MOUNTED FLEXIBLE DELINEATORS WILL BE MADE AS FOLLOWS ITEM NO.:
713-02.30, FLEXIBLE TUBULAR DELINEATOR, PER EACH.
 - (N) SPACING FOR SURFACE MOUNTED FLEXIBLE DELINEATOR POSTS SHALL BE 20' OR LESS.
 - (O) SURFACE MOUNTED FLEXIBLE DELINEATORS SHALL BE INSTALLED PER MANUFACTURER'S INSTRUCTIONS.
 - (P) ONLY PRODUCTS LISTED ON THE DEPARTMENT'S QPL SHALL BE USED.

(Replaced Std Dwg T-PBR-2)

STATE OF TENNESSEE
STANDARD DRAWING
DEPARTMENT OF TRANSPORTATION

DETAILS FOR FLEXIBLE DELINEATORS