



**STATE OF TENNESSEE  
DEPARTMENT OF TRANSPORTATION**

**DESIGN DIVISION**  
SUITE 1200, JAMES K. POLK BUILDING  
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NASHVILLE, TENNESSEE 37243-1402  
(615) 741-0835

**BUTCH ELEY**  
DEPUTY GOVERNOR  
COMMISSIONER OF TRANSPORTATION

**BILL LEE**  
GOVERNOR

**INSTRUCTIONAL BULLETIN NO. 23-04**

**Regarding Various Revised and New Standard Drawings and  
Revised Chapters 5, 7 and 10 of the Design Guidelines**

**Effective October 6, 2023 letting (July 26, 2023 Turn-in)**, the following Standard Drawings have been revised or are new. In addition, Chapters 5 (Right-of-Way), 7 (Item Numbers) and 10 (Index of Standard Drawings) of the Roadway Design Guidelines and the web site have been updated accordingly and are available online.

**Drawings:**

**Chapter 5**

- 5-202.01 Barrier Warrant 1: At Bridges or Culverts  
Standard Drawing S-PL-2 has been removed.
- 5-202.06 Barrier Length of Need  
Standard Drawing S-PL-2 has been removed.
- 5-203.01 Guardrail Special Designs  
Standard Drawing S-PL-2 has been replaced with new standard drawings S-GRS-7 and 7A.
- 5-206.01 Anchorages  
Standard Drawing S-PL-2 has been replaced with new Standard Drawings S-GRS-7 and 7A.

**Chapter 7**

- 7-705.00 Guardrail  
Item Numbers 705-06.01, 705-06.10, 705-06.11, 705-06.20, 705-06.25 and 705-06.30  
Standard Drawing S-PL-2 has been revised to S-PL-2M.  
Item number 705-06.15 has been added for new Standard Drawings S-GRS-7 and 7A.

**New Standard Drawings:**

**10-105.00 ROADWAY, PAVEMENT APPURTENANCES, AND FENCES**

**10-105.02 INTERSECTIONS**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
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RP-DHO-2		MEDIAN OPENING DETAILS FOR RESTRICTED CROSSING & J-TURN INTERSECTIONS
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**10-107.00 SAFETY DESIGN AND GUARDRAILS****10-107.06 GUARDRAIL (SPECIAL CASES)**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
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S-GRS-7		SHORT – RADIUS GUARDRAIL SYSTEM (SRGS)
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S-GRS-7A		SHORT- RADIUS GUARDRAIL SYSTEM (SRGS) DETAILS
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**10-107.09 CONCRETE MEDIAN BARRIERS**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
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S-SSMB-10		SPECIAL DETAIL FOR CONCRETE MEDIAN BARRIER WALL BARRIER WALL TRANSITION FROM 32" TO 51"
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**10-107.10 GUARDRAIL MAINTENANCE**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
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S-PL-2M		SAFETY PLAN AT SIDE ROADS OR PRIVATE DRIVES
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**10-108.00 DESIGN – TRAFFIC CONTROL****10-108.01 PAVEMENT MARKINGS**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
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T-M-19		PAVEMENT MARKING DETAILS FOR RESTRICTED CROSSING & J-TURN INTERSECTIONS
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**10-200.00 SIGNS**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
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T-S-26		SIGNING PLAN FOR RESTRICTED CROSSING & J-TURN INTERSECTIONS
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**Revised Standard Drawings:**

<b>10-100.00</b>		<b>STANDARD ROADWAY TITLE SHEET, ABBREVIATIONS, AND LEGENDS</b>
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<b>10-100.02</b>		<b>STANDARD ABBREVIATIONS AND LEGENDS</b>
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<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
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RD-L-3	03-01-23	STANDARD LEGEND FOR SIGNALIZATION AND LIGHTING
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**10-102.00 PIPE CULVERTS AND ENDWALLS****10-102.01 PIPE CULVERTS AND FLUME**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
D-PB-1	03-01-23	STANDARD DETAILS FOR CONCRETE PIPE INSTALLATION
D-PB-2	03-01-23	STANDARD DETAILS FOR FLEXIBLE PIPE INSTALLATION

**10-105.00 ROADWAY, PAVEMENT APPURTENANCES, AND FENCES****10-105.05 FENCES AND RIGHT-OF-WAY MARKERS**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
S-F-1	03-01-23	HIGH VISIBILITY FENCE

**10-106.00 MULTIMODAL****10-106.04 SIDEWALK**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
MM-SW-1	03-01-23	DETAILS FOR CONCRETE SIDEWALK

**10-107.00 SAFETY DESIGN AND GUARDRAILS****10-107.01 CLEAR ZONE AND SAFETY HAZARDS**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
S-PL-1	03-01-23	SAFETY PLAN FOR BARRIER LENGTH OF NEED
S-PL-1A	03-01-23	SAFETY PLAN FOR BARRIER LENGTH OF NEED (FOR RIGID OBJECTS)
S-PL-1B	03-01-23	SAFETY PLAN FOR BARRIER LENGTH OF NEED ON CURVED ROADWAYS
S-PL-3	03-01-23	SAFETY PLAN MINIMUM INSTALLATION AT BRIDGE ENDS

**10-107.03 CRASH CUSHIONS**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
S-CC-1	03-01-23	CRASH CUSHION

**10-107.04 GUARDRAIL DETAILS**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
S-GR31-1D	03-01-23	GUARDRAIL POST PLACEMENT IN ROCK

**10-107.08 GUARDRAIL ANCHORS**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
S-GRA-4	03-01-23	IN-LINE GUARDRAIL ANCHOR TO PRIVATE DRIVE

**10-108.00 DESIGN – TRAFFIC CONTROL****10-108.01 PAVEMENT MARKINGS**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
T-M-4A	03-01-23	STANDARD UNSIGNALIZED MID-BLOCK CROSSING
T-M-4B	03-01-23	STANDARD SIGNALIZED MID-BLOCK CROSSING
T-M-5	03-01-23	MARKING DETAIL FOR FREEWAYS
T-M-6	03-01-23	MARKING DETAIL FOR EXPRESSWAY AND FREEWAY INTERCHANGES

**10-109.00 EROSION PREVENTION AND SEDIEMENT CONTROL****10-109.02 SLOPE DEVICES**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
EC-STR-3C	03-01-23	SILT FENCE WITH WIRE BACKING
EC-STR-3D	03-01-23	ENHANCED SILT FENCE

The new standard drawings S-GRS-7 and S-GRS-7A, which are MASH TL-3, will replace S-PL-2 which is NCHRP 350 TL-2 standard. Standard drawing S-PL-2 has been renamed to S-PL-2M and has been placed under the Guardrail Maintenance Series.

The new Traffic Operations standard drawing T-S-26 has been developed in conjunction with RP-DHO-2 and T-M-19. Standard drawing T-S-26 has been placed under the Traffic Operations Standards.

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 5 – Right-of-Way is available online at this location:

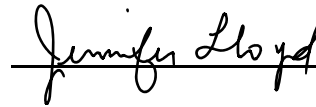
[https://www.tn.gov/content/dam/tn/tdot/roadway-design/documents/design\\_guidelines/DG-C5.pdf](https://www.tn.gov/content/dam/tn/tdot/roadway-design/documents/design_guidelines/DG-C5.pdf)

Chapter 7 – Item Numbers is available online at this location:

[https://www.tn.gov/content/dam/tn/tdot/roadway-design/documents/design\\_guidelines/dg-2023/DG-C7.pdf](https://www.tn.gov/content/dam/tn/tdot/roadway-design/documents/design_guidelines/dg-2023/DG-C7.pdf)

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

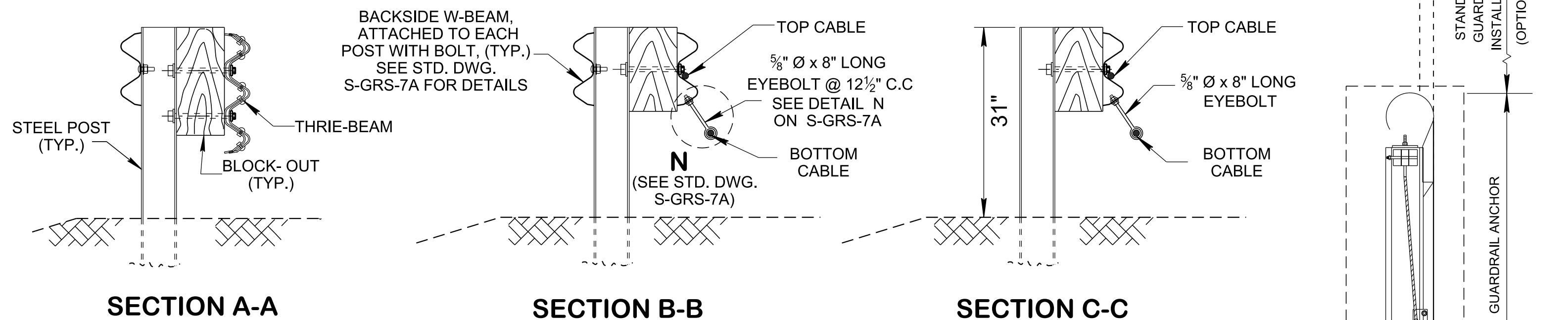


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Jennifer Lloyd, PE  
Civil Engineering Director  
Roadway Design Division

KJL:ARH:RBB  
April 6, 2023

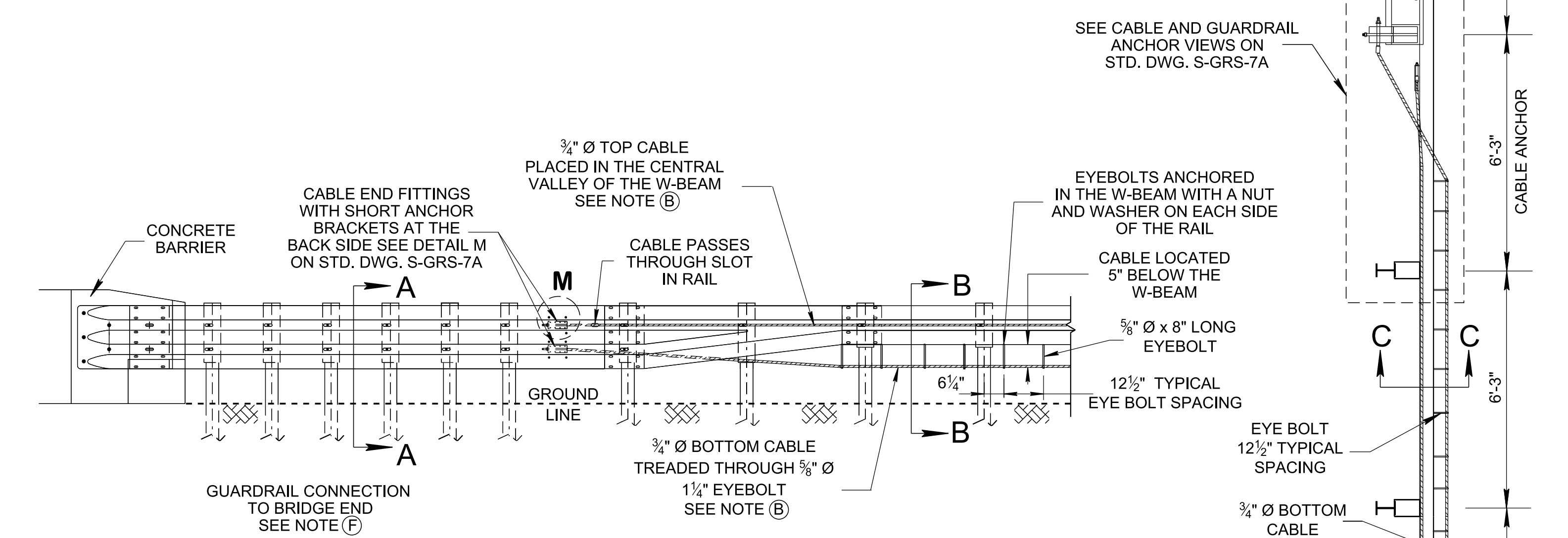
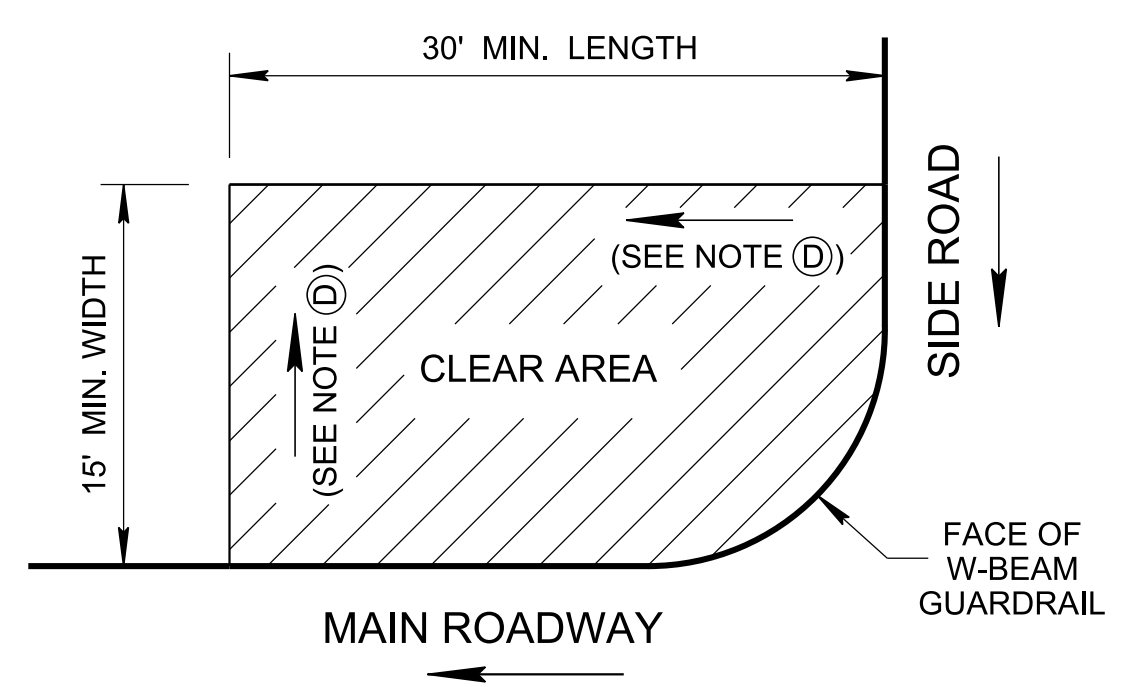
3/16/2023 2:45:06 PM P:\StandDraw\DESIGN STANDARDS\Standards Drawings\Standard Roadway Drawings - CURRENT\In Progress\10-106.00 Safety Design and Guardrails IP\106.06 Guardrail (Special Cases) IP\SGRS7-202



NOTES: THE FIRST, CENTER AND LAST POINTS IN THE RADIUS SECTION WILL NOT BE CONNECTED TO THE RAIL TO CONTROL DEFORMATION OF THE BARRIER UNDER IMPACT.  
ON CURVED SECTION, THE RADIUS AND POST SPACING ARE MEASURED FROM INSIDE OF RAIL, AND THE INSTALLATION LENGTHS OF GUARDRAIL AND CABLES ARE MEASURED ALONG TRAFFIC SIDE.

**TABLE A**

NUMBER OF POST REQUIREMENTS	
GUARDRAIL RADIUS	NUMBER OF POSTS
8'	5
16'	9
24'	13
32'	17
40'	21
48'	25



**NOTE TO DESIGNER**

THIS STANDARD TO BE USED ON ROADWAYS ON THE NATIONAL HIGHWAY SYSTEM. FOR NON NATIONAL HIGHWAY SYSTEM FACILITIES, USE S-GRA-4.

**GENERAL NOTES**

(A) THE INTENT OF THIS STANDARD DRAWING IS TO OFFER A MASH TL-3 CRASHWORTHY CURVED GUARDRAIL SYSTEM INSTALLATION AT SIDE ROAD INTERSECTIONS AND DRIVEWAY ENTRANCES. THE DESIGNER IS TO VERIFY THAT THE ENTIRE GUARDRAIL LENGTH CAN BE CONSTRUCTED WITHIN THE PROPOSED RIGHT-OF-WAY. FOR INSTALLATIONS WHERE THE GUARDRAIL RADIUS IS NOT INCLUDED IN TABLE A, THE DESIGNER IS TO ROUND UP.

(B) THE TOP AND BOTTOM CABLES SHALL BE 3/4" DIAMETER CLASS A GALVANIZED 3x7 CABLES WITH A MINIMUM BREAKING STRENGTH OF 39 KIPS. THE FINISHED CABLE ASSEMBLY WILL BE INSTALLED SO THAT THE CABLE ASSEMBLY IS PUT IN TENSION UNTIL ALL SLACK IS REMOVED. FURNISHING AND INSTALLING CABLES, CABLE ANCHORS, ANCHOR PLATE ASSEMBLIES, HARDWARE INCLUDING THREADED RODS, BOLTS, NUTS WASHERS AND ALL PLATES SHALL BE INCLUDED TO THE SRGS ITEM.

(C) AN ADDITIONAL 18'-9" W BEAM IS ATTACHED TO THE BACK OF THE THRIE-BEAM. THIS W BEAM BACKRAIL IS DIRECTLY CONNECTED TO THE POSTS WITHOUT BLOCKOUTS. FURNISHING AND INSTALLING W BEAM BACKRAIL, ROUNDED END SECTION, HARDWARE INCLUDING BOLTS, NUTS AND WASHERS SHALL BE INCLUDED TO THE SRGS ITEM.

(D) THIS SYSTEM WILL OFFER THE BEST ENGINEERING PRACTICE AT LOCATIONS WHERE 1:10 OR MORE SLOPE GRADED. CLEAR ZONE MAY NOT BE ACHIEVABLE DUE TO THE EXTREME SITE CONDITIONS. SEE STANDARD DRAWING S-PL-6 FOR SAFETY PLAN SAFETY HARDWARE PLACEMENT ON OUTSIDE EDGE DETAILS.

(E) SEE STANDARD DRAWING S-GR31 SERIES FOR POSTS, RAIL, AND HARDWARE STANDARDS FOR CONSTRUCTION.

(F) SEE STANDARD DRAWING S-GRC SERIES FOR CONNECTING TO BRIDGE RAIL OR OTHER CONCRETE BARRIER FOR DETAILS.

(G) SEE STANDARD DRAWING S-GRS-7A FOR THE DETAILS DESIGNATED ON THIS SHEET.

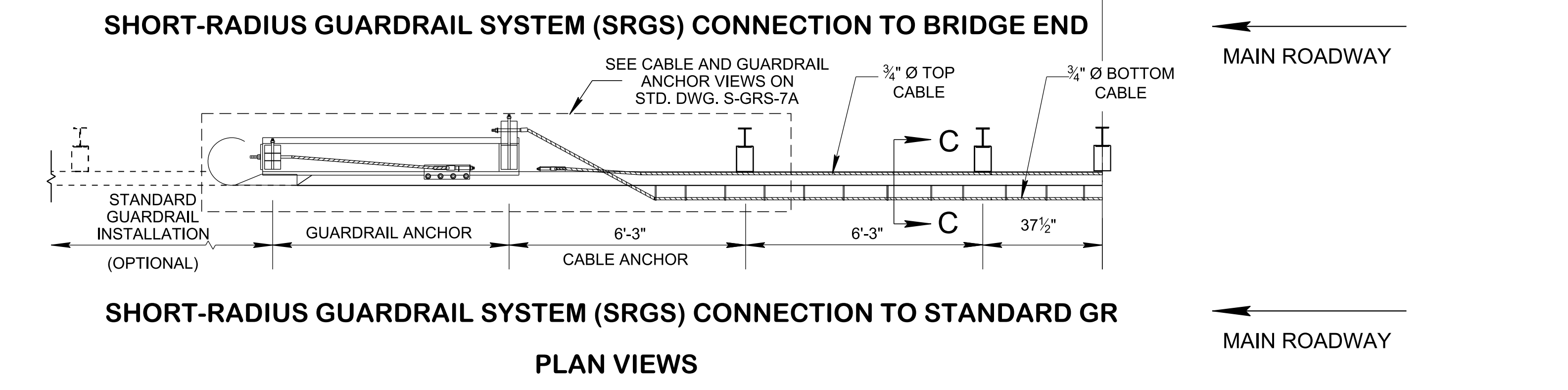
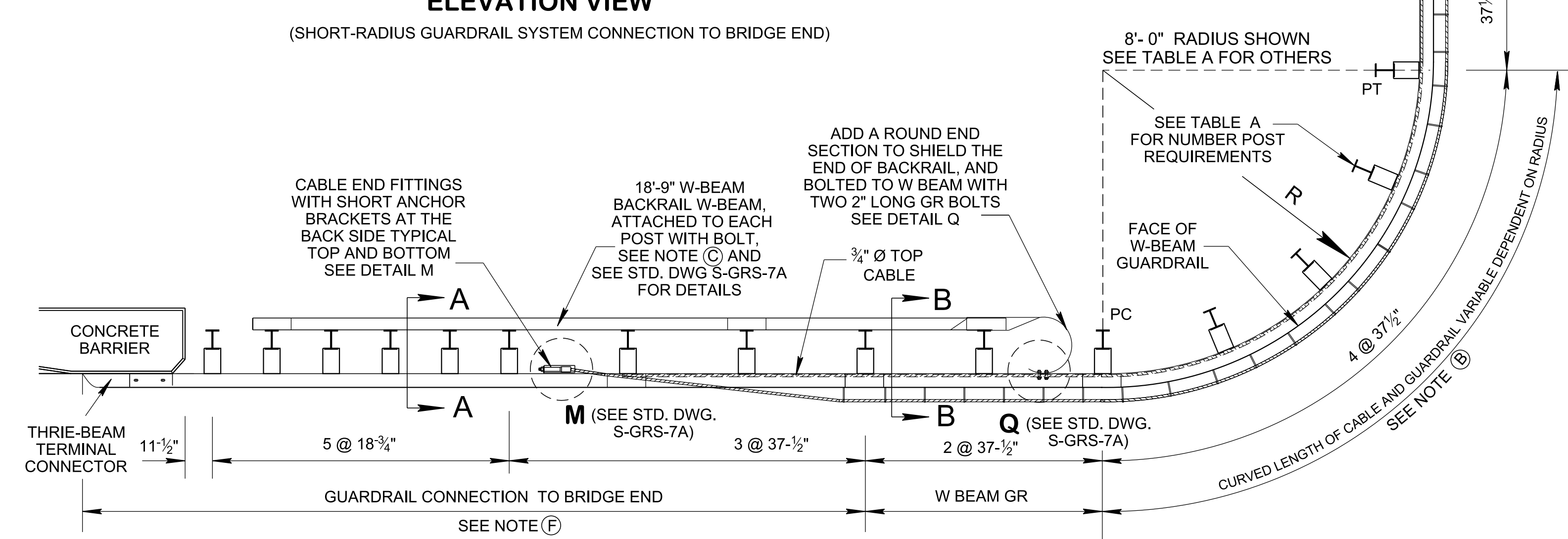
(H) THE CLEAR AREA BEHIND THE GUARDRAIL SHALL REMAIN UNOBSTRUCTED AND UNENCUMBERED TO ALLOW THE GUARDRAIL TO FUNCTION PROPERLY. OBSTACLES (I.E., ENDWALLS, SIGNS, DITCHES, ETC.) WITHIN THIS AREA MUST BE REMOVED, RELOCATED, OR REDESIGNED.

(I) W-BEAMS SHALL BE SHOP BENT AS REQUIRED.

(J) TO DETERMINE IF A ROAD IS ON THE NATIONAL HIGHWAY SYSTEM, CONSULT THE FUNCTIONAL CLASSIFICATION MAPS MAINTAINED BY THE TDOT LONG RANGE PLANNING DIVISION. SEE TDOT LONG RANGE PLANNING WEBSITE.

(K) THE SHORT- RADIUS GUARDRAIL SYSTEM (SRGS) WAS DEVELOPED AND COMPLETED UNDER NCHRP PROJECT 15-53: ROADSIDE BARRIER DESIGN NEAR BRIDGE ENDS WITH RESTRICTED RIGHTS-OF-WAY.

(L) PAYMENT FOR SHORT- RADIUS GUARDRAIL SYSTEM (SRGS) SHALL INCLUDE ALL MATERIALS, EQUIPMENT, AND LABOR NECESSARY FOR CONSTRUCTION, AND SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBERS:  
705-06.15 SHORT- RADIUS GUARDRAIL SYSTEM MASH TL-3 (DESCRIPTION) PER EACH  
DESIGNER SHALL ENTER 8 FT, 16 FT, 24 FT, 32 FT, 40 FT OR 48 FT RADIUS UNDER ITEM DESCRIPTION. DO NOT USE OTHER RADII.



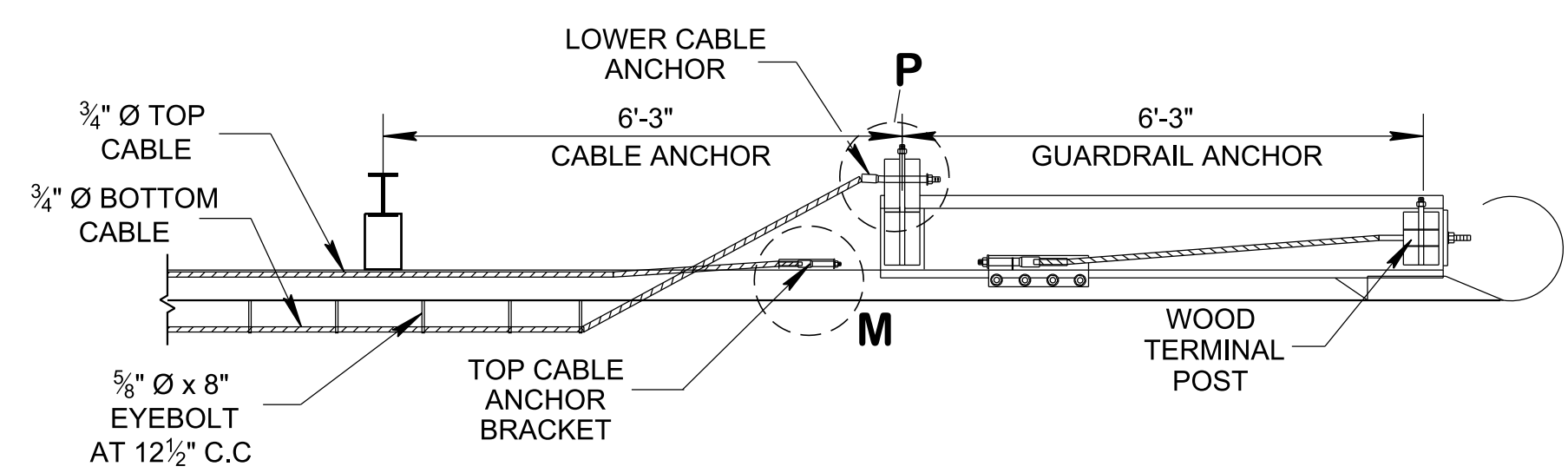
(Replaced Std Dwg S-PL-2)

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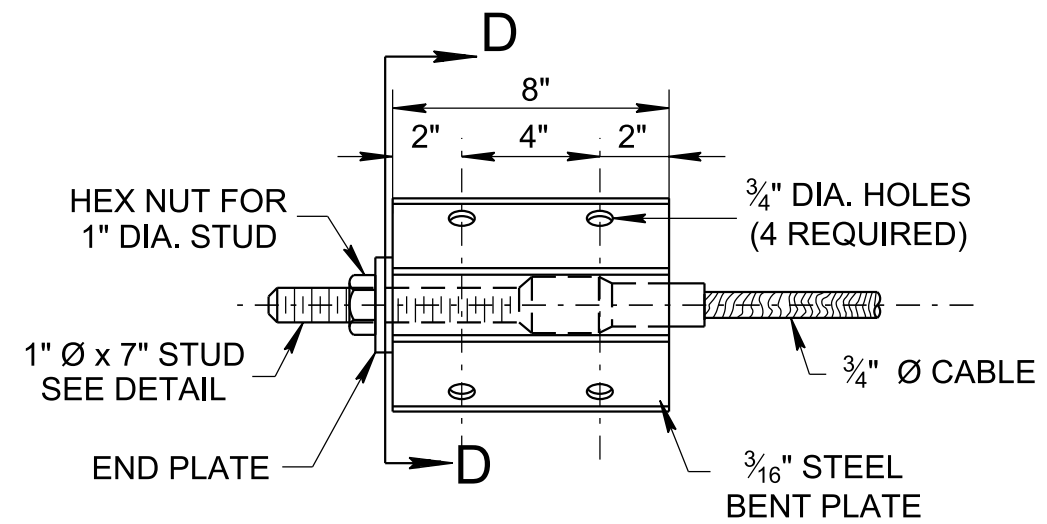
SHORT- RADIUS GUARDRAIL SYSTEM (SRGS)

09-04-2022 S-GRS-7

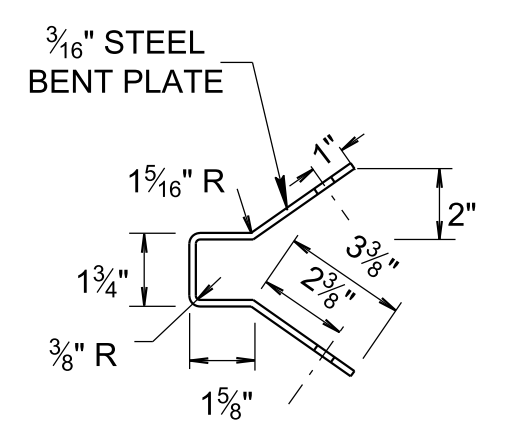
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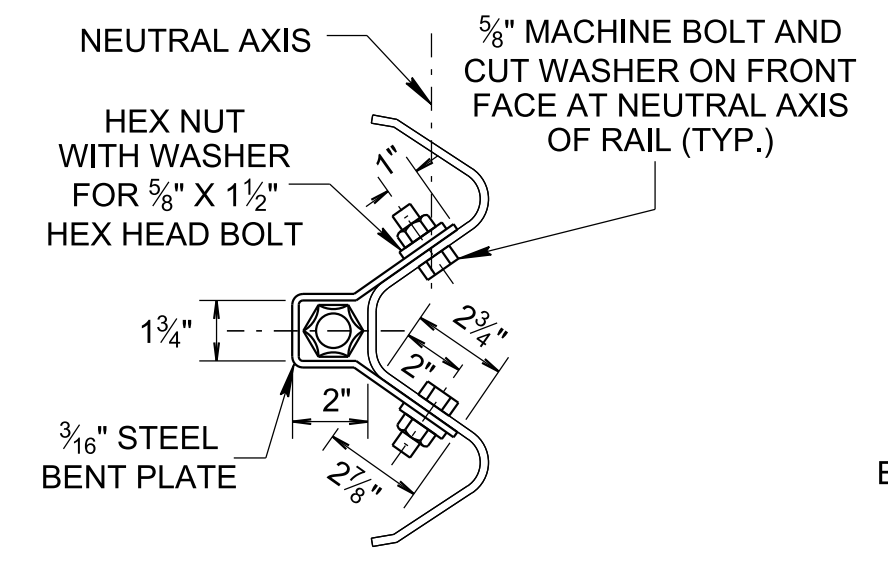
**PLAN VIEW  
FOR CABLE AND GUARDRAIL ANCHORS DETAIL**



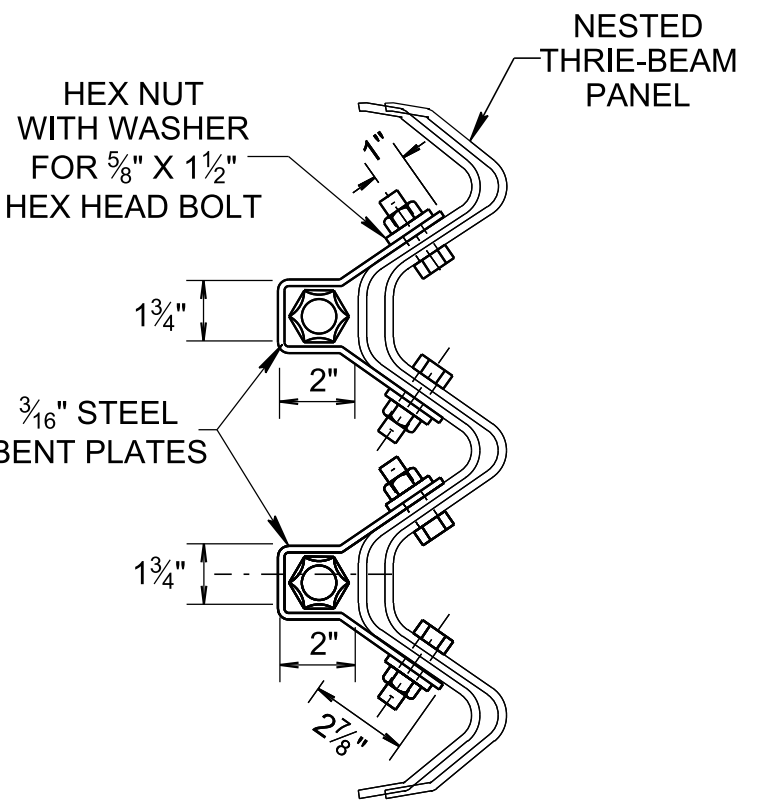
**DETAIL M  
FRONT VIEW**



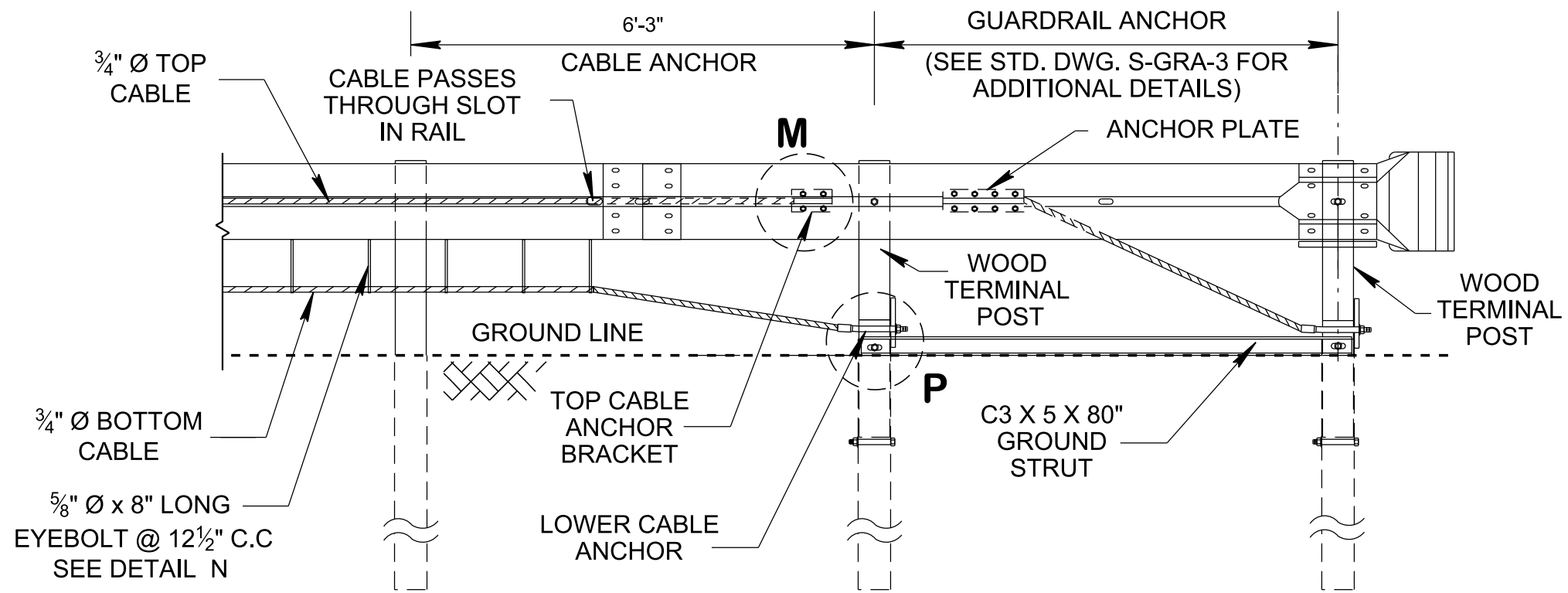
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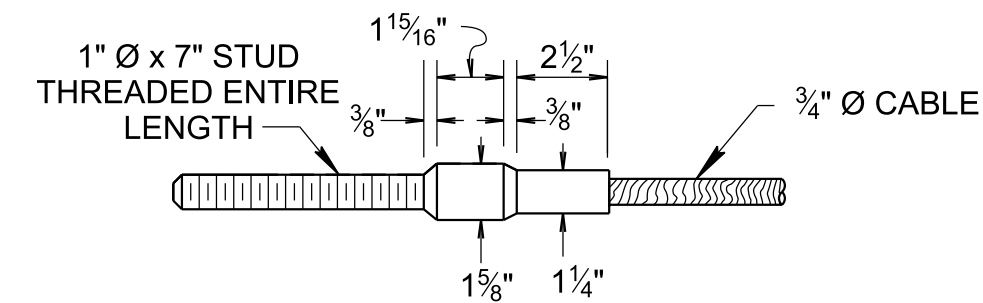
**SECTION D-D**



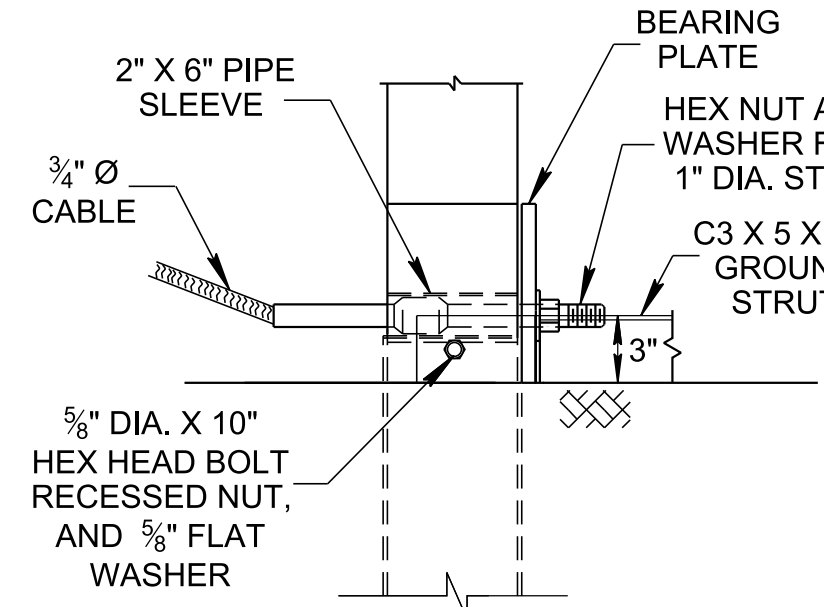
**2 - 3/16\"/>**



**ELEVATION VIEW  
FOR CABLE AND GUARDRAIL ANCHORS DETAIL**

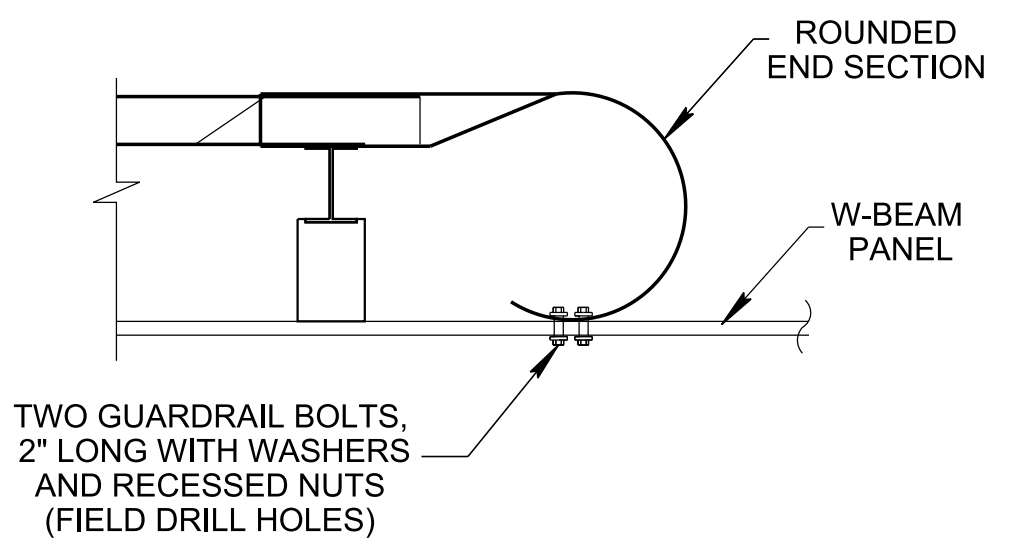


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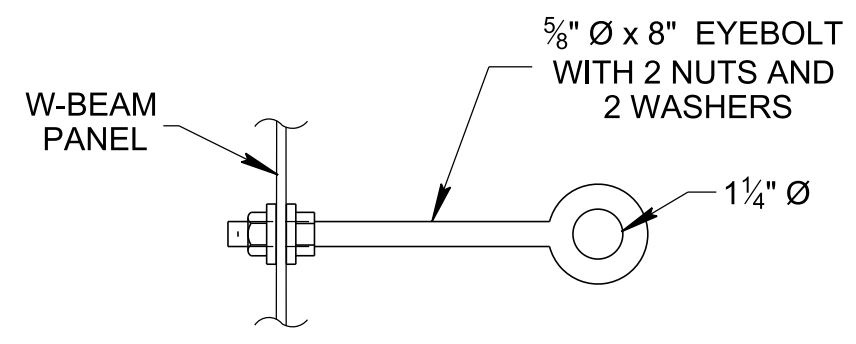


**DETAIL P  
BEARING PLATE ASSEMBLY  
(SEE STD. DWG. S-GRA-3 FOR  
ADDITIONAL DETAILS)**

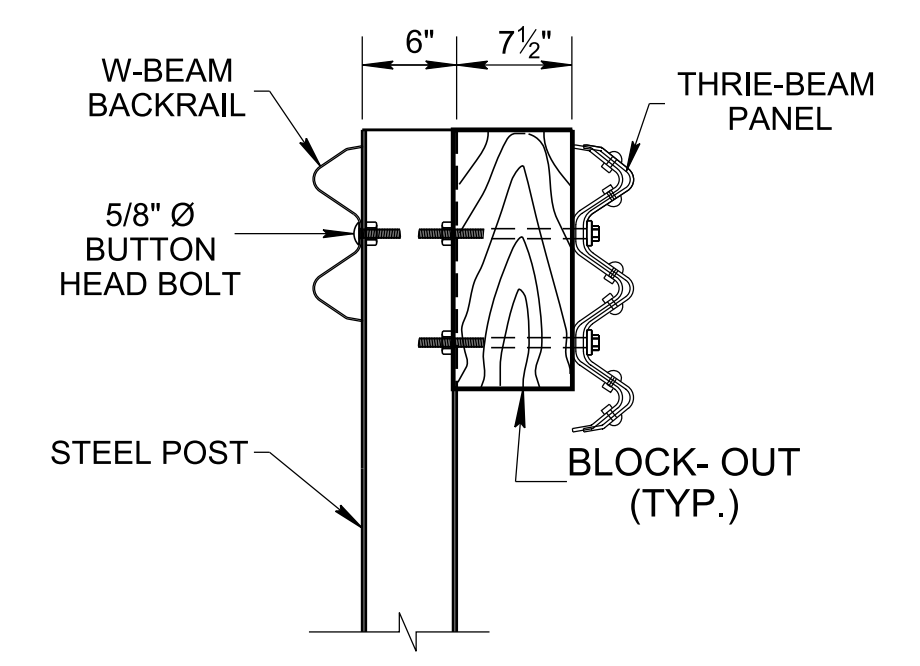
**ANCHOR PLATE ASSEMBLY DETAILS  
(SEE STD. DWG. S-GRA-3 FOR  
ADDITIONAL DETAILS)**



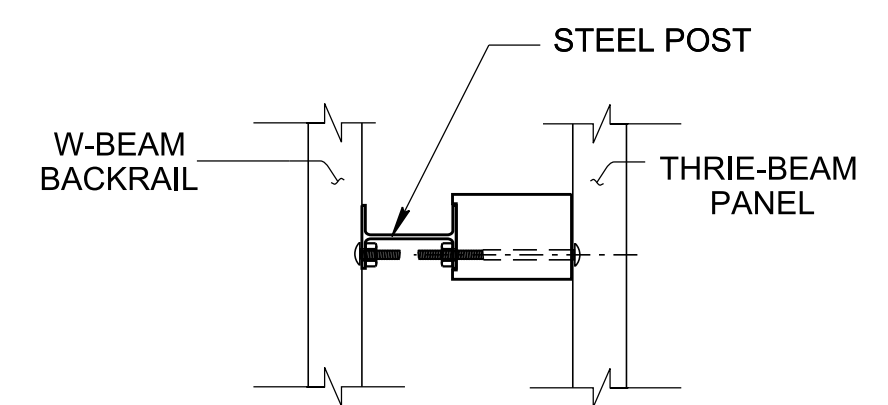
**DETAIL Q  
ROUNDED END SECTION**



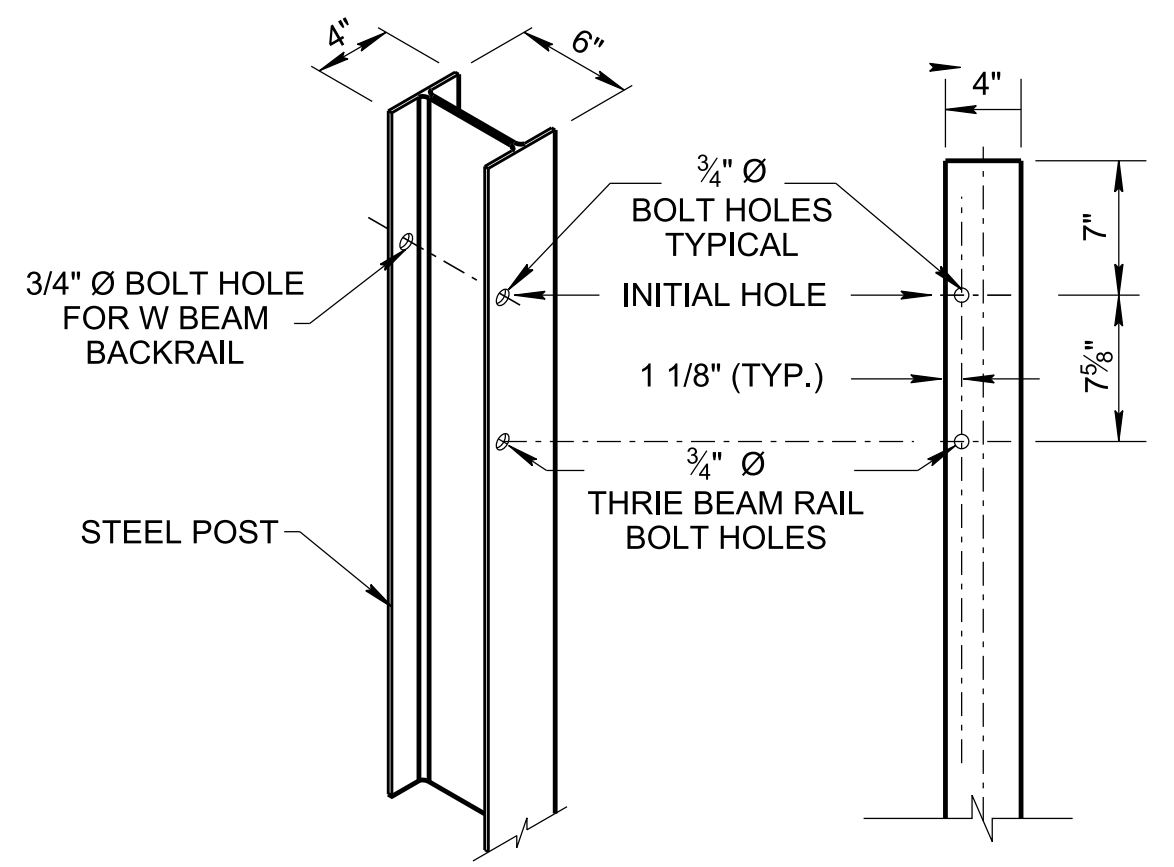
**DETAIL N  
5/8\"/>**



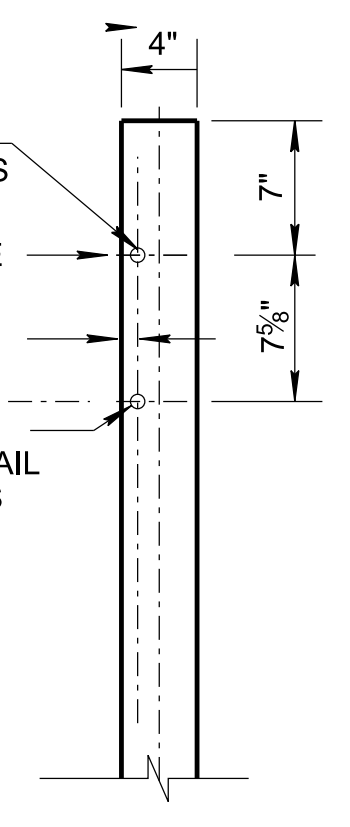
**SIDE VIEW**



**PLAN VIEW**



**ISOMETRIC**



**FRONT VIEW**

**DETAILS FOR THRIE-BEAM WITH W-BEAM BACKRAIL GUARDRAIL  
(SEE STD. DWG. S-GR31 SERIES FOR ADDITIONAL DETAILS)**

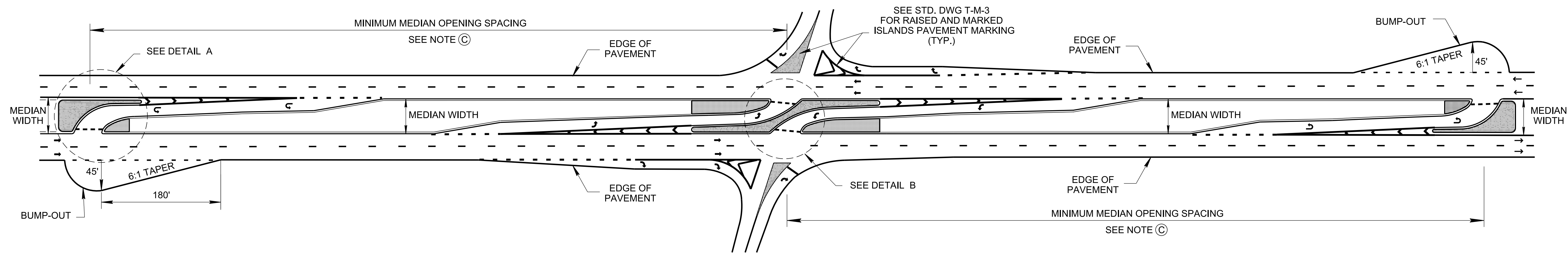
- GENERAL NOTES**
- (A) SEE STANDARD DRAWING S-GRS-7 FOR THE DETAILS SHOWN ON THIS SHEET.
  - (B) SEE STANDARD DRAWINGS S-GR31 SERIES FOR POSTS, RAIL, AND HARDWARE STANDARDS FOR CONSTRUCTION.
  - (C) SEE STANDARD DRAWING S-GRA-3 FOR ADDITIONAL BEARING AND ANCHOR PLATES ASSEMBLY DETAILS.
  - (D) PAYMENT FOR FURNISHING AND INSTALLING CABLE AND GUARDRAIL ANCHORS, ANCHOR PLATE ASSEMBLIES, HARDWARE INCLUDING THREADED RODS, BOLTS, NUTS WASHERS AND ALL PLATES SHALL BE PAID UNDER SHORT-RADIUS GUARDRAIL SYSTEM ITEM NUMBER.

(Replaced Std Dwg S-PL-2)

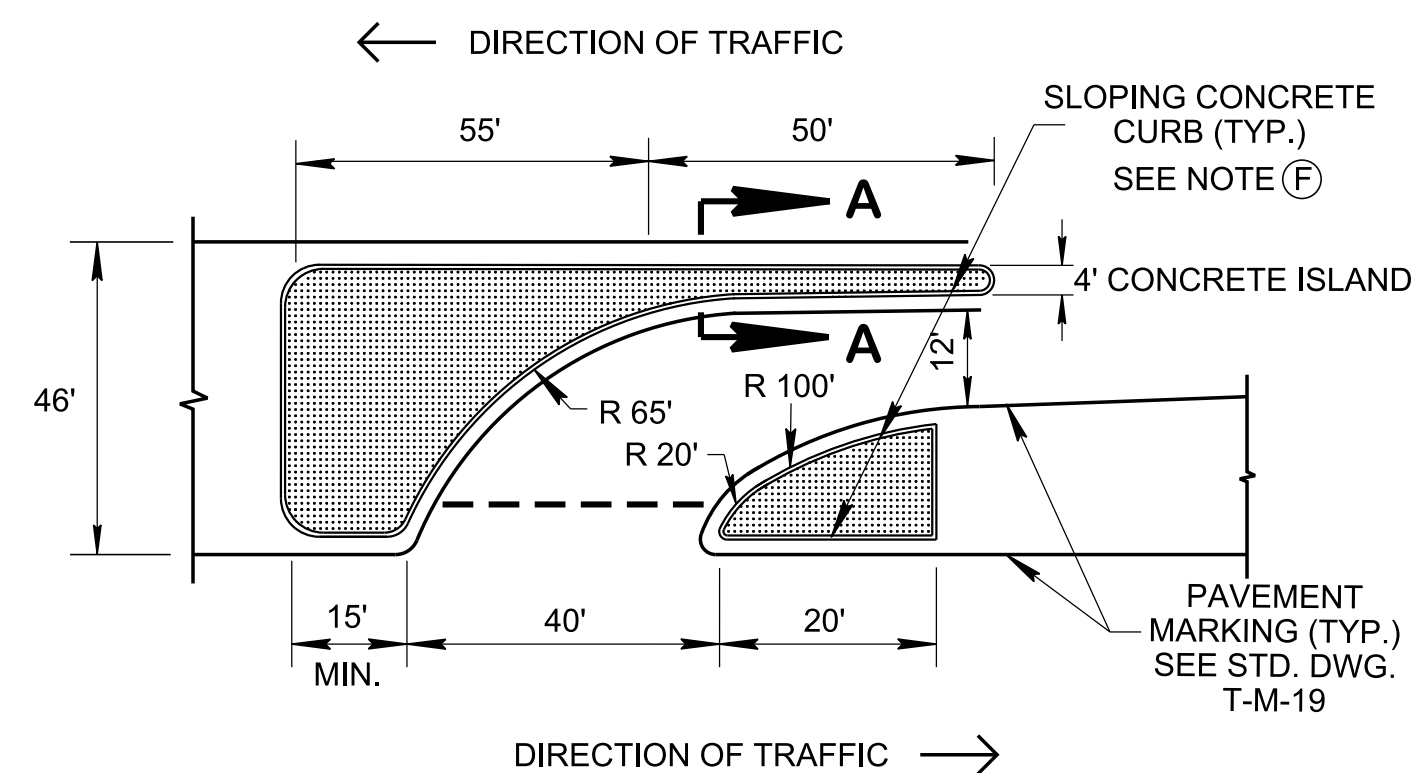
**STATE OF TENNESSEE**  
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 DRAWING  
**DEPARTMENT OF TRANSPORTATION**

**SHORT-RADIUS  
 GUARDRAIL SYSTEM  
 (SRGS)  
 DETAILS**

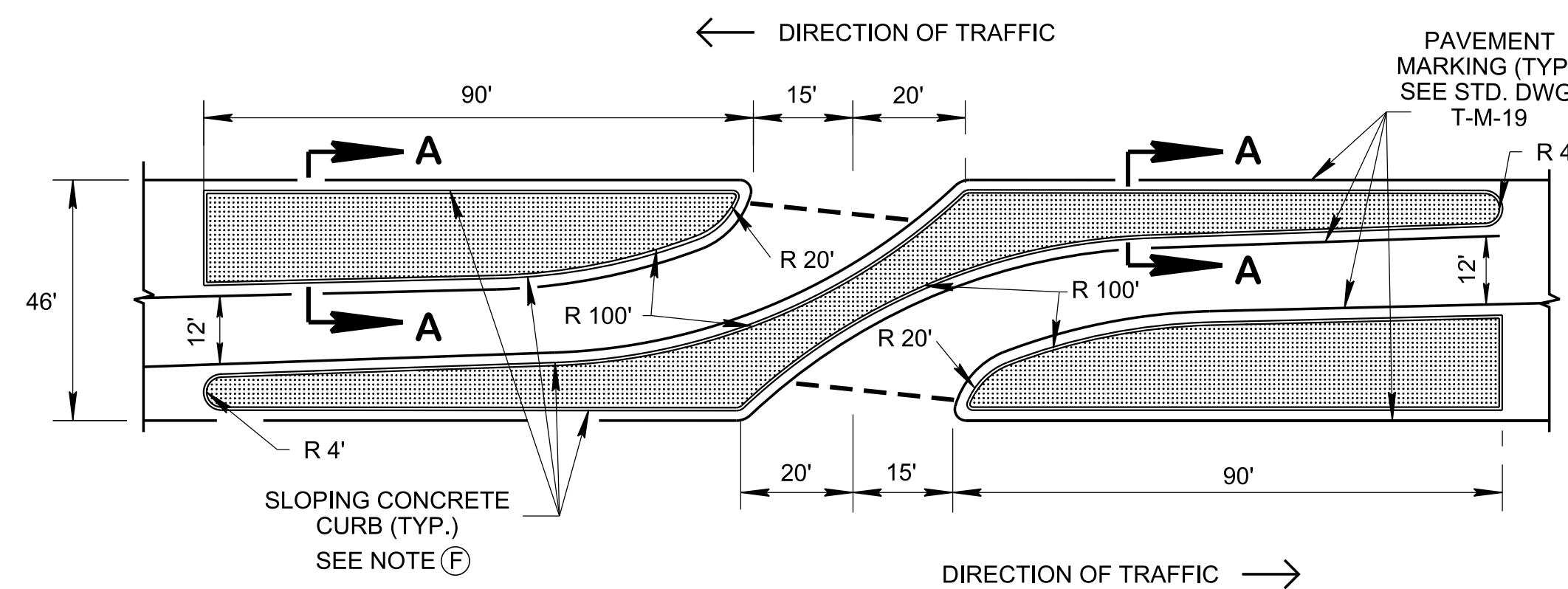
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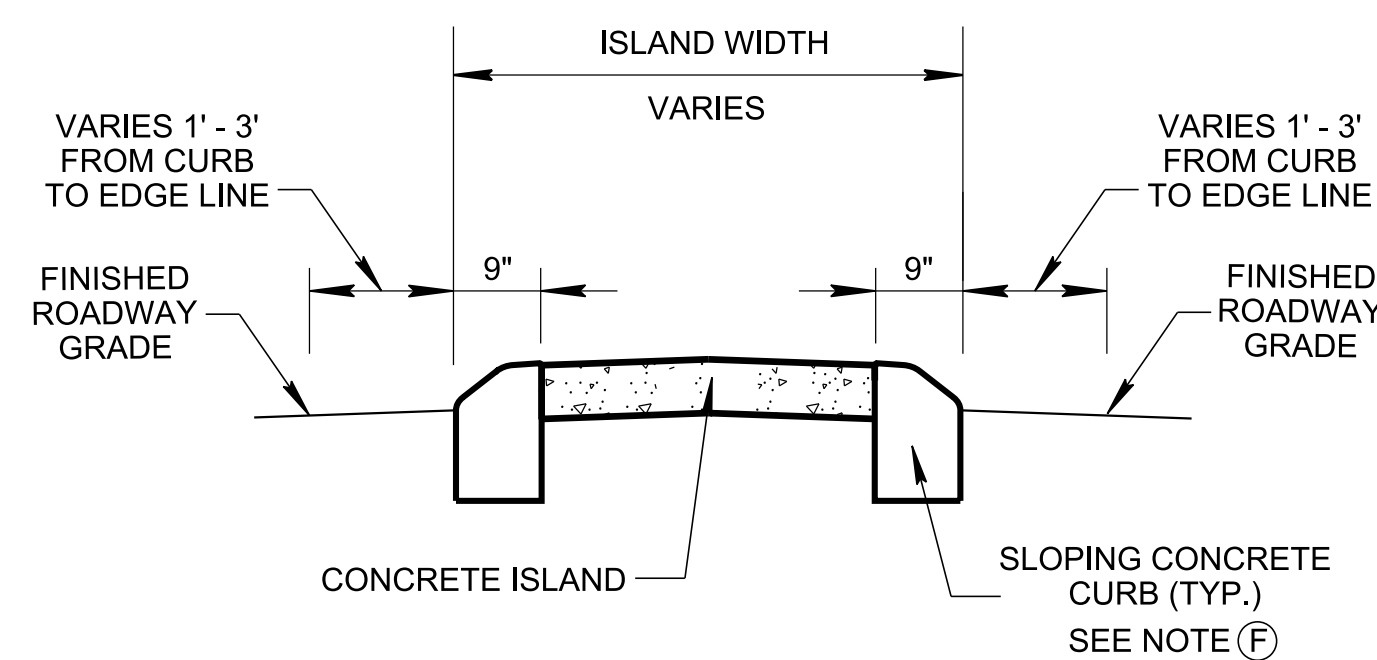
**PLAN VIEW FOR J-TURN AND RESTRICTED CROSSING INTERSECTIONS**



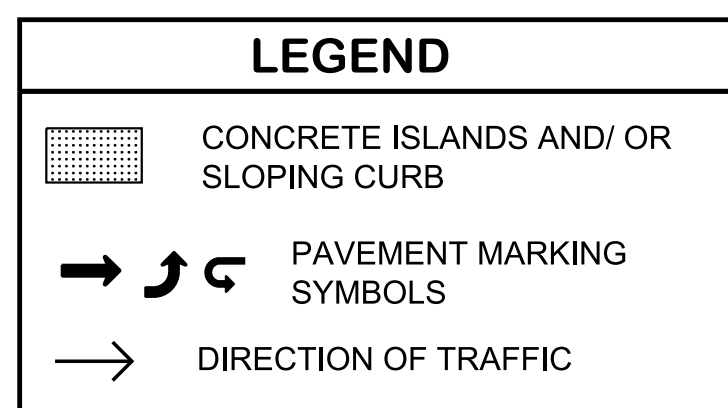
**DETAIL A**  
**J-TURN INTERSECTION**  
(REVERSE TO OPPOSITE END)  
(SEE NOTE (A))



**DETAIL B**  
**RESTRICTED CROSSING INTERSECTION**  
(SEE NOTE (A))



**SECTION A-A**  
**(TYP.)**



**GENERAL NOTES**

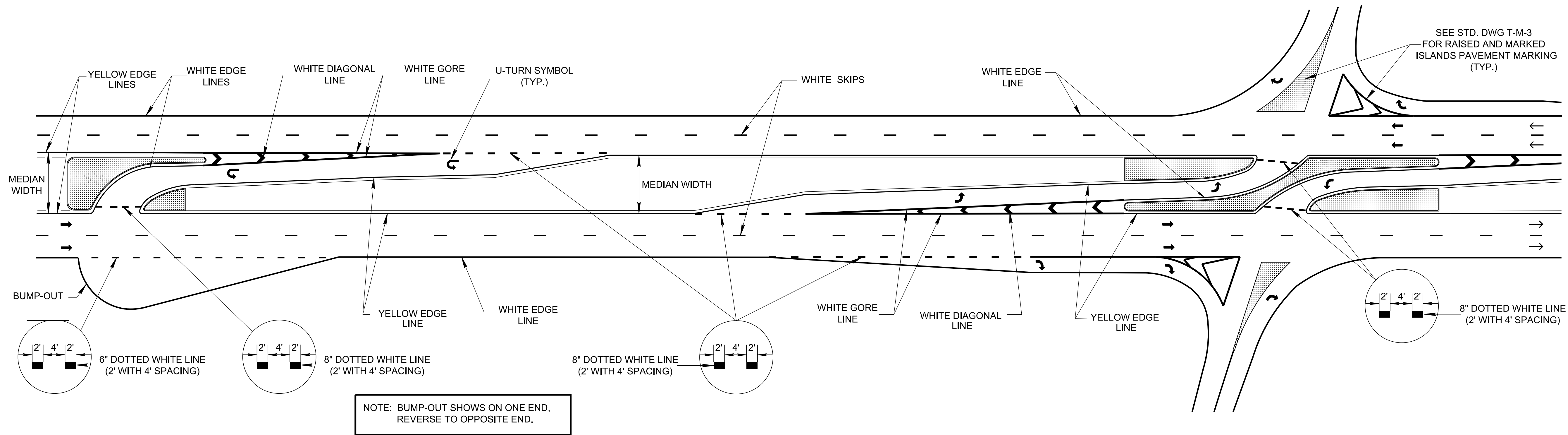
- (A) THIS DRAWING SHOWS A DESIGN FOR A 46' MEDIAN WIDTH, ASSUMING 55 MPH POSTED SPEED AND A DESIGN BUMP OUT TO ACCOMMODATE WB-50. WHEN OTHER MEDIAN WIDTHS, DESIGN VEHICLE, AND POSTED SPEEDS ARE USED, ENGINEERING JUDGEMENT SHALL BE USED TO ESTABLISH APPROPRIATE GEOMETRY.
- (B) REFERENCE SHOULD BE MADE TO "A POLICY ON GEOMETRIC DESIGN OF HIGHWAYS AND STREETS" AASHTO, 2018 (GREEN BOOK), AND "RESTRICTED CROSSING U-TURN INTERSECTION INFORMATIONAL GUIDE", FHWA, 2014.
- (C) REFER TO TDOT HIGHWAY SYSTEM ACCESS MANUAL (HSAM) VOLUME 3: GEOMETRIC DESIGN CRITERIA FOR REQUIRED MINIMUM SPACING OF MEDIAN OPENINGS.
- (D) SEE STANDARD DRAWING RP-DHO-1 FOR MINIMUM MEDIAN WIDTH FOR U-TURNS-TYPE "J" INFORMATION.
- (E) SEE STANDARD DRAWING T-M-19 FOR PAVEMENT MARKING AND T-S-26 FOR SIGNING DETAILS FOR J-TURN AND RESTRICTED CROSSING INTERSECTIONS.
- (F) SEE STANDARD DRAWING RP-SC-1 FOR SLOPING CONCRETE CURB AND CURB AND GUTTER.
- (G) SEE STANDARD DRAWING RD11-SD SERIES FOR INTERSECTION SIGHT DISTANCE DRAWINGS.
- (H) WHEN PED/BIKE FACILITY NEEDED, CONTACT THE TDOT MULTI MODAL DESIGN DIVISION FOR ADDITIONAL GUIDANCE.

STATE OF TENNESSEE  
STANDARD DRAWING  
DEPARTMENT OF TRANSPORTATION

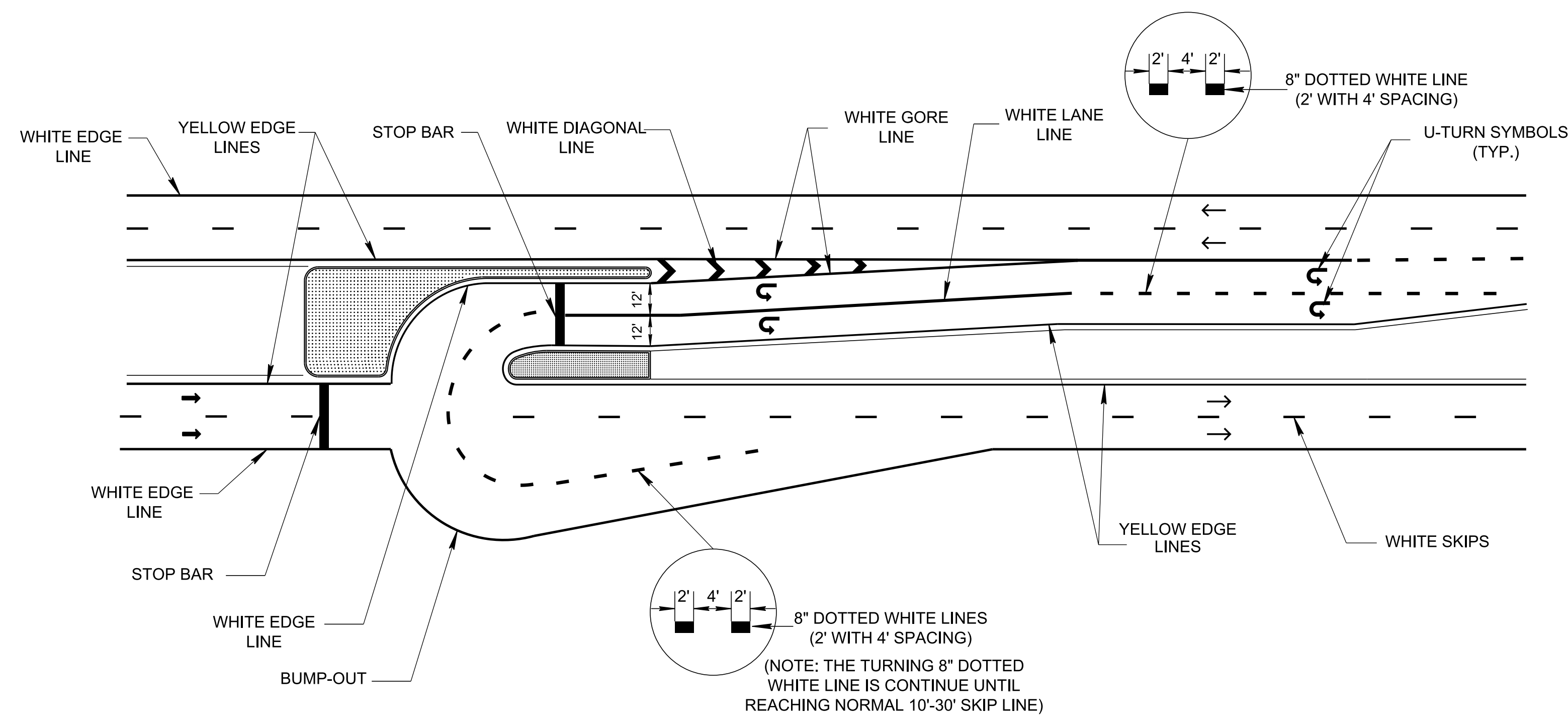
**MEDIAN OPENING  
DETAILS FOR  
RESTRICTED  
CROSSING & J-TURN  
INTERSECTIONS**



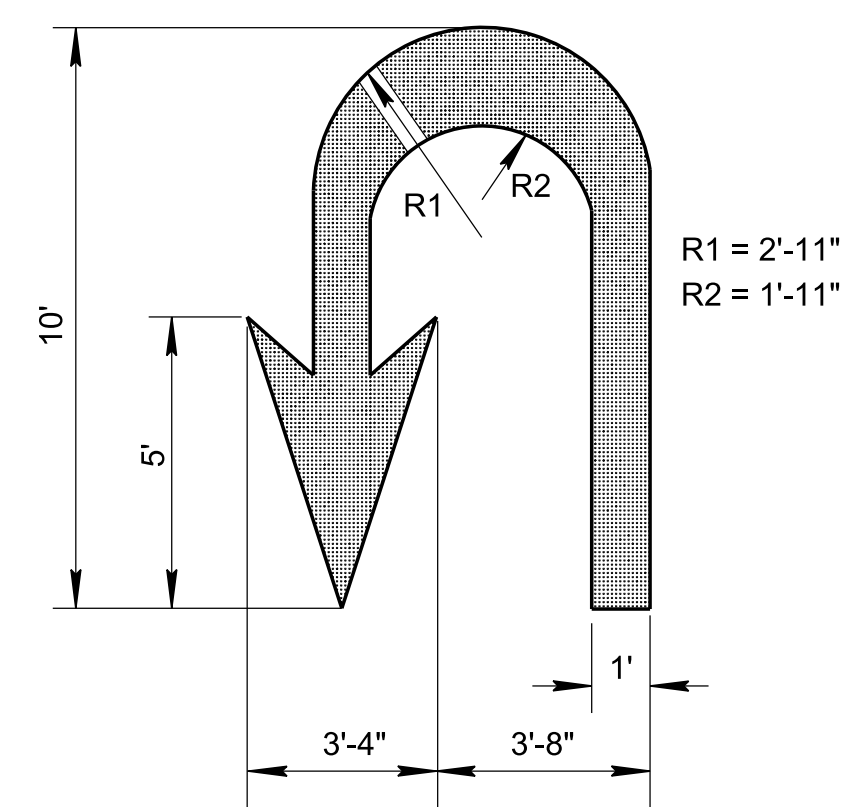
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**PLAN VIEW FOR J-TURN AND RESTRICTED CROSSING INTERSECTIONS**



**PLAN VIEW FOR SIGNALIZED J-TURN (DUAL U-TURN) INTERSECTION**



**U-TURN LEFT-USE ARROW**

LEGEND	
	CONCRETE ISLANDS AND/OR SLOPING CURB
	PAVEMENT MARKING SYMBOLS
	DIRECTION OF TRAFFIC

GENERAL NOTES	
(A)	SEE STANDARD DRAWING RP-DHO-2 FOR MEDIAN OPENING DETAILS AND T-S-26 FOR SIGNING DETAILS FOR RESTRICTED CROSSING AND J-TURN INTERSECTIONS.
(B)	SEE STANDARD DRAWING T-M-3 AND T-M-4 FOR CHANNELIZATION MARKING AND INTERSECTION MARKING DETAILS.
(C)	PAVEMENT MARKERS ARE REQUIRED ONLY WHEN SPECIFIED IN THE PLANS.

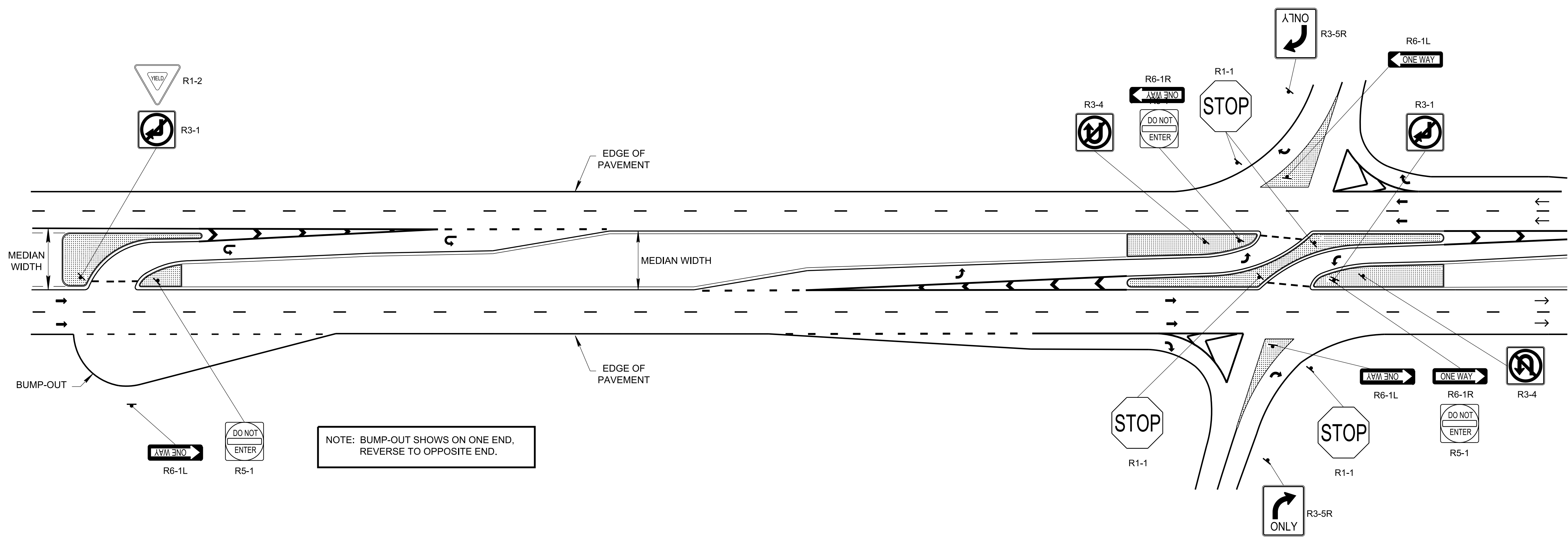
**STATE OF TENNESSEE**  
 STANDARD DRAWING  
 DEPARTMENT OF TRANSPORTATION

**PAVEMENT MARKING  
 DETAILS FOR  
 RESTRICTED  
 CROSSING & J-TURN  
 INTERSECTIONS**

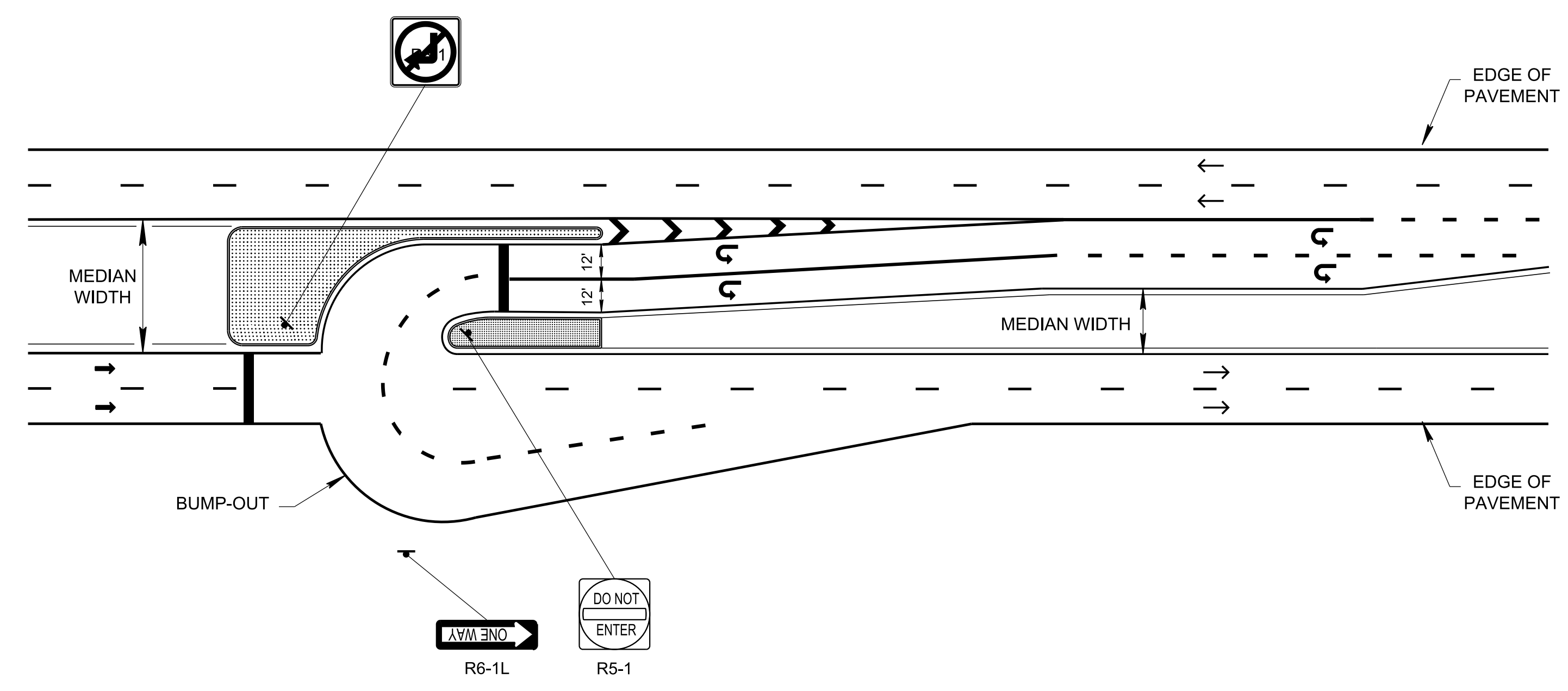
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**PLAN VIEW FOR J-TURN AND RESTRICTED CROSSING INTERSECTIONS**



**PLAN VIEW FOR SIGNALIZED J-TURN (DUAL U-TURN) INTERSECTION**

LEGEND	
	CONCRETE ISLANDS AND/OR SLOPING CURB
	GROUND MOUNT SIGN
	PAVEMENT MARKING SYMBOLS
	DIRECTION OF TRAFFIC

GENERAL NOTES	
(A)	SEE STANDARD DRAWING RP-DHO-2 FOR MEDIAN OPENING DETAILS AND T-M-19 FOR PAVEMENT MARKING FOR RESTRICTED CROSSING AND J-TURN INTERSECTIONS.
(B)	SIGNS ARE REQUIRED ONLY WHEN SPECIFIED IN THE PLANS.

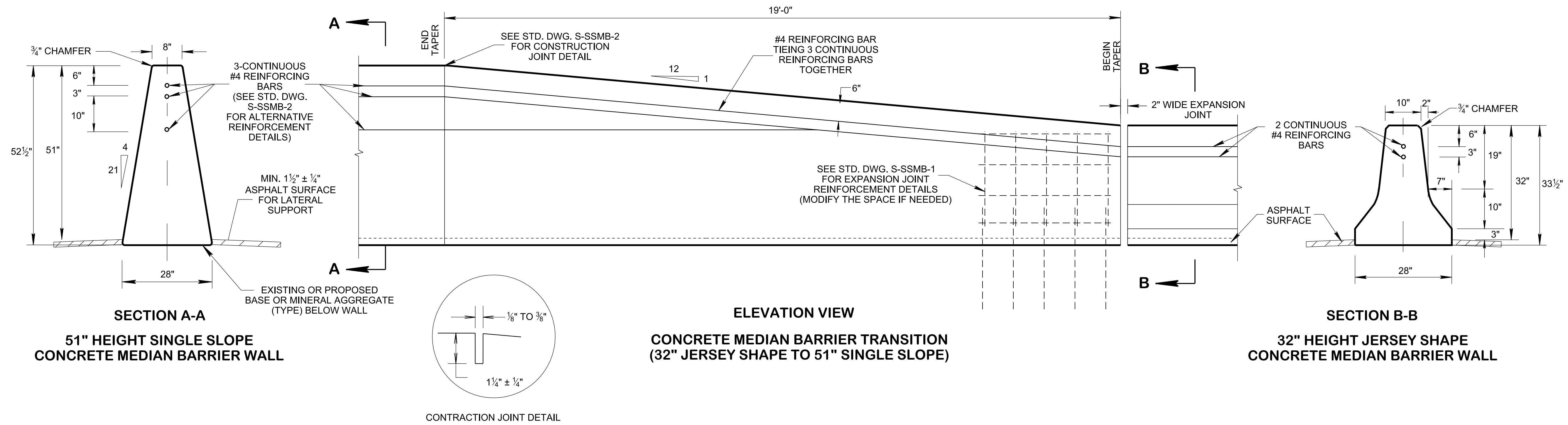
**STATE OF TENNESSEE**  
 STANDARD DRAWING  
 DEPARTMENT OF TRANSPORTATION

**SIGNING PLAN FOR RESTRICTED CROSSING & J-TURN INTERSECTIONS**

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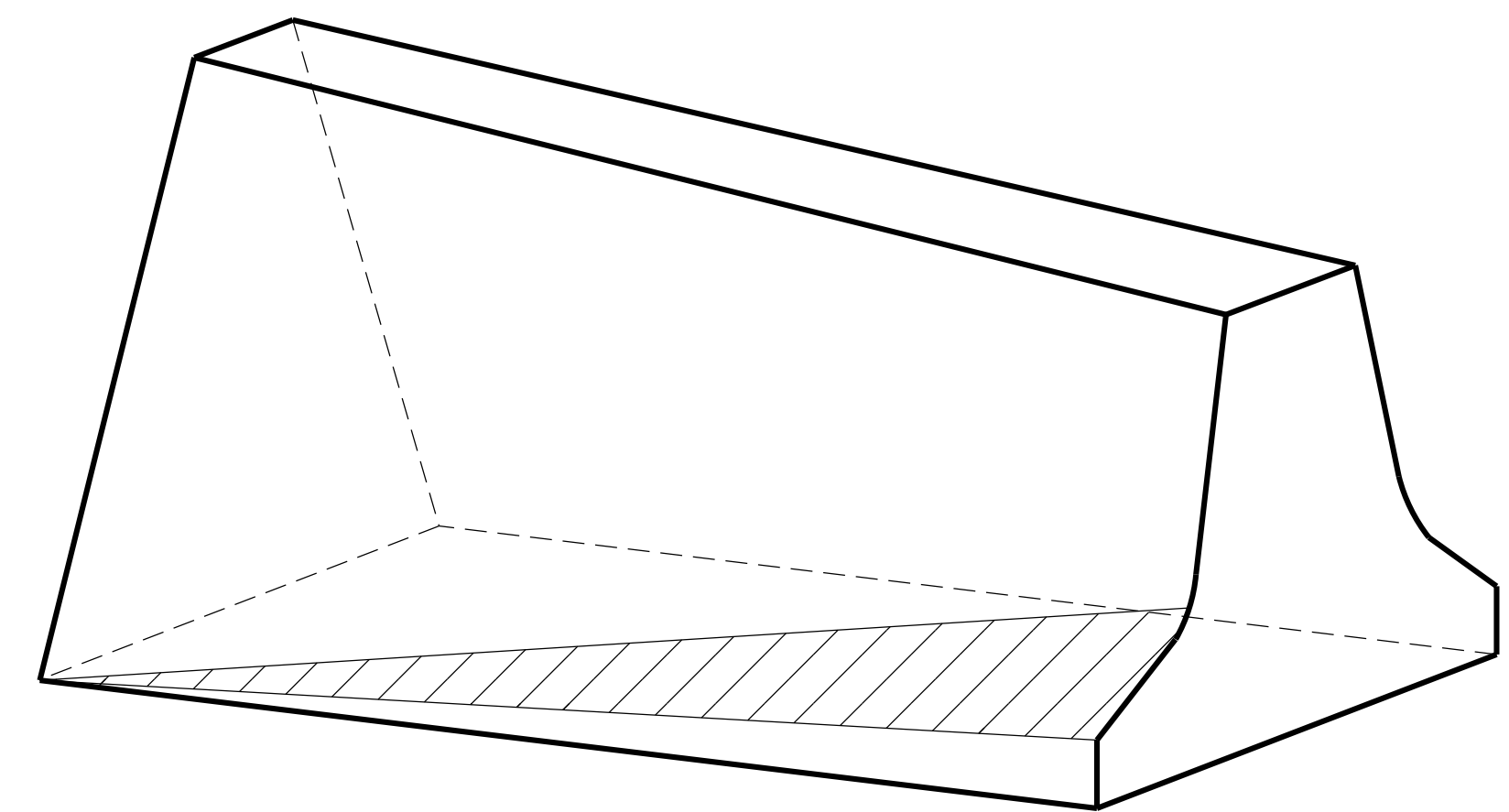
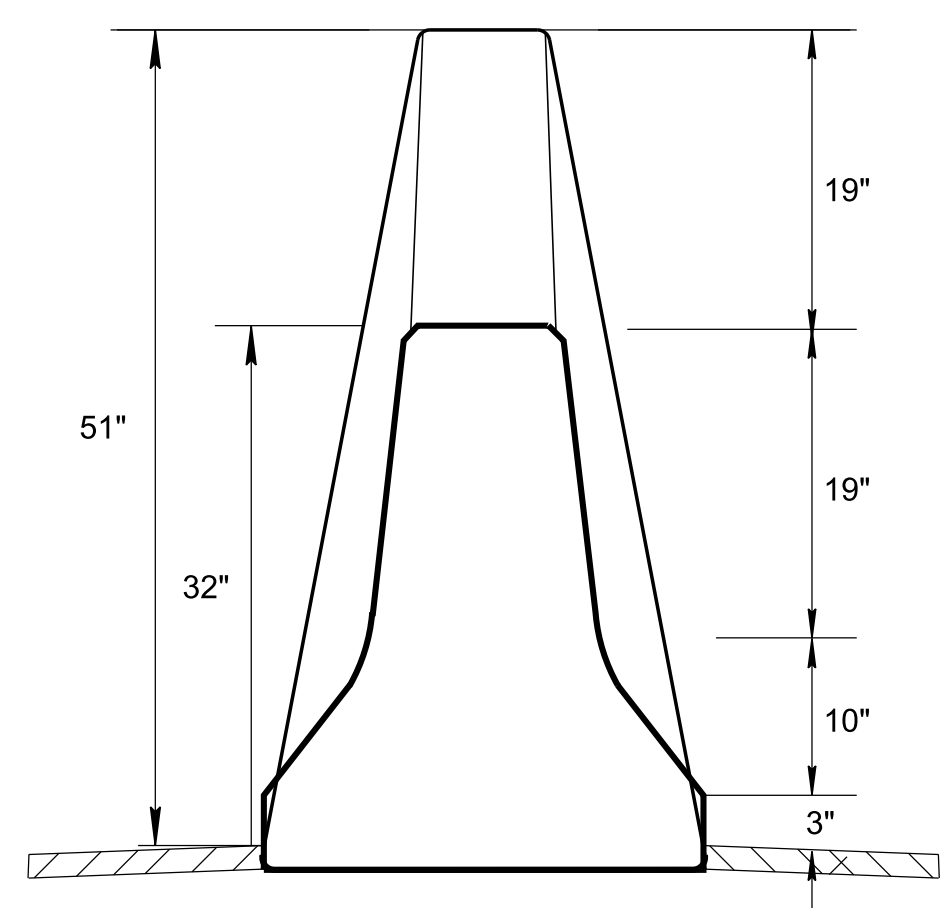
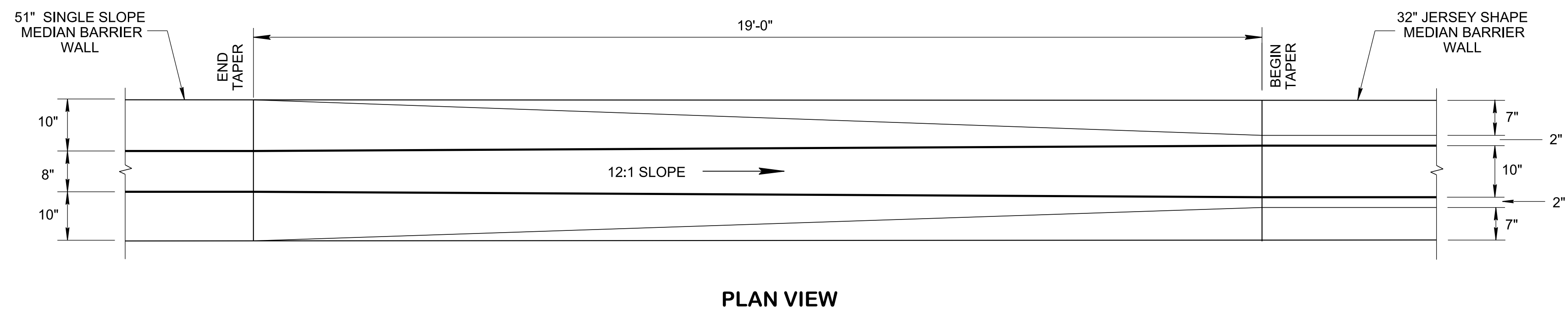
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**SECTION A-A**  
**51" HEIGHT SINGLE SLOPE**  
**CONCRETE MEDIAN BARRIER WALL**

**SECTION B-B**  
**32" HEIGHT JERSEY SHAPE**  
**CONCRETE MEDIAN BARRIER WALL**



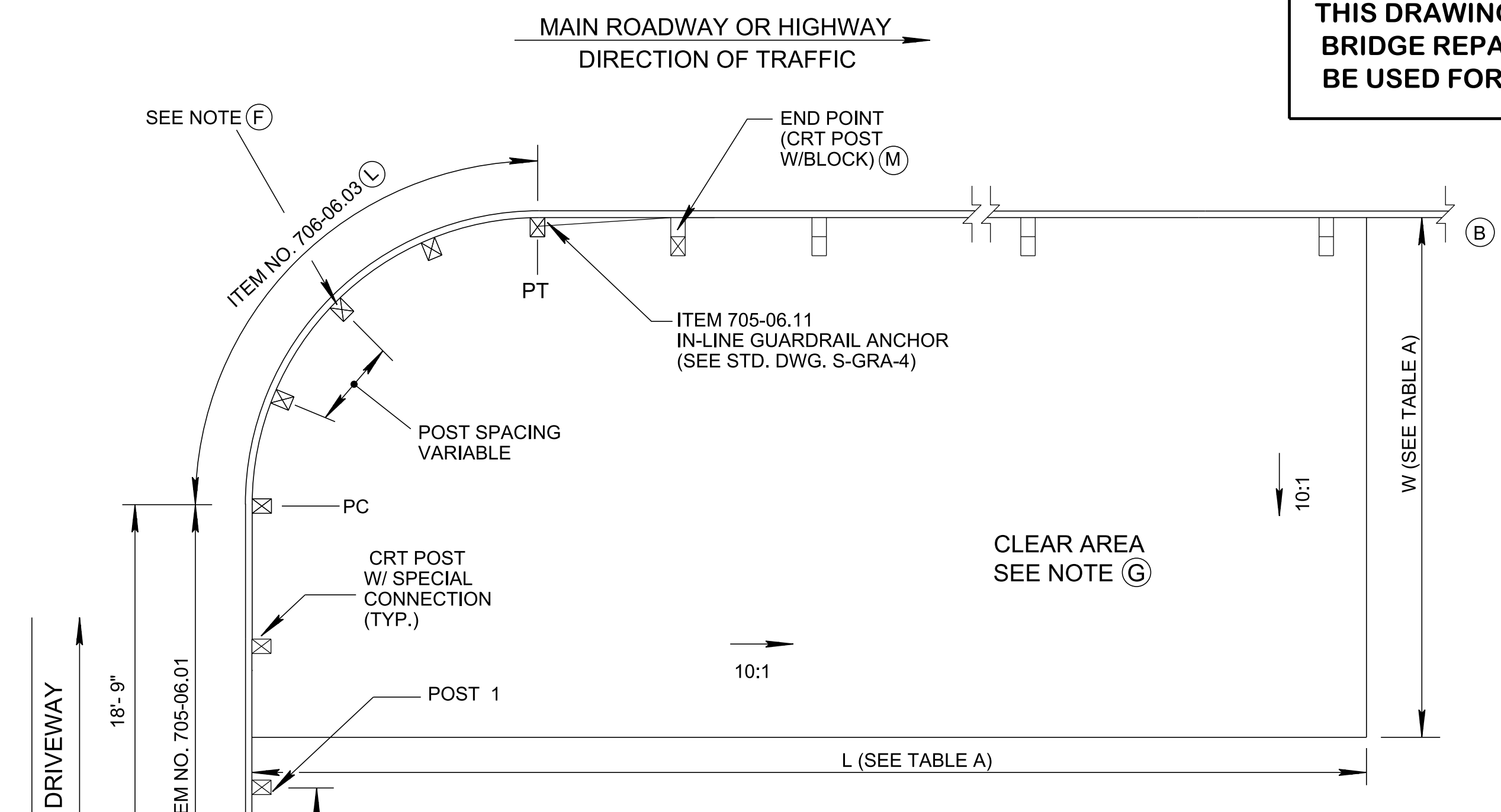
- GENERAL NOTES**
- (A) CONCRETE BARRIER WALL SHALL BE CONSTRUCTED IN ACCORDANCE WITH STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, SECTION 711 AND/OR CURRENT SPECIAL PROVISIONS.
  - (B) CONCRETE:  $F'_c = 3,000$  POUNDS PER SQUARE INCH AT 28 DAYS  
 REINFORCING STEEL: ASTM A615,  $F_y = 60,000$  POUNDS PER SQUARE INCH  
 ALL REINFORCING IS TO BE INSTALLED AS DETAILED ON THIS DRAWING.
  - (C) REFER TO STANDARD DRAWINGS S-SSMB-1 AND S-SSMB-2 FOR ADDITIONAL INFORMATION.
  - (D) CONTRACTION JOINT TO BE PLACED AT THE BEGINNING AND ENDING OF THE TRANSITION.
  - (E) CHAMFER TOP AND END EDGES 3/4 INCH.
  - (F) PAYMENT FOR MEDIAN BARRIER TRANSITION WILL BE INCLUDED IN THE UNIT PRICE OF 51IN SINGLE SLOPE CONCRETE BARRIER WALL.

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**DEPARTMENT OF TRANSPORTATION**

**SPECIAL DETAIL**  
**FOR CONCRETE**  
**MEDIAN BARRIER**  
**WALL TRANSITION**  
**FROM 32" TO 51"**

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



**PLAN VIEW  
(15' RADIUS SHOWN, TYPICAL DRIVEWAY ENTRANCE)**

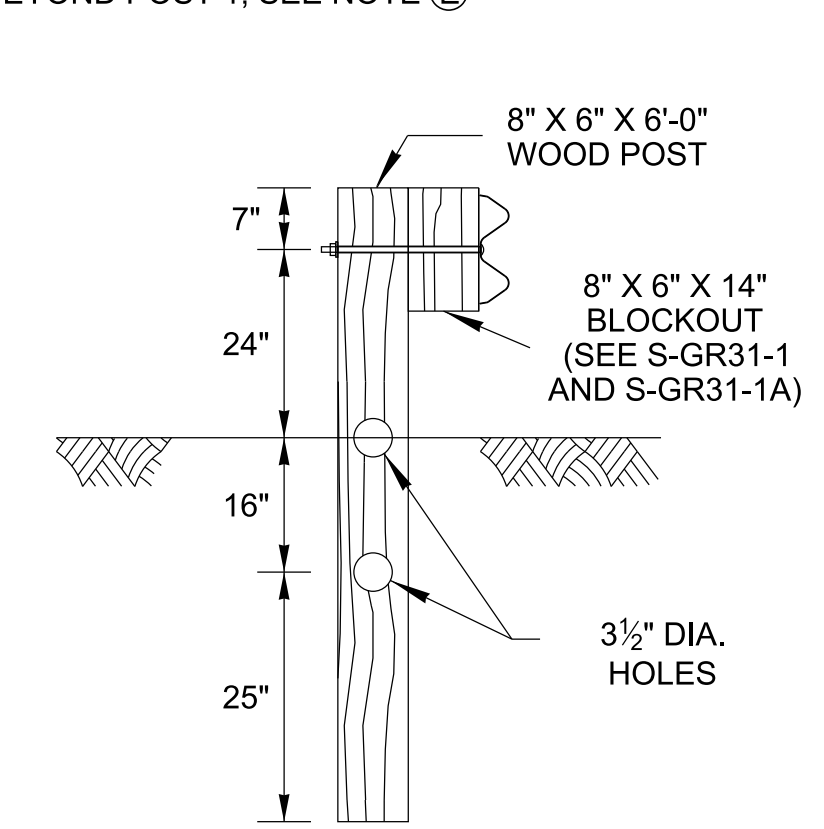
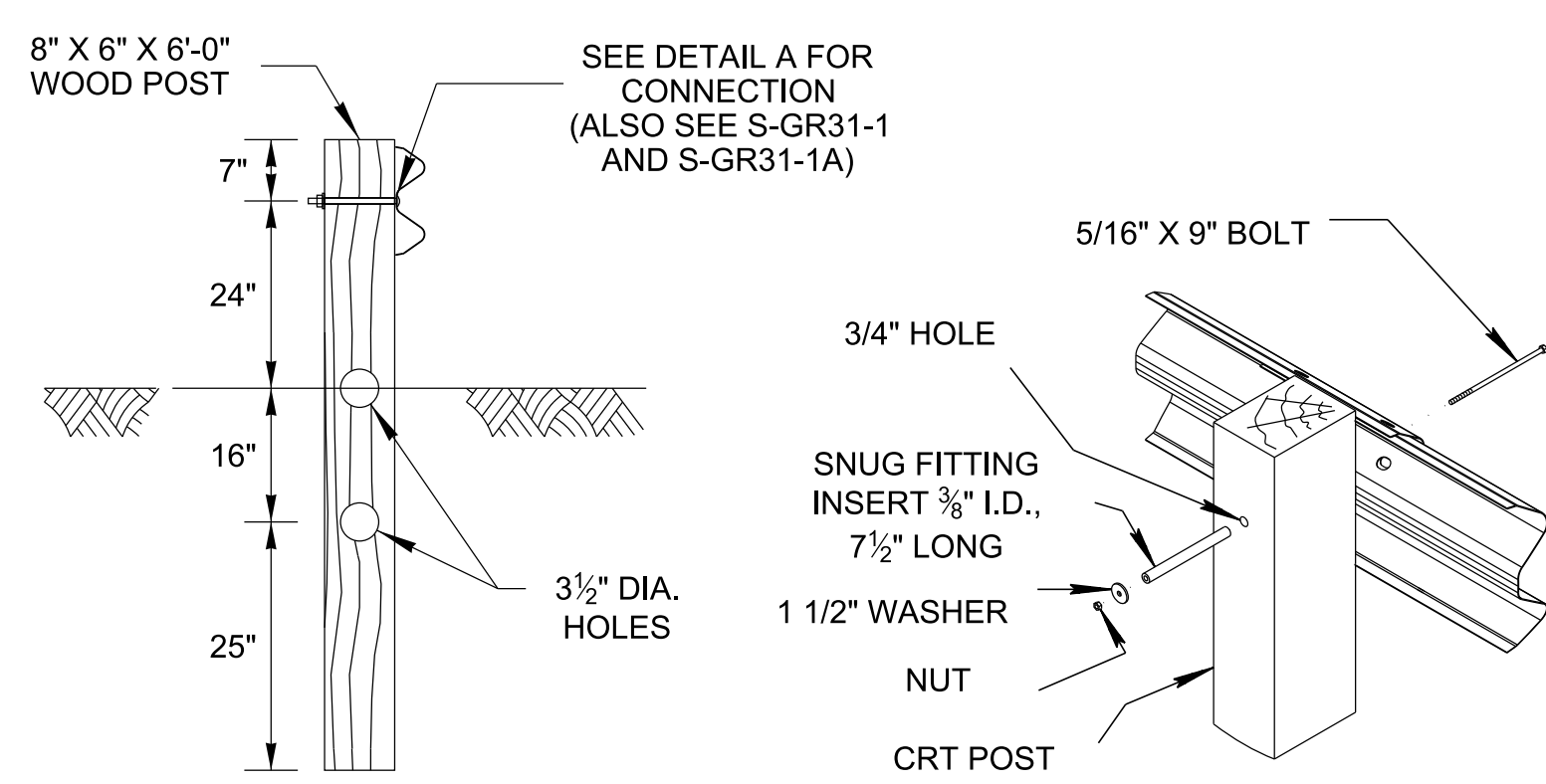
**TABLE A  
POST AND CLEAR AREA REQUIREMENTS**

GUARDRAIL RADIUS	NUMBER OF CRT POSTS	CLEAR AREA	
		L	W
(F) 15'	9	30'	15'
20'	10	30'	15'
40'	15	50'	20'
50'	18	70'	35'

**TABLE B  
ESTIMATED QUANTITIES FROM BEGINNING POINT TO END POINT**

RADIUS	705-06.01	705-06.11
(F) 15'	51'-8"	1 *
20'	59'-6 1/2"	1 *
40'	90'-11 1/2"	1 *
50'	106'-8"	1 *

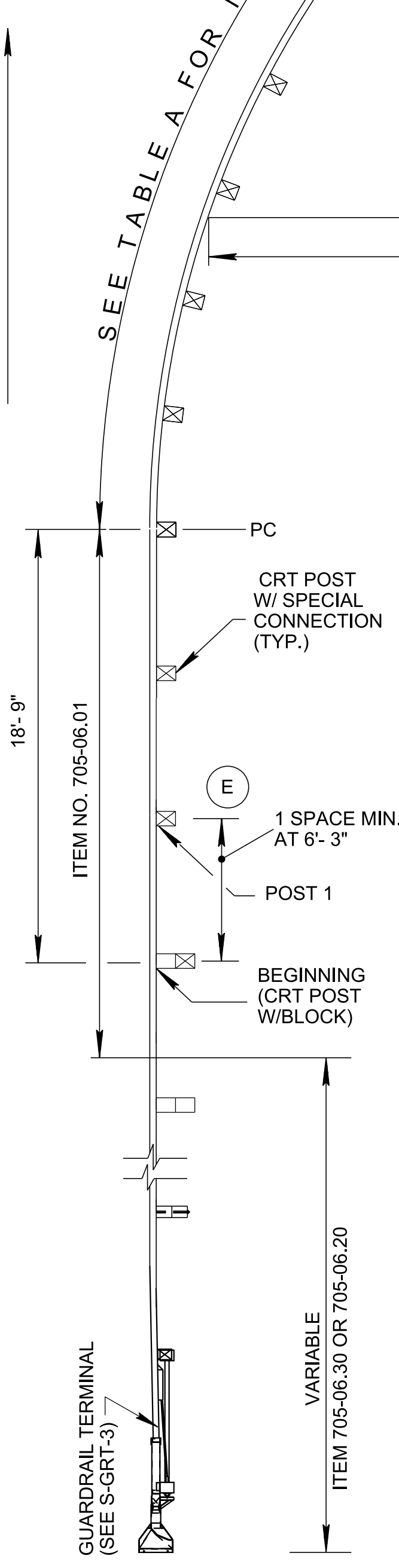
\* IF GUARDRAIL CONTINUES BEYOND POST 1, SEE NOTE (E)



**SPECIAL CRT POST NOTES**

- 1 FEWER CRT POSTS ARE REQUIRED FOR SMALLER RADII. ATTACH GUARDRAIL TO POST WITH A 5/16" X 9" LONG BOLT, A 3/8" X 7 1/2" SNUG FITTING INSERT AND A 1 1/2" WASHER WITH NUT ON BACK OF POST.
- 2 THE FLAT WASHER IS USED UNDER THE NUT, BEHIND THE POST ONLY. NO WASHER IS USED AT THE RAIL.

SIDE ROAD



**NOTE TO DESIGNER**

THIS STANDARD TO BE USED ON ROADWAYS ON THE NATIONAL HIGHWAY SYSTEM. FOR NON NATIONAL HIGHWAY SYSTEM FACILITIES, USE S-GRA-4.

**GENERAL NOTES**

- (A) THIS STANDARD DRAWING IS TO BE USED WHEN THE LENGTH OF NEED EXTENDS TO OR BEYOND AN INTERSECTION. DESIGNER IS TO VERIFY THAT THE ENTIRE LENGTH CAN BE CONSTRUCTED WITHIN THE PROPOSED RIGHT-OF-WAY. FOR INSTALLATION WHERE GUARDRAIL RADIUS IS NOT INCLUDED IN TABLE A, ROUND UP. FOR INSTALLATION WHERE GUARDRAIL RADIUS IS LARGER THAN 35 FEET, USE STANDARD INSTALLATION PER S-GR31-1.
- (B) IF CONNECTING TO BRIDGE RAIL OR OTHER CONCRETE BARRIER, SEE S-GRC SERIES FOR MINIMUM LENGTH OF TRANSITION SECTION BETWEEN GUARDRAIL AND RIGID WALL.
- (C) THE FORESLOPE FROM THE EDGE OF THE SHOULDER INTO THE FACE OF GUARDRAIL SHOULD NOT BE STEEPER THAN 10(H):1(V).
- (D) SEE S-GR31-1 AND S-GR31-1A FOR POSTS, RAIL, AND HARDWARE STANDARDS FOR CONSTRUCTION.
- (E) USE APPROPRIATE END TERMINAL PER STANDARD DRAWINGS:  
FOR SIDE ROADS > 45 MPH, USE S-GRT-2  
FOR SIDE ROADS < 45 MPH, USE S-GRT-3  
FOR DRIVES, USE S-GRA-3
- (F) DO NOT CONNECT RAIL TO CENTER POST IN CURVE FOR 8'-6" RADIUS DESIGN.
- (G) THE CLEAR AREA BEHIND THE GUARDRAIL SHALL REMAIN UNOBSTRUCTED AND UNENCUMBERED TO ALLOW THE GUARDRAIL TO FUNCTION PROPERLY. OBSTACLES (I.E., ENDWALLS, SIGNS, DITCHES, ETC.) WITHIN THIS AREA MUST BE REMOVED, RELOCATED, OR REDESIGNED.
- (H) W-BEAMS SHALL BE SHOP BENT AS REQUIRED.
- (I) TO DETERMINE IF A ROAD IS ON THE NATIONAL HIGHWAY SYSTEM, CONSULT THE FUNCTIONAL CLASSIFICATION MAPS MAINTAINED BY THE TDOT LONG RANGE PLANNING DIVISION. SEE TDOT LONG RANGE PLANNING WEBSITE.
- (J) THE CURVED GUARDRAIL INSTALLATION SHOWN ON THIS STANDARD DRAWING HAS BEEN EVALUATED PER NCHRP 350 TL-2.
- (K) PAYMENT FOR TYPICAL INSTALLATION WILL BE UNDER ITEM NUMBERS:  
705-06.01 W BEAM GR (TYPE 2) MASH TL3 PER L. F.  
705-06.10 GR TERMINAL TRAILING END (TYPE 13) MASH TL3 PER EACH  
705-06.11 GR TERMINAL (IN-LINE) MASH TL3 PER EACH  
705-06.20 TANGENT ENERGY ABSORBING TERM MASH TL-3 PER EACH  
705-06.30 GR TERMINAL (TYPE 21) MASH TL2 PER EACH
- (L) FOR RADIUS LESS THAN OR EQUAL TO 150', USE SHOP BENT W-BEAM ITEM NO. 706-06.03 INSTEAD OF ITEM NO. 705-06.01.
- (M) FOR PLACEMENT WITH GUARDRAIL CONNECTION TO BRIDGE ENDS OR BARRIER WALL THIS POST MAY BE USED AS THE LAST POST.

(Replaced Std Dwg S-PL-2)

STATE OF TENNESSEE  
STANDARD DRAWING  
DEPARTMENT OF TRANSPORTATION

**SAFETY PLAN  
AT SIDEROADS  
OR  
PRIVATE DRIVES**

S-PL-2M

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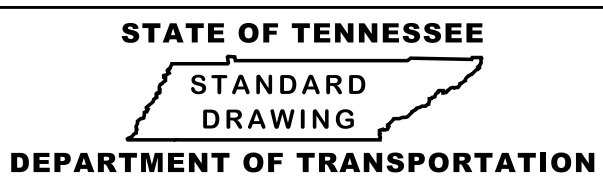
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# STANDARD LEGEND

EXISTING		PROPOSED
	LOOP DETECTOR WITH LEAD-IN	
	RADAR/VIDEO DETECTION AREA	
	RADAR DETECTOR	
	VIDEO DETECTION CAMERA	
	VIDEO DETECTION CAMERA 360	
	EMERGENCY VEHICLE DETECTOR	
	POLE MOUNTED CONTROLLER	
	PAD MOUNTED CONTROLLER	
	PEDESTRIAN SIGNAL HEAD WITH NUMBER	
	RECTANGULAR RAPID FLASHING BEACON	
	SIGNAL HEAD WITH NUMBER	
	SIGNAL HEAD WITH NUMBER AND BACKPLATE	
	PULL BOX	
	FIBER OPTIC PULL BOX	
	2" CONDUIT	
	STRAIN POLE FOR SIGNAL SUPPORT	
	WOOD POLE FOR SIGNAL SUPPORT	

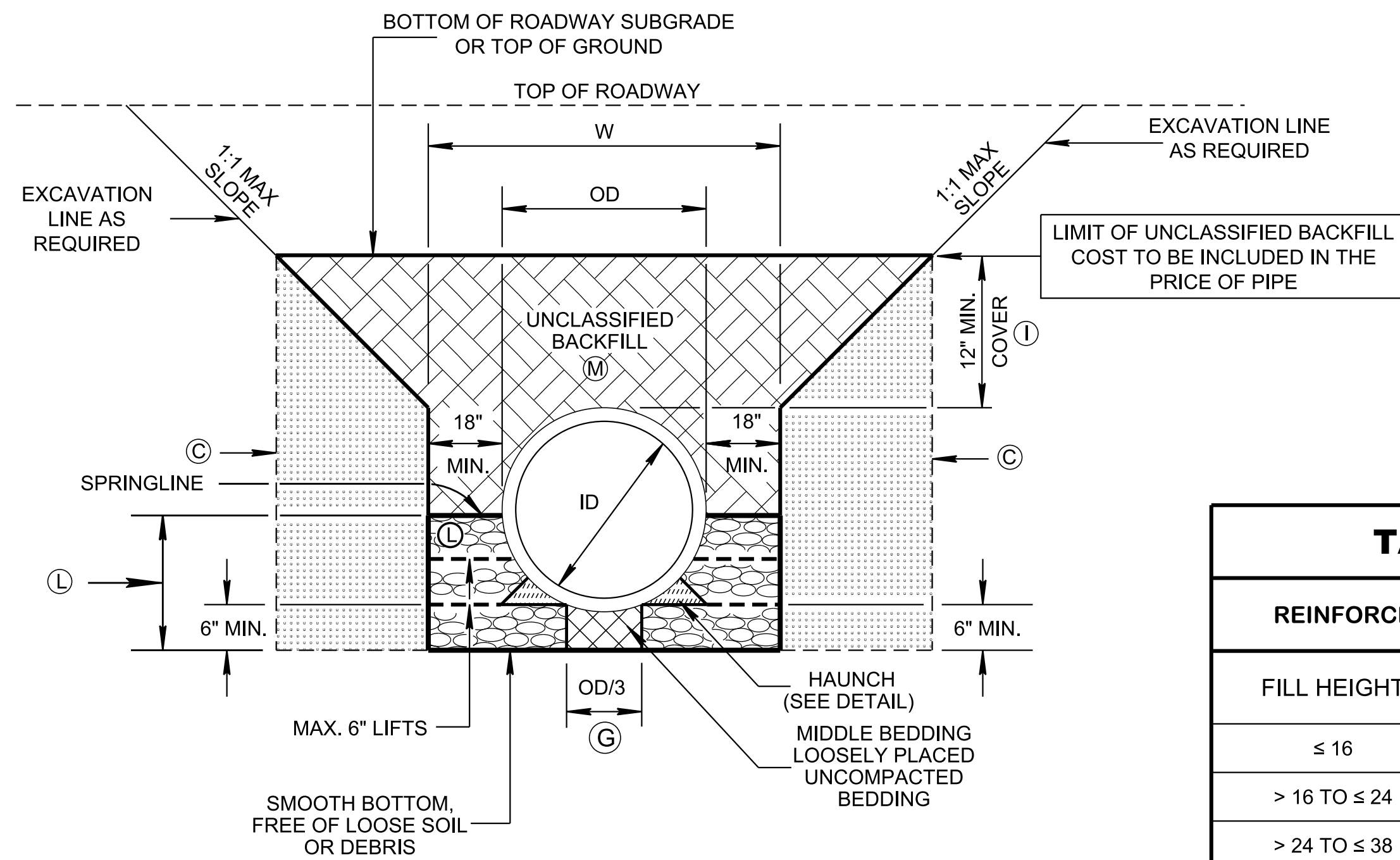
- REV. 9-18-79: ADDED SIGNAL HEAD WITH NUMBER AND BACKPLATE, PEDESTRIAN PUSHBUTTON WITH NUMBER AND PAVEMENT ARROW TO EXISTING AND PROPOSED LEGEND.
- REV. 1-11-82: ADDED EROSION CONTROL LEGEND.
- REV. 8-21-89: ADDED WETLAND BOUNDARY.
- REV. 1-19-91: REDREW SHEET AND ADDED SYMBOL FOR BOTH BELOW AND ABOVE GROUND SEDIMENT TRAPS.
- REV. 10-26-94: CHANGED DRAWING NO. FROM RD-L-2 TO RD-L-3. ADDED LIGHTING SYMBOLS. MOVED WETLAND BOUNDARY SYMBOL TO DRAWING NO. RD-L-1. MOVED EROSION CONTROL SYMBOLS TO DRAWING NO. RD-L-4.
- REV. 2-28-01: DELETED SYMBOL FOR EXISTING JACKED AND BORED CONDUIT WITH PULL BOXES.
- REV. 4-15-04: CHANGED LEGEND FOR LOOP DETECTOR WITH LEAD-IN. ADDED SYMBOLS FOR VIDEO DETECTION AREA, VIDEO DETECTION CAMERA, EMERGENCY VEHICLE DETECTOR, AND FIBER OPTIC PULL BOX. MOVED SYMBOLS BEGINNING WITH SYMBOL FOR GUYING DEVICE ANGLE ANCHOR TO NEW DRAWING NO. RD-L-4.
- REV. 3-16-17: ADDED SYMBOL FOR EXISTING RADAR/VIDEO DETECTION AREA. ADDED "RADAR" BEFORE "VIDEO DETECTION AREA". ADDED "WITHOUT BACKPLATE" AFTER "SIGNAL HEAD WITH NUMBER".
- REV. 02-20-20: REDREW SHEET.
- REV. 03-01-23: ADDED RADAR DETECTOR, VIDEO DETECTION CAMERA 360 AND RECTANGULAR RAPID FLASHING BEACON TO EXISTING AND PROPOSED LEGEND.

APPROVED BY FHWA  
(ALL OTHERS APPROVED BY TDOT)



## STANDARD LEGEND FOR SIGNALIZATION AND LIGHTING

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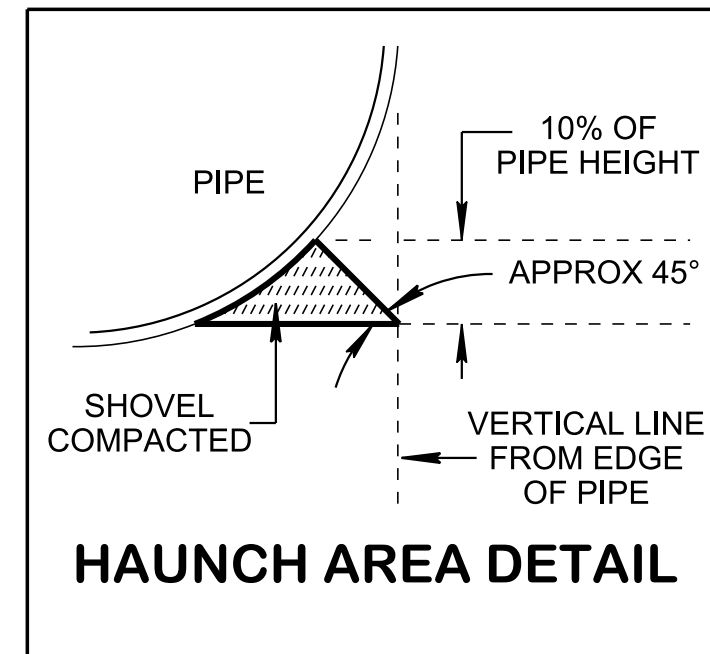
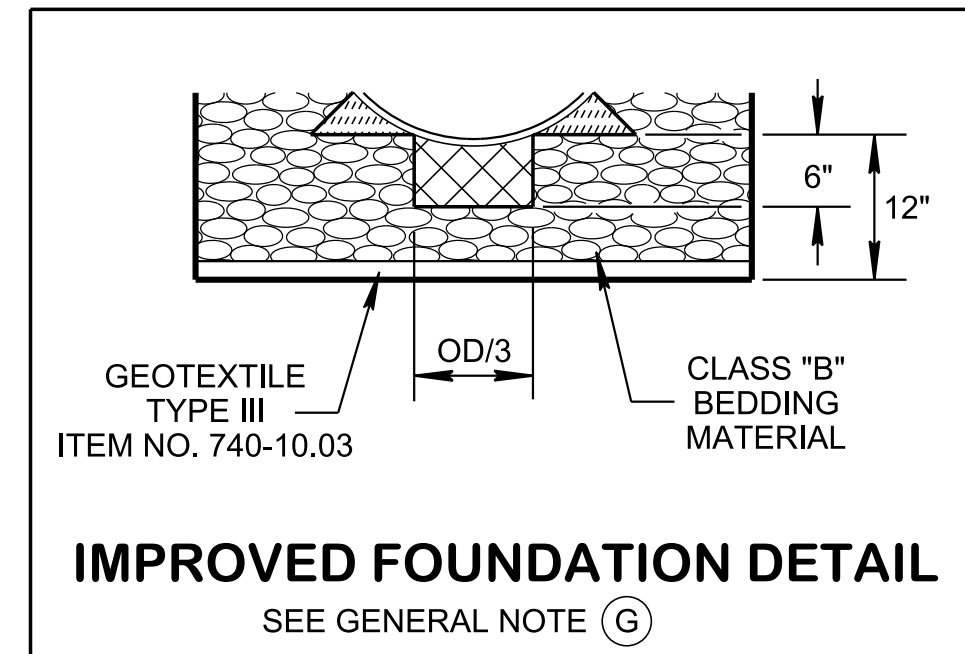
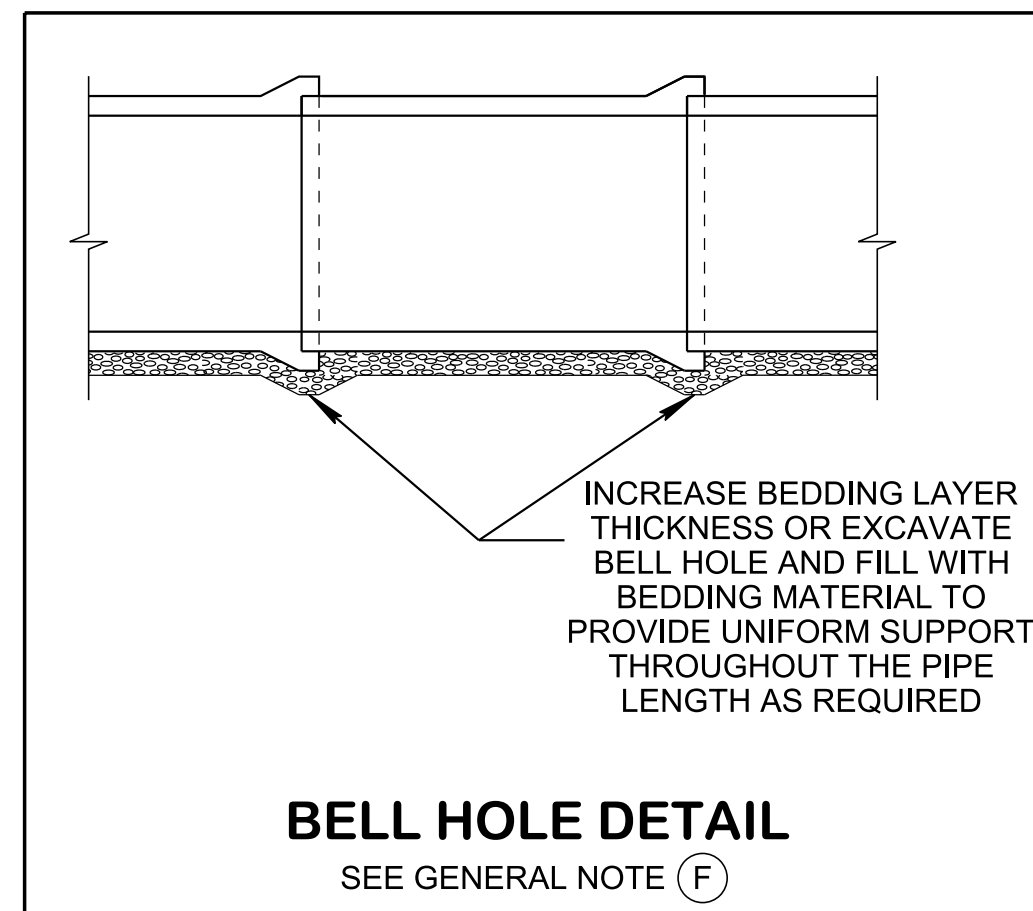


**STANDARD TRENCH INSTALLATION**

(PIPE CULVERT INSTALLATION DETAIL)

NOTE: CENTER PIPE IN TRENCH  
SEE GENERAL NOTE (B)

REINFORCED CONCRETE PIPE	
FILL HEIGHT	CLASSIFICATION (AASHTO M170)
≤ 16	III
> 16 TO ≤ 24	IV
> 24 TO ≤ 38	V
> 38	SPECIAL DESIGN



**GENERAL NOTES**

- PIPE MATERIALS:**
- (A) REINFORCED CONCRETE PIPE SHALL MEET THE REQUIREMENTS OF AASHTO M-170. THE WALL THICKNESS SHALL BE "WALL B" (EXPECT: FOR STRUCTURES DEEPER THAN THE MINIMUM DEPTH, "WALL C" MAY BE USED) AND THE RCP CLASS SHALL BE AS LISTED IN "TABLE A". ALL PIPE MANUFACTURING PLANTS SHALL BE CERTIFIED BY EITHER ACPA OR NPCA. REFER SOP 5-3 FOR MORE INFORMATION.
- INSTALLATIONS REQUIREMENTS:**
- (B) FOR EMBANKMENT AREAS OR WHERE TRENCH CONDITIONS DO NOT EXIST, AN INDUCED TRENCH SOIL EMBANKMENT SHALL BE CONSTRUCTED SEE D-PB-3.
  - (C) FOR TRENCHES WITH IN SITU SOIL WALLS, THE SOIL SHALL BE AT LEAST AS FIRM AS THE MAJORITY OF THE SUBGRADE AS DETERMINED BY THE ENGINEER. SOIL NOT MEETING THIS REQUIREMENT SHALL BE REMOVED AND REPLACED.
  - (D) FOR ADDITIONAL INSTALLATION INFO SEE SECTION 27 "CONCRETE CULVERTS" OF THE AASHTO STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES AND ASTM C-1479-10.
  - (E) ONLY AS MUCH TRENCH AS CAN BE SAFELY MAINTAINED SHALL BE OPENED. ALL TRENCHES SHALL BE BACKFILLED AND COMPACTED TO THE MINIMUM COVER DEPTH 12" ABOVE THE PIPE AS SOON AS PRACTICABLE, BUT NOT LATER THAN THE END OF EACH WORKING DAY IN ACCORDANCE WITH THE COMPACTED REQUIREMENTS.
  - (F) JOINTS BETWEEN PIPES REQUIRE A RUBBER GASKET MEETING ASTM C443. AT CONNECTIONS TO STRUCTURES USE NON-SHRINK GROUT OR RUBBER GASKET PER C923 OR C1478. WHERE PIPE WITH BELLS ARE INSTALLED, BELL HOLES SHALL BE EXCAVATED IN BEDDING TO SUCH DIMENSIONS THAT THE ENTIRE LENGTH OF THE BARREL OF THE PIPE WILL BE SUPPORTED BY THE BEDDING WHEN PROPERLY INSTALLED AS SHOWN IN BELL HOLE DETAIL.
  - (G) WHERE THE TRENCH FOUNDATION IS FOUND UNACCEPTABLE OR LOCATION WHERE THE WATER TABLE IS FOUND HIGH:
    - (1) IMPROVED FOUNDATION OR EXCAVATABLE FLOWABLE FILL (EFF) MAY BE USED AT ENGINEER'S INSTRUCTION AS SHOWN ON THIS SHEET. AS NEEDED THE COST OF REMOVAL OF UNSATISFACTORY BEDDING MATERIAL AND REPLACEMENT WITH SATISFACTORY MATERIAL, INCLUDING GEOTEXTILE, WILL BE PAID SEPARATELY.
    - (2) FIELD ENGINEER SHALL REVIEW SITE CONDITIONS TO CONFIRM TYPICAL BEDDING AS SHOWN IS ADEQUATE TO PROVIDE STRUCTURAL SUPPORT OR FOUNDATION IMPROVEMENT IS REQUIRED.
  - (H) FOR MULTIPLE PIPES MINIMUM SPACING BETWEEN PIPES IS:
    - 36" PIPES AND SMALLER: EQUAL TO THE OUTSIDE DIAMETER OF THE LARGEST PIPE.
    - PIPES LARGER THAN 36": EQUAL TO HALF THE OUTSIDE DIAMETER OF THE LARGEST PIPE.
  - (I) FOR MINIMUM COVER DEPTHS FOR CONSTRUCTION LOADS SEE D-PB-3.
  - (J) CLASS "B" BEDDING MAY NOT BE REQUIRED UNDER SIDE DRAINS FOR PRIVATE DRIVES, FIELD ENTRANCES, PIPES OUTSIDE THE SHOULDER LIMITS OF INTERCHANGE RAMP, OR PIPES OUTSIDE NORMAL SLOPE LINES. BEDDING TYPE AS PER STANDARD SPECIFICATION 204.10.B.
  - (K) ARCH AND OVAL SHAPED PIPE CULVERTS SHALL BE INSTALLED THE SAME AS CIRCULAR WITH O.D. EQUAL TO THE WIDEST HORIZONTAL DIMENSION ON THE PIPE. TO ESTIMATE BEDDING MATERIAL FOR THESE PIPES WITH INTERNAL WIDTH THE SAME AS DIAMETER IN THE TABLE, MULTIPLY BEDDING QUANTITY BY 0.5 FOR THE SHOWN MINIMUM TRENCH DIMENSIONS.
- BEDDING AND BACKFILL REQUIREMENTS:**
- (L) CLASS "B" BEDDING MATERIAL MEETING THE REQUIREMENTS OF CONSTRUCTION SPECIFICATION SUBSECTION 204.04 SHALL BE PLACED IN LIFTS, NOT TO EXCEED 6 INCHES, TO THE PIPE SPRINGLINE. A MINIMUM COMPACTION LEVEL OF 90% OF THE STANDARD PROCTOR DENSITY PER AASHTO T99 SHALL BE ACHIEVED BY USE OF VIBRATORY PLATE.
  - (M) UNCLASSIFIED BACKFILL SHALL BE PLACED AND COMPACTED IN LAYERS NOT EXCEEDING A 8 INCH LOOSE LIFT THICKNESS AND BROUGHT UP EVENLY AND SIMULTANEOUSLY ON BOTH SIDES OF THE PIPE TO AN ELEVATION NOT LESS THAN ONE FOOT ABOVE THE TOP OF THE PIPE.
- UNCLASSIFIED BACKFILL TO THE LIMIT OF PIPE BACKFILL LINE SHALL BE COMPACTED IN ACCORDANCE TO STANDARD SPECIFICATION 204.11. HYDRO-HAMMER TYPE OF COMPACTORS MAY BE USED AROUND THE PIPE HOWEVER THEY SHALL NOT BE USED DIRECTLY OVER THE PIPE TO PREVENT ANY DAMAGE. ALL COMPACTION EQUIPMENT USED SHALL BE APPROVED BY THE ENGINEER.
- (N) PLACE 6 INCHES MINIMUM OF CLASS "B" BEDDING MATERIAL, ALONG WITH SUFFICIENT ADDITIONAL CLASS "B" BEDDING MATERIAL ACCURATELY SHAPED AS SHOWN IN HAUNCH AREA DETAIL.
- END TREATMENTS:**
- (1) ALL CROSS DRAINS (PERPENDICULAR) PLACED UNDER A MAINLINE ROADWAY REQUIRE TYPE U ENDWALLS CONFORMING TO THE ROADWAY FILL SLOPE AS SHOWN ON STANDARD DRAWINGS D-PE-15A THROUGH D-PE-48A FOR END WALL GEOMETRY AND D-PE-99 FOR GRATE DETAILS. ALL CULVERT ENDWALLS LOCATED WITHIN THE CLEAR ZONE (S-CZ-1) REQUIRE A SAFETY GRATE (18" OR 24" PIPE ENDWALLS MAY OMIT THE STEEL GRATE); ALL CROSS DRAIN CULVERTS LARGER THAN 48" MUST BE PROTECTED BY A GUARDRAIL OR ENDWALL OR MUST BE PLACED OUTSIDE THE CLEAR ZONE. CROSS DRAIN ENDWALLS PLACED OUTSIDE THE CLEAR ZONE MAY USE TYPE A (D-PE-1), TYPE B (D-PE-9 THRU 9F), OR STRAIGHT HEADWALL (D-PE-4) IN LIEU OF TYPE U OR IF THE PIPE END WALL IS PROTECTED BY A GUARDRAIL.
  - (2) ALL SIDE DRAINS (PARALLEL) PLACED UNDER A SIDE ROAD, DRIVEWAY, OR FIELD ENTRANCE, ETC. THAT INTERSECT A MAINLINE ROADWAY, REQUIRE SAFETY ENDWALLS AS SHOWN ON THE D-SEW- SERIES STANDARD DRAWINGS WITH SAFETY GRATE (D-SEW-1A) WITH A MAXIMUM 6:1 TAPER IF THE CULVERT ENDWALLS ARE LOCATED INSIDE THE CLEAR ZONE (S-CZ-1).
  - (3) ALL MEDIAN CROSSOVER SIDE DRAINS (LONGITUDINAL) PLACED UNDER MEDIAN OPENINGS REQUIRE SAFETY ENDWALLS AS SHOWN ON D-SEW-12D STANDARD DRAWING WITH SAFETY GRATE (D-SEW-1A) WITH MAXIMUM 12:1 TAPER IF THE CULVERT ENDWALLS ARE LOCATED INSIDE THE CLEAR ZONE (S-CZ-1).
- INSPECTION REQUIREMENTS:**
- (P) ALL PIPES SHALL UNDERGO INSPECTION ACCORDING TO SECTION 607.09 OF THE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION OR PER SECTION 27 OF AASHTO STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES OR PER ASTM C1840.
- PAYMENT:**
- EXCAVATION FOR PIPE WILL NOT BE MEASURED AND PAID FOR DIRECTLY AND ANY SOIL NOT MEETING REQUIREMENT FOR TRENCHES SHALL BE REMOVED AND REPLACED. ALL COST OF THIS WORK WILL BE INCLUDED IN THE COST OF THE PROPOSED PIPE CULVERT. SEE TABLE B FOR PIPE CULVERT ITEM NUMBERS.
- PAYMENT FOR CLASS "B" BEDDING MATERIAL, UNCLASSIFIED BACKFILL TO THE LIMIT LINE, AND/OR IF REQUIRED EXCAVATABLE FLOWABLE FILL AND BEDDING MATERIAL WILL BE INCLUDED IN THE UNIT PRICE OF THE PIPE.
- GEOTEXTILE TYPE III TO BE USED ONLY IF IMPROVED FOUNDATION IS REQUIRED, AND WILL BE PAID UNDER ITEM NO.

740-10.03	GEOTEXTILE (TYPE III)(EROSION CONTROL)	PER S.Y.
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CONCRETE PIPE CULVERT				CLASS "B" BEDDING MATERIAL (CY/LF)	UNCLASSIFIED BACKFILL MATERIAL (CY/LF)
PIPE DIA	PAYMENT ITEM NO (PER L.F.)	CLASS**	MIN.* W		
18"	607-03.02 THRU 607-03-04	III THRU V	59"	0.216	0.336
24"	607-05.02 THRU 607-05-04	III THRU V	66"	0.266	0.479
30"	607-06.02 THRU 607-06-04	III THRU V	73"	0.283	0.581
36"	607-07.02 THRU 607-07-04	III THRU V	80"	0.302	0.683
42"	607-08.02 THRU 607-08-04	III THRU V	87"	0.323	0.787
48"	607-09.02 THRU 607-09-04	III THRU V	94"	0.344	0.891
54"	607-10.02 THRU 607-10-04	III THRU V	101"	0.363	0.989
60"	607-11.03 THRU 607-11-05	III THRU V	108"	0.386	1.105

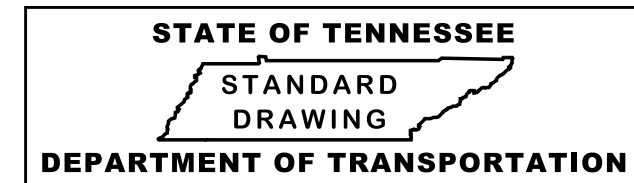
**LEGEND**

ID	=	INSIDE DIAMETER
OD	=	OUTSIDE DIAMETER
		CLASS "B" BEDDING COMPACTED TO 90% STANDARD PROCTOR DENSITY
		CLASS "B" BEDDING UNCOMPACTED
		FIRM INSITU SOIL OR CLASS "B" BEDDING COMPACTED TO 90% STANDARD PROCTOR DENSITY
		HAUNCH AREA, SHOVEL COMPACTED
		UNCLASSIFIED BACKFILL (FINE COMPACTABLE SOIL)

\* FOR " WALL B" WALL THICKNESS.  
\*\* NOTE: CONCRETE PIPE CLASSES FOR REQUIRED D-LOAD CAPACITY. MINIMUM CLASS III SHALL BE USED UNDER ROADWAYS.

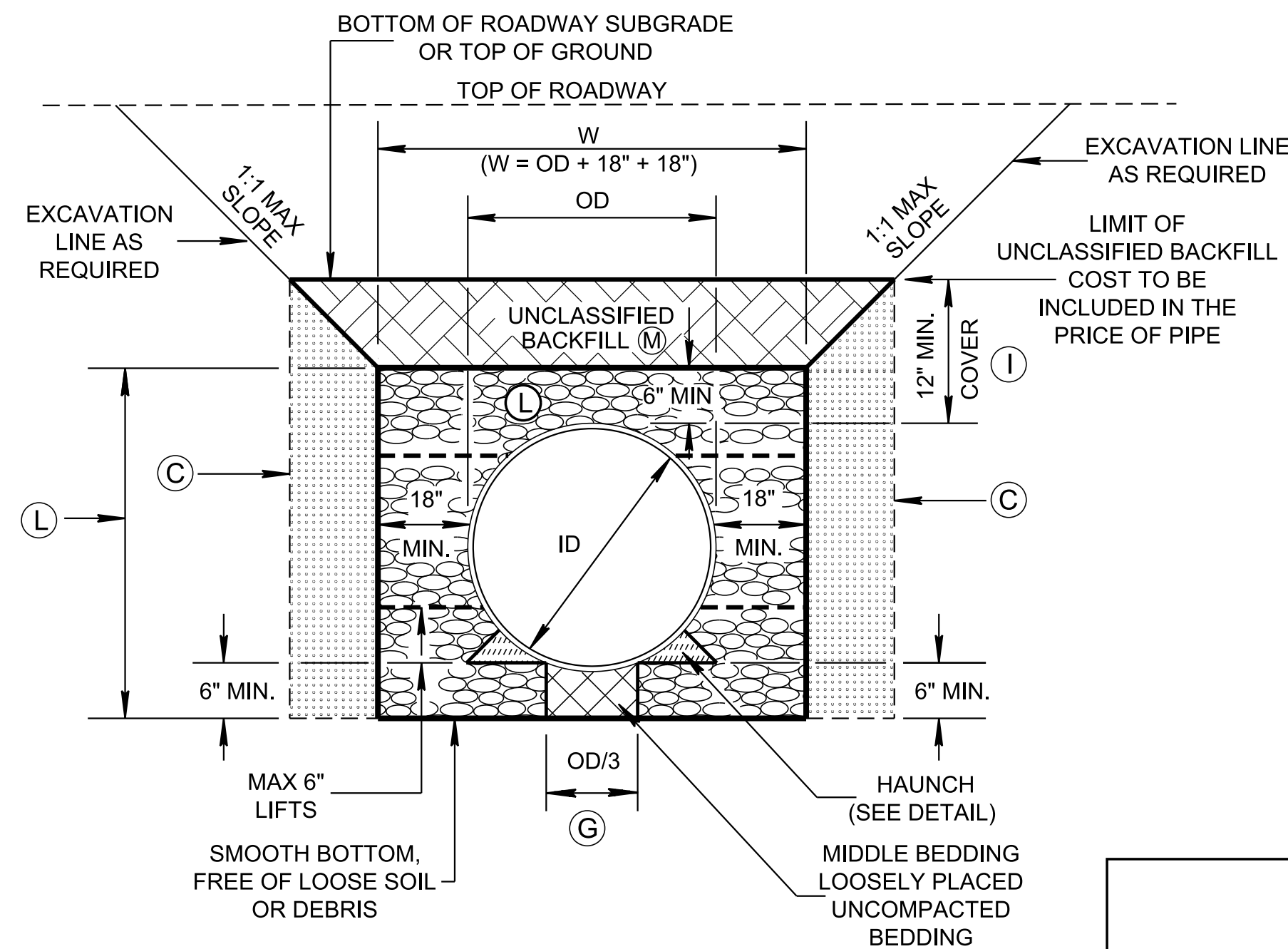
- REV. 7-12-07: REVISED GENERAL NOTE (I)
- REV. 6-1-09: REVISED GENERAL NOTE (I) AND TITLE NAME. ADDED GENERAL NOTE (I)
- REV. 2-1-12: REVISED DRAWING NAME ADDED EFF DETAIL. REVISED GENERAL NOTES AND TABLE. ADDED MINIMUM COVER TABLE.
- REV. 8-21-12: REVISED GENERAL NOTES. CHANGED BACKFILL MATERIAL.
- REV. 1-2-13: REVISED TRENCH DETAILS REVISED BEDDING TABLE.
- REV. 3-16-17: CLARIFIED PAYMENT ITEM NO. IN TABLE B.
- REV. 06-28-19: REVISED DETAIL FOR STANDARD TRENCH INSTALLATION, TABLE B AND GENERAL NOTES. REDREW SHEET.
- REV. 11-30-20: REVISED DETAIL FOR STANDARD TRENCH INSTALLATION, TABLE B AND GENERAL NOTES. ADDED BELL HOLE DETAIL.
- REV. 03-04-21: REVISED TABLE B.
- REV. 03-01-23: REVISED GENERAL NOTE (G)

APPROVED BY FHWA  
(ALL OTHERS APPROVED BY TDOT)



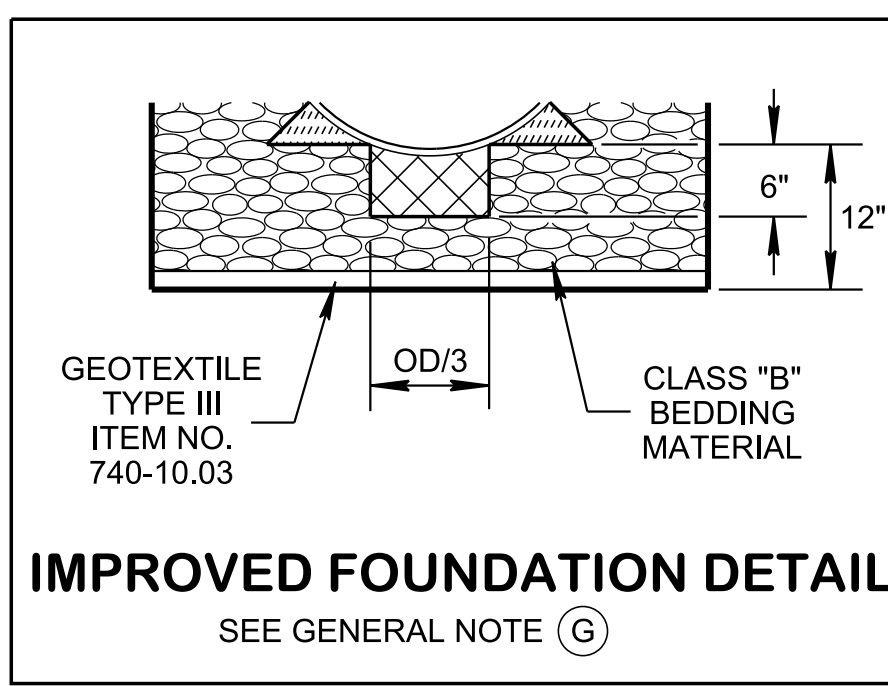
STANDARD DETAILS FOR CONCRETE PIPE INSTALLATION

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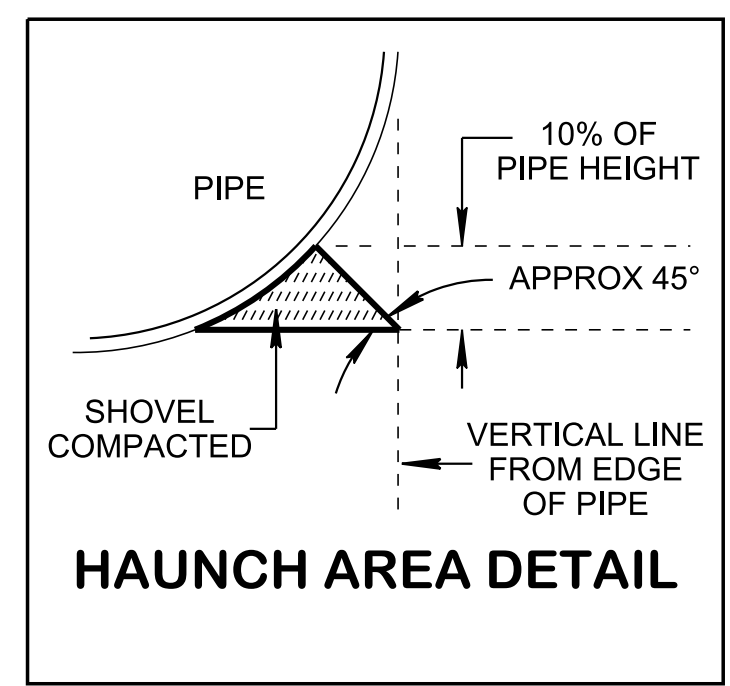


**STANDARD TRENCH INSTALLATION**

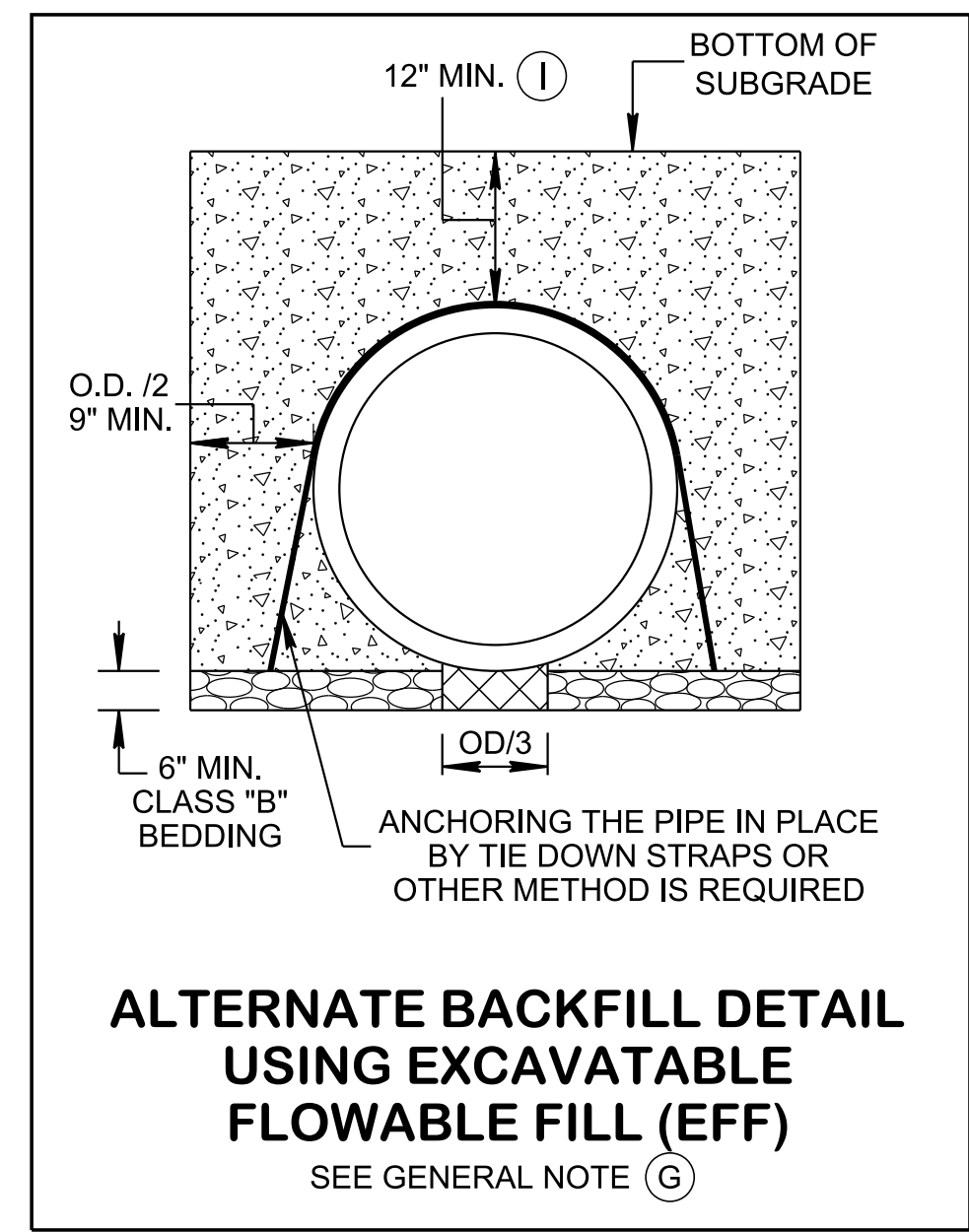
(PIPE CULVERT INSTALLATION DETAIL)  
NOTE: CENTER PIPE IN TRENCH  
SEE GENERAL NOTE (B)



**IMPROVED FOUNDATION DETAIL**  
SEE GENERAL NOTE (G)



**HAUNCH AREA DETAIL**



**ALTERNATE BACKFILL DETAIL USING EXCAVATABLE FLOWABLE FILL (EFF)**  
SEE GENERAL NOTE (G)

PIPE CULVERT		CLASS "B" BEDDING MATERIAL (CY/LF)	UNCLASSIFIED BACKFILL MATERIAL (CY/LF)
PIPE DIA	PAYMENT ITEM NO		
18"	607-03.30	0.371	0.095
24"	607-05.30	0.463	0.104
30"	607-06.30	0.595	0.117
36"	607-07.30	0.703	0.127
42"	607-08.30	0.814	0.137
48"	607-09.30	0.932	0.148
54"	607-10.30	1.055	0.158
60"	607-11.30	1.183	0.168
66"	607-12.30	1.315	0.178
72"	607-13.30	1.453	0.188

NOTE: SEE TDOT DESIGN DIVISION DRAINAGE MANUAL SECTION 6, APPENDIX, TABLE 6A-1 FOR PIPE SELECTION CRITERIA BASED ON SYSTEM AND FILL HEIGHT.

**LEGEND**

- ID = INSIDE DIAMETER
- OD = OUTSIDE DIAMETER
- CLASS "B" BEDDING COMPACTED TO 90% STANDARD PROCTOR DENSITY
- CLASS "B" BEDDING UNCOMPACTED
- FIRM INSITU SOIL OR CLASS "B" BEDDING COMPACTED TO 90% STANDARD PROCTOR DENSITY
- HAUNCH AREA, SHOVEL COMPACTED
- UNCLASSIFIED BACKFILL (FINE COMPACTABLE SOIL)
- EXCAVATABLE FLOWABLE FILL (EFF)

**GENERAL NOTES**

- PIPE MATERIALS:**
- (A) FLEXIBLE PIPE MATERIALS ARE HDPE, PVC, CMP, SRTRP, AND PP.
- ALL HIGH DENSITY POLYETHYLENE (HDPE) PIPE USED FOR CULVERT AND STORM DRAIN APPLICATIONS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M294, TYPE S, CURRENT EDITION ALL HDPE PIPE DELIVERED AND USED SHALL BE A PARTICIPANT IN NTPEP. MAX. PIPE DIA. FOR HDPE PIPE IS 60".
- POLY VINYL CHLORIDE (PVC) PROFILE WALL DRAINAGE PIPE SHALL MEET AASHTO DESIGNATION M-304. THE MAXIMUM PIPE DIAMETER FOR PVC PIPE IS 36".
- STEEL REINFORCED THERMOPLASTIC RIBBED PIPE (SRTRP) SHALL MEET AASHTO DESIGNATION M335, THE MAXIMUM PIPE DIAMETER FOR THE PIPE IS 60".
- CORRUGATED METAL PIPE (CMP) SHALL BE ALUMINIZED COATED CORRUGATED METAL PIPE AND SHALL MEET AASHTO M274, MAXIMUM DIA IS 72".
- POLYPROPYLENE PIPE (PP) SHALL MEET AASHTO DESIGNATION M-330, THE MAXIMUM PIPE DIAMETER IS 60".
- INSTALLATIONS REQUIREMENTS:**
- (B) FOR EMBANKMENT AREAS OR WHERE TRENCH CONDITIONS DO NOT EXIST, AN INDUCED TRENCH SHALL BE CONSTRUCTED. SEE STD. DWG. NO. D-PB-3.
- (C) FOR TRENCHES WITH IN SITU SOIL WALLS, ANY PORTION OF THE WALL SHALL BE AT LEAST AS FIRM AS THE MAJORITY OF THE SUBGRADE. SOIL NOT MEETING THIS REQUIREMENT SHALL BE REMOVED AND REPLACED.
- (D) FOR ADDITIONAL INSTALLATION INFORMATION SEE AASHTO SECTION 30 OR ASTM D2321. ALL PIPES SHALL BE ASSEMBLED AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS. PIPE SHALL BE PLACED IN THE BED STARTING AT THE DOWNSTREAM END.
- (E) ONLY AS MUCH TRENCH AS CAN BE SAFELY MAINTAINED SHALL BE OPENED. ALL TRENCHES SHALL BE BACKFILLED AND COMPACTED TO THE MINIMUM COVER DEPTH OF 12" ABOVE THE PIPE AS SOON AS PRACTICABLE, BUT NOT LATER THAN THE END OF EACH WORKING DAY IN ACCORDANCE WITH THE COMPACTION REQUIREMENTS.
- (F) **JOINT REQUIREMENTS:**
- CMP JOINING SYSTEM SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M36. HDPE, PP, SRTRP, AND PVC PIPE SHALL BE JOINED IN ACCORDANCE WITH ASTM D3212 AND MEET THE PERFORMANCE REQUIREMENT FOR SOIL-TIGHTNESS, UNLESS WATER-TIGHTNESS IS SPECIFIED. FOR A CONTINUOUS LINE OF PIPE, THE CONNECTIONS BETWEEN PIPE SECTIONS WILL BE FREE FROM IRREGULARITIES ALONG THE FLOW LINE. JOINTS BETWEEN PLASTIC FLEXIBLE PIPE AND STRUCTURE SHALL HAVE A GASKET MEETING ATM F2510. FOR CMP PIPE TO STRUCTURE CONNECTIONS OR PLASTIC PIPE AT A SKEW GREATER THAN 15°, WHERE A GASKET WILL NOT WORK, NON-SHRINK GROUT APPLIED IN TWO STAGES SHALL BE USED.
- (G) ONLY WHERE THE TRENCH FOUNDATION IS FOUND UNACCEPTABLE OR LOCATION WHERE THE WATER TABLE IS FOUND HIGH:
- (1) IMPROVED FOUNDATION OR EXCAVATABLE FLOWABLE FILL (EFF) MAY BE USED AT ENGINEER'S INSTRUCTION AS SHOWN ON THIS SHEET. AS NEEDED, THE COST OF REMOVAL OF UNSATISFACTORY BEDDING MATERIAL AND REPLACEMENT WITH SATISFACTORY MATERIAL, INCLUDING GEOTEXTILE, WILL BE PAID SEPARATELY.
  - (2) FIELD ENGINEER SHALL REVIEW SITE CONDITIONS INCLUDING THE POSSIBLE EFFECTS OF WATER TABLE TO CONFIRM TYPICAL BEDDING AS SHOWN IS ADEQUATE TO PROVIDE STRUCTURAL SUPPORT OR FOUNDATION IMPROVEMENT IS REQUIRED.
- (H) MINIMUM SPACING BETWEEN MULTIPLE PIPES ARE:
- 36" PIPES AND SMALLER: EQUAL TO THE OUTSIDE DIAMETER OF THE LARGEST PIPE.
- PIPES LARGER THAN 36": EQUAL TO HALF THE OUTSIDE DIAMETER OF THE LARGEST PIPE.
- (I) FOR MINIMUM COVER DEPTHS FOR CONSTRUCTION LOADS SEE D-PB-3.
- (J) MAXIMUM ALLOWABLE FILL HEIGHTS ARE AS DEFINED IN THE DRAINAGE MANUAL SECTION 6, APPENDIX, TABLE 6A-1.
- BEDDING AND BACKFILL REQUIREMENTS:**
- (K) PLACE 6 INCHES MINIMUM OF CLASS B BEDDING MATERIAL, ALONG WITH SUFFICIENT ADDITIONAL CLASS "B" BEDDING MATERIAL ACCURATELY SHAPED AS SHOWN IN HAUNCH AREA DETAIL.
- (L) CLASS "B" BEDDING MATERIAL MEETING THE REQUIREMENTS OF CONSTRUCTION SPECIFICATION SUBSECTION 204.04 SHALL BE PLACED IN LIFTS AND UP TO 6 INCHES ABOVE THE TOP OF PIPE. A MINIMUM COMPACTION LEVEL OF 90% OF THE STANDARD PROCTOR DENSITY PER AASHTO T99 SHALL BE ACHIEVED BY USE OF VIBRATORY PLATE.
- (M) UNCLASSIFIED BACKFILL SHALL BE PLACED AND COMPACTED IN LAYERS NOT EXCEEDING A 8 INCH LOOSE LIFT THICKNESS STARTING FROM THE CLASS B BEDDING, 6 INCHES ABOVE THE TOP OF PIPE, TO AN ELEVATION NOT LESS THAN ONE FOOT ABOVE THE TOP OF THE PIPE.
- (N) **END TREATMENTS:**
- (1) ALL CROSS DRAINS (PERPENDICULAR) PLACED UNDER A MAINLINE ROADWAY REQUIRE TYPE U ENDWALLS CONFORMING TO THE ROADWAY FILL SLOPE AS SHOWN ON STANDARD DRAWINGS D-PE-15A THROUGH D-PE-48A FOR END WALL GEOMETRY AND D-PE-99 FOR GRATE DETAILS. ALL CULVERT ENDWALLS LOCATED WITHIN THE CLEAR ZONE (S-CZ-1) REQUIRE A SAFETY GRATE (18" OR 24" PIPE ENDWALLS MAY OMIT THE STEEL GRATE). ALL CROSS DRAIN CULVERTS LARGER THAN 48" MUST BE PROTECTED BY A GUARDRAIL OR ENDWALL OR MUST BE PLACED OUTSIDE THE CLEAR ZONE. CROSS DRAIN ENDWALLS PLACED OUTSIDE THE CLEAR ZONE MAY USE TYPE A (D-PE-1), TYPE B (D-PE-9 THRU 9F), OR STRAIGHT HEADWALL (D-PE-4) IN LIEU OF TYPE U OR IF THE PIPE END WALL IS PROTECTED BY A GUARDRAIL.
  - (2) ALL SIDE DRAINS (PARALLEL) PLACED UNDER A SIDE ROAD, DRIVEWAY, OR FIELD ENTRANCE, ETC. THAT INTERSECT A MAINLINE ROADWAY, REQUIRE SAFETY ENDWALLS AS SHOWN ON THE D-SEW- SERIES STANDARD DRAWINGS WITH SAFETY GRATE (D-SEW-1A) WITH A MAXIMUM 6:1 TAPER IF THE CULVERT ENDWALLS ARE LOCATED INSIDE THE CLEAR ZONE (S-CZ-1).
  - (3) ALL MEDIAN CROSSOVER SIDE DRAINS (LONGITUDINAL) PLACED UNDER MEDIAN OPENINGS REQUIRE SAFETY ENDWALLS AS SHOWN ON D-SEW- 12D STANDARD DRAWING WITH SAFETY GRATE (D-SEW-1A) WITH MAXIMUM 12:1 TAPER IF THE CULVERT ENDWALLS ARE LOCATED INSIDE THE CLEAR ZONE (S-CZ-1).
- (O) **INSPECTION REQUIREMENTS:**
- ALL PIPES SHALL UNDERGO INSPECTION ACCORDING TO SECTION 607.09 OF THE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION OR PER SECTION 30 OF AASHTO STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES CURRENT EDITION.
- (P) **PAYMENT:**
- EXCAVATION FOR PIPE WILL NOT BE MEASURED AND PAID FOR DIRECTLY AND ANY SOIL NOT MEETING REQUIREMENT FOR TRENCHES SHALL BE REMOVED AND REPLACED. ALL COST OF THIS WORK WILL BE INCLUDED IN THE COST OF THE PROPOSED PIPE CULVERT. SEE TABLE A FOR PIPE CULVERT ITEM NUMBERS.
- PAYMENT FOR CLASS "B" BEDDING MATERIAL, UNCLASSIFIED BACKFILL TO THE LIMIT LINE, AND/OR IF REQUIRED EXCAVATABLE FLOWABLE FILL, TIE DOWN STRAPS AND BEDDING MATERIAL WILL BE INCLUDED IN THE UNIT PRICE OF THE PIPE.
- GEOTEXTILE TYPE III TO BE USED ONLY IF IMPROVED FOUNDATION IS REQUIRED, AND WILL BE PAID UNDER ITEM NO.

- REV. 7-12-07: REVISED GENERAL NOTE (I)
- REV. 6-1-09: REVISED GENERAL NOTE (I) AND TITLE NAME. ADDED GENERAL NOTE (I)
- REV. 2-1-12: REVISED DRAWING NAME ADDED EFF DETAIL. REVISED GENERAL NOTES AND TABLE. ADDED MINIMUM COVER TABLE.
- REV. 8-21-12: REVISED GENERAL NOTES. CHANGED BACKFILL MATERIAL.
- REV. 1-2-13: REVISED TRENCH AND ADDED FILL DETAIL.
- REV. 1-29-14: ADDED PP, RE LETTERED AND REVISED NOTES.
- REV. 06-28-19: REVISED DETAIL FOR STANDARD TRENCH INSTALLATION, AND GENERAL NOTES. REMOVED TABLE A AND RENAMED TABLE B TO A. REVISED TABLE A CONTENT AND LEGEND. REDREW SHEET.
- REV. 11-30-20: REVISED DETAIL FOR STANDARD TRENCH INSTALLATION, TABLE A AND GENERAL NOTES.
- REV. 03-04-21: REVISED TABLE A.
- REV. 01-28-22: REVISED GENERAL NOTE (F).
- REV. 03-01-23: REVISED GENERAL NOTE (G).

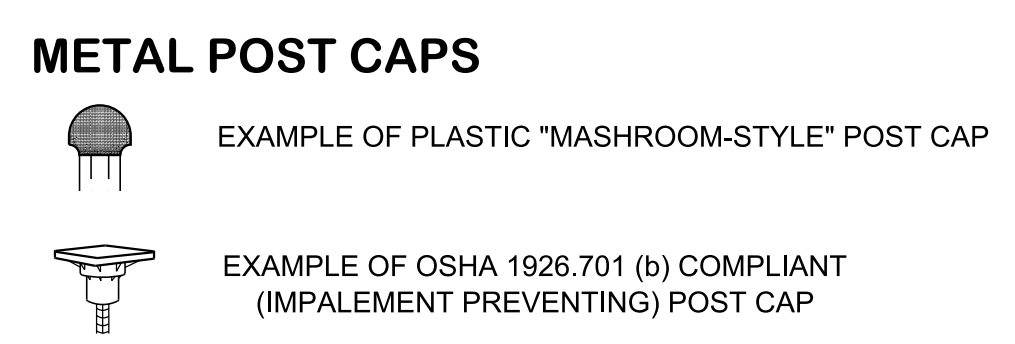
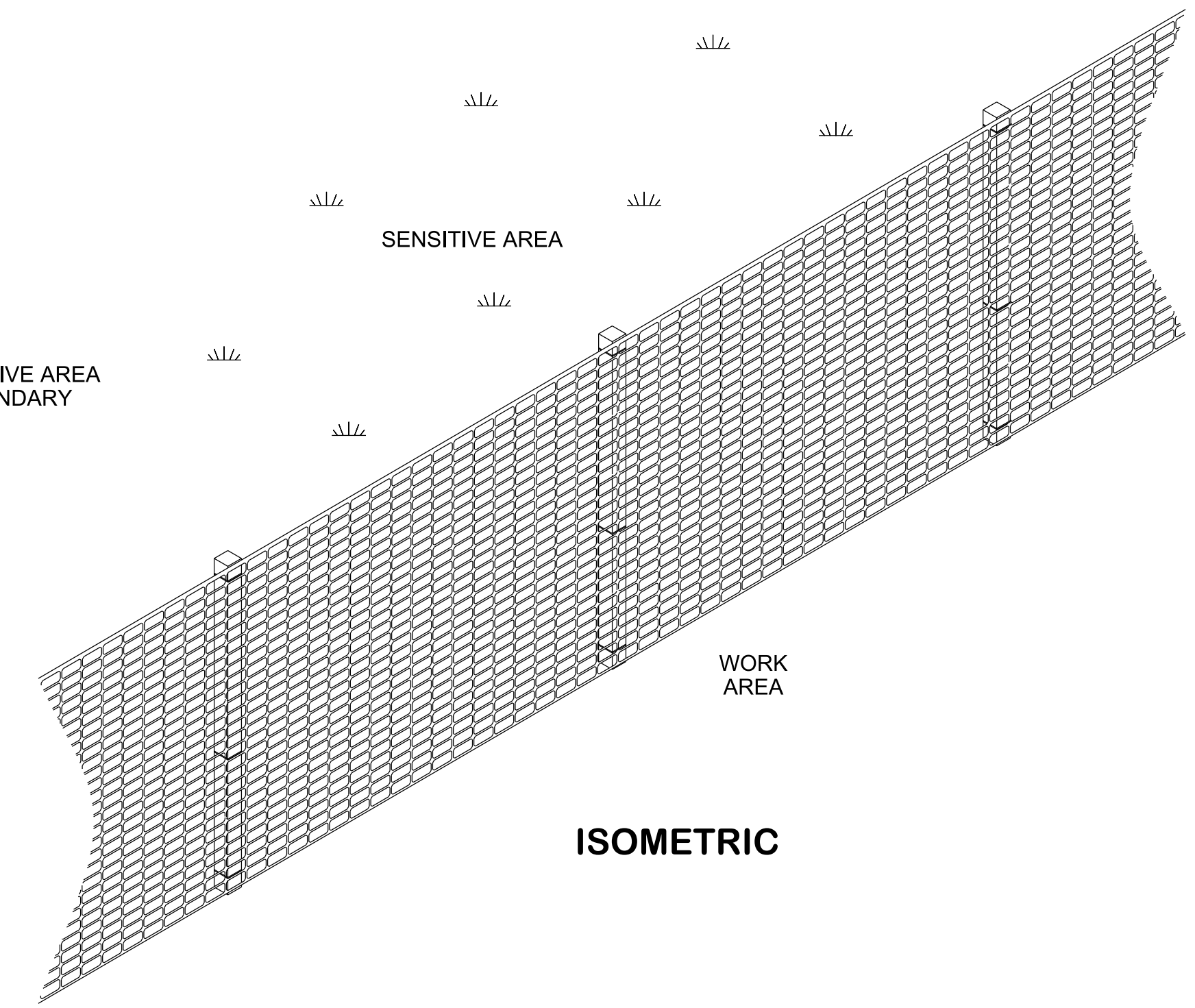
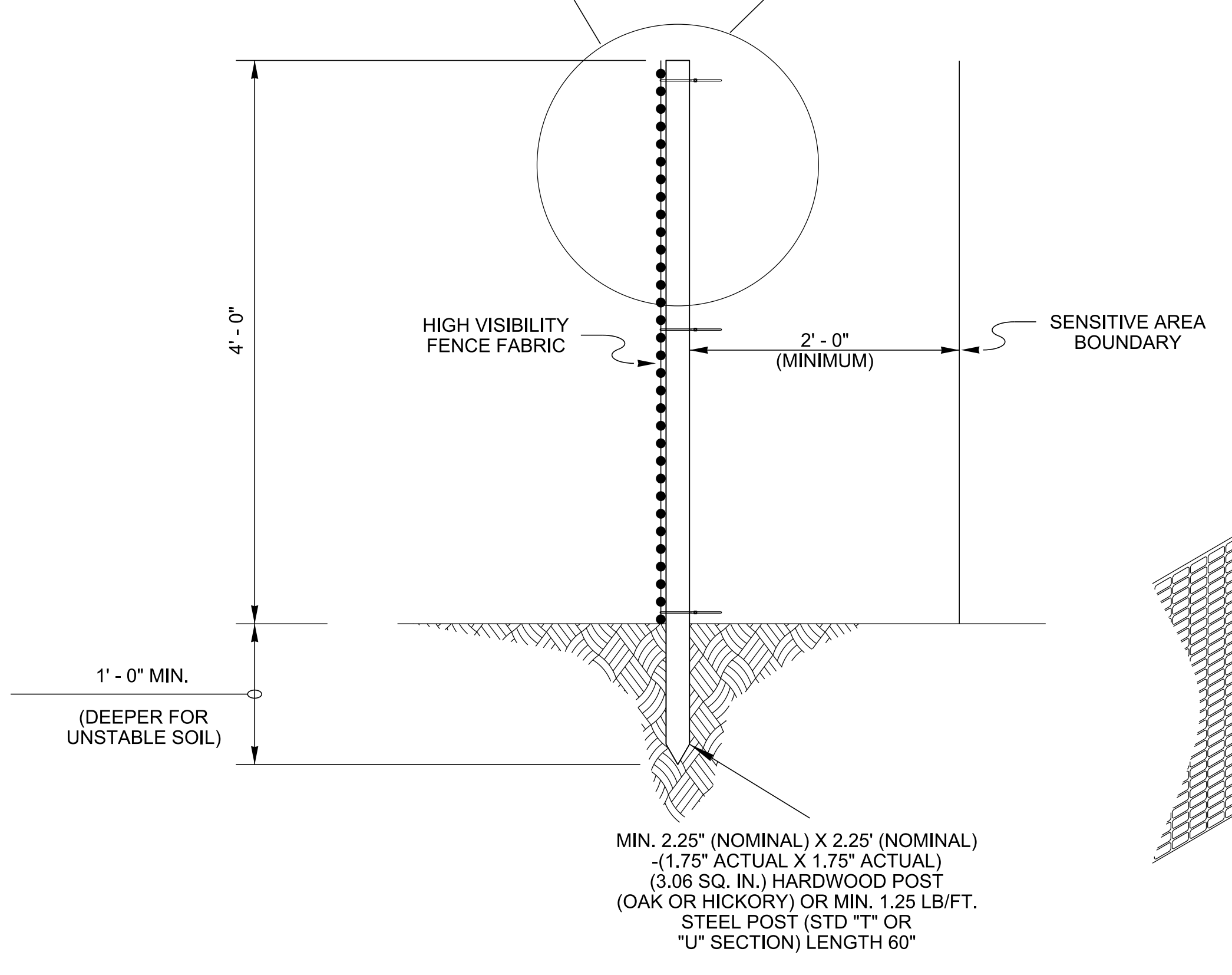
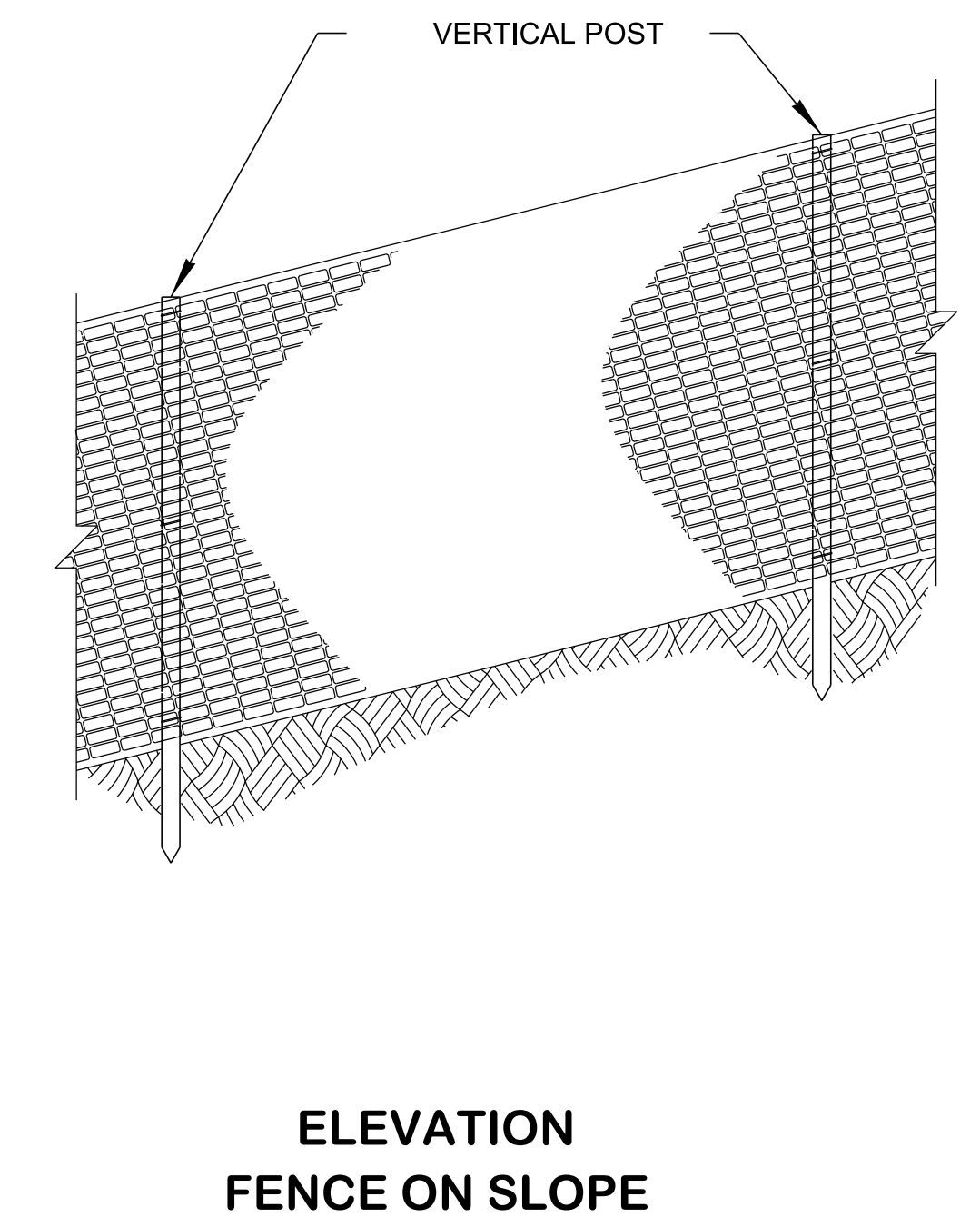
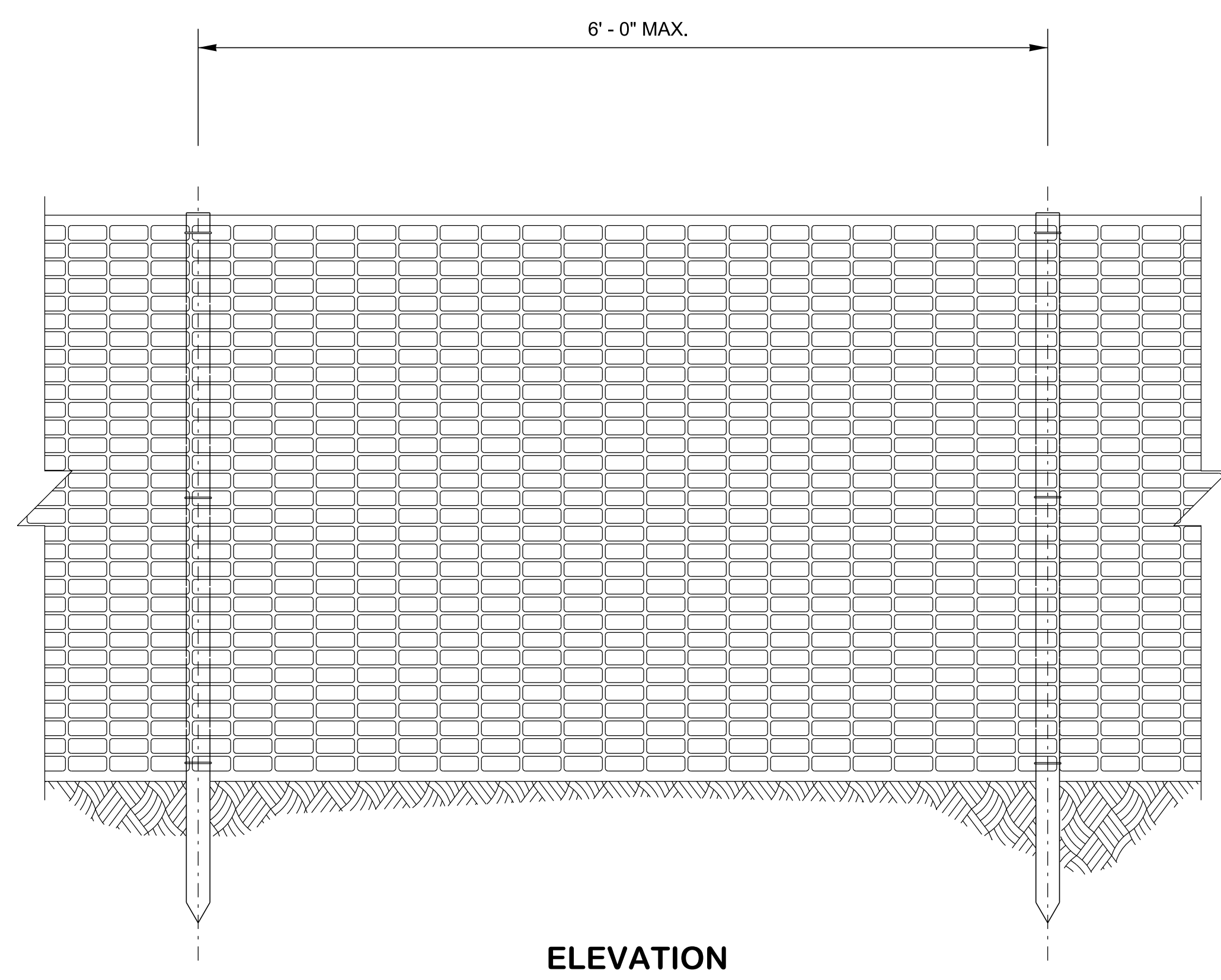
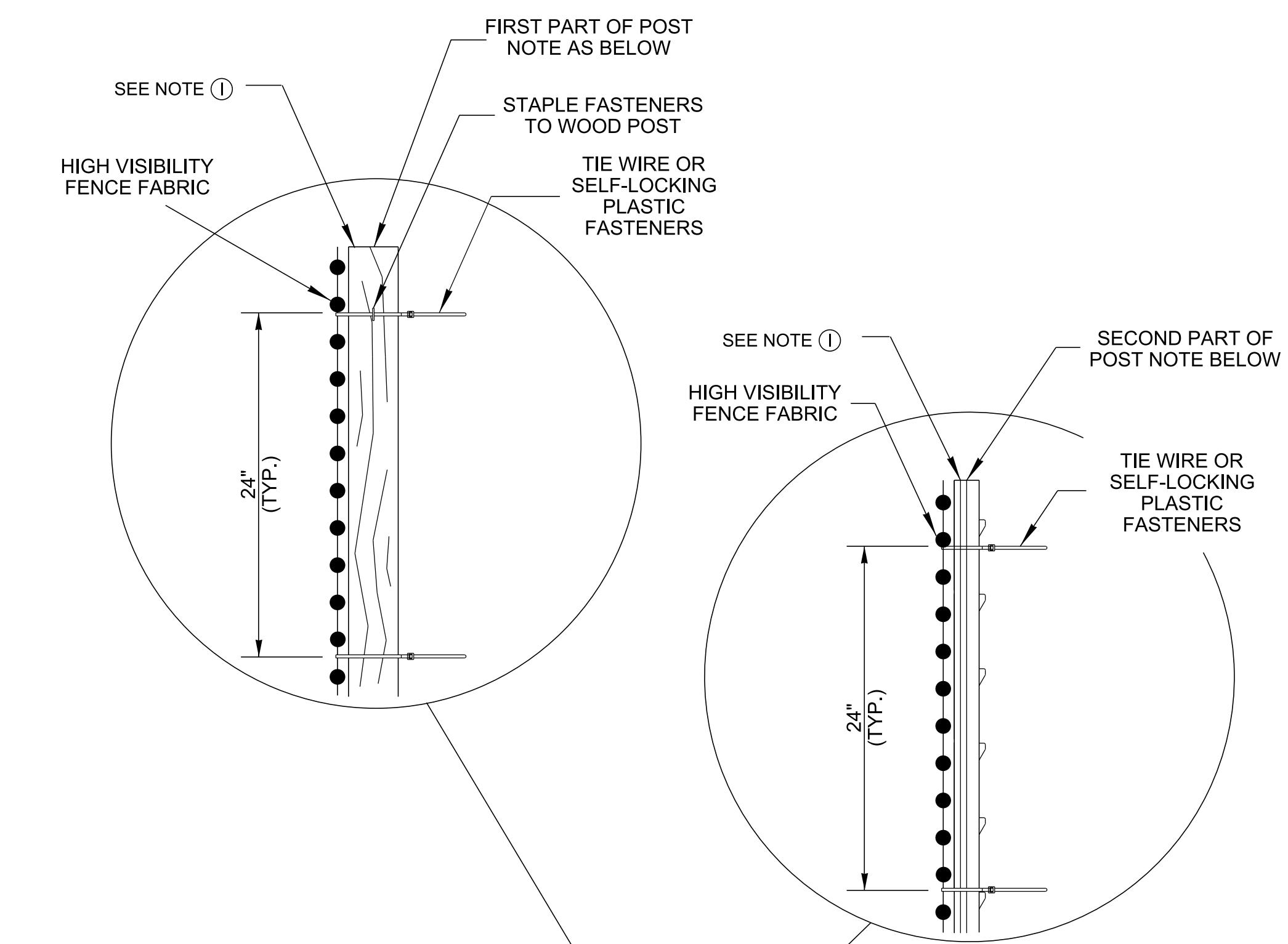
APPROVED BY FHWA  
(ALL OTHERS APPROVED BY TDOT)

STATE OF TENNESSEE  
STANDARD DRAWING  
DEPARTMENT OF TRANSPORTATION  
STANDARD DETAILS FOR FLEXIBLE PIPE INSTALLATION

740-10.03      GEOTEXTILE (TYPE III)(EROSION CONTROL)      PER S.Y.

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REV. 05-24-12: ADDED HIGH VISIBILITY FENCE LEGEND.  
 REV. 06-28-2019: ADDED GENERAL NOTE NO. ① REDREW SHEET.  
 REV. 03-01-2023: GENERAL NOTE ① WAS REVISED. ADDED METAL POST CAPS LEGEND.



- GENERAL NOTES**
- (A) HIGH VISIBILITY FENCE IS INTENDED TO BE PLACED TO PREVENT DISTURBANCE OF SENSITIVE AREAS, THEIR BUFFERS, AND OTHER AREAS REQUIRED TO BE LEFT UNDISTURBED DURING CONSTRUCTION. IT MAY ALSO BE USED TO MARK APPROVED CLEARING LIMITS AND TO CONTROL VEHICLE ACCESS TO AND ON THE PROJECT SITE.
  - (B) HIGH VISIBILITY FENCE FABRIC SHALL BE MACHINED PRODUCED ORANGE COLORED MESH MANUFACTURED FROM POLYPROPYLENE OR POLYETHYLENE. IT SHALL BE FULLY STABILIZED ULTRAVIOLET RESISTANT.
  - (C) HIGH VISIBILITY FENCE FABRIC MAY BE MADE FROM RECYCLED MATERIALS. MATERIALS SHALL NOT CONTAIN BIODEGRADABLE FILLER MATERIALS THAT CAN DEGRADE THE PHYSICAL OR CHEMICAL CHARACTERISTICS OF THE FINISHED FABRIC.
  - (D) HIGH VISIBILITY FENCE FABRIC SHALL HAVE A MINIMUM 4 FOOT WIDTH AND SHALL BE FURNISHED IN ONE CONTINUOUS WIDTH AND SHALL NOT BE SPLICED TO CONFORM TO THE SPECIFIED WIDTH DIMENSION.
  - (E) STEEL POST SHALL BE ROLLED FROM HIGH CARBON STEEL AND SHALL HAVE A MINIMUM WEIGHT OF 1.25 LB/FT. POST SHALL BE HOT-DIPPED GALVANIZED OR PAINT. STEEL POST MAY BE EQUIPPED WITH AN ANCHOR PLATE HAVING A MINIMUM AREA OF 14 SQUARE INCHES. IF POSTS ANCHOR PLATES USED THEY SHALL CONFORM TO THE REQUIREMENTS OF ASTM A702.
  - (F) HIGH VISIBILITY FENCE FABRIC SHALL BE FASTENED TO THE POST USING TIE WIRE OR SELF-LOCKING PLASTIC FASTENERS WITH A MAXIMUM FASTENERS SPACING OF 2 FEET. WHEN WOOD POSTS ARE USED THE FASTENERS SHALL BE STAPLED TO THE POST.
  - (G) HIGH VISIBILITY FENCE THAT IS DAMAGED DURING CONSTRUCTION SHALL BE REPAIRED OR REPLACED AT THE CONSTRUCTORS EXPENSE ON THE SAME DAY THE DAMAGE OCCURS.
  - (H) HIGH VISIBILITY FENCE SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBER:  
 707-08.11 HIGH VISIBILITY CONSTRUCTION FENCE, L.F.  
 PAYMENT SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR CONSTRUCTION MAINTENANCE, AND REMOVAL OF HIGH VISIBILITY FENCE.
  - (I) OSHA 1926.701(B) COMPLIANT (IMPALEMENT PREVENTING) POST CAPS SHALL BE REQUIRED FOR ANY METAL POST ABOVE WHICH PEOPLE MAY BE WORKING AND THE RISK OF FALLING DOWN ONTO THE POST IS PRESENT. REGARDLESS OF HOW HIGH THE POST STICKS UP OUT OF THE GROUND. PLASTIC "MUSHROOM-STYLE" POST CAPS SHALL BE REQUIRED FOR ANY METAL POST WITH AN INSTALLED HEIGHT LESS THAN 36" ABOVE THE GROUND AND WHEN THERE ARE NO WORKERS CONDUCTING WORK ABOVE THE POSTS. NO CAPS SHALL BE REQUIRED FOR METAL POSTS WITH AN INSTALLED HEIGHT OF 36" OR GREATER AND WHEN THERE ARE NO WORKERS CONDUCTING WORK ABOVE THE POSTS. ALL CAPS SHALL BE ORANGE OR YELLOW TO ENHANCE VISIBILITY. WHEN REQUIRED, PAYMENT OF POST CAPS SHALL BE INCLUDED IN THE TOTAL COST OF HIGH VISIBILITY FENCE.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED

STATE OF TENNESSEE  
 STANDARD DRAWING  
 DEPARTMENT OF TRANSPORTATION

HIGH VISIBILITY  
 FENCE

EROSION CONTROL PLAN LEGEND: \* HVF \* HVF \* HIGH VISIBILITY FENCE

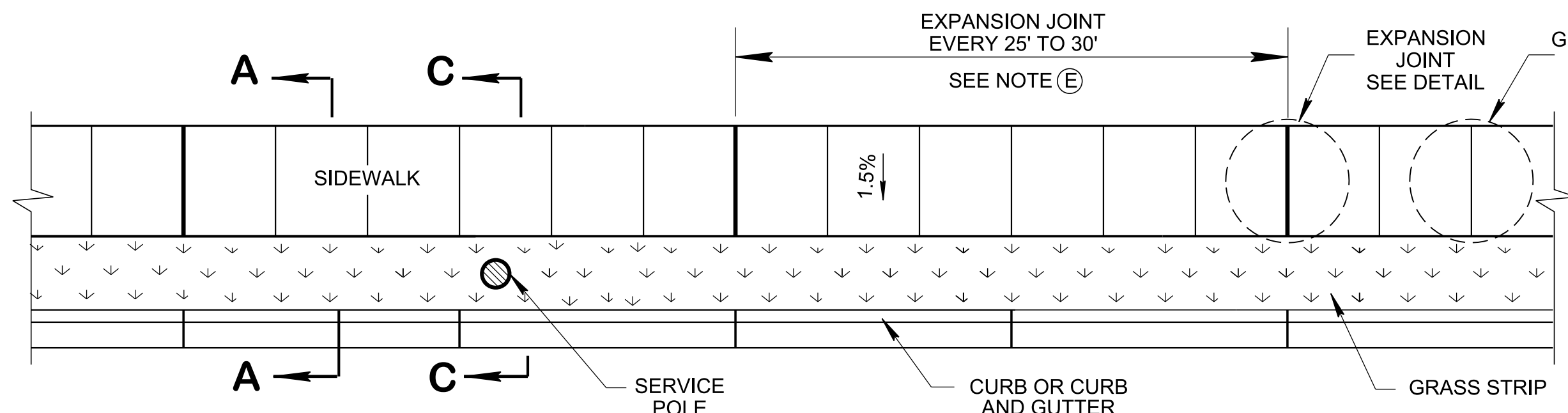
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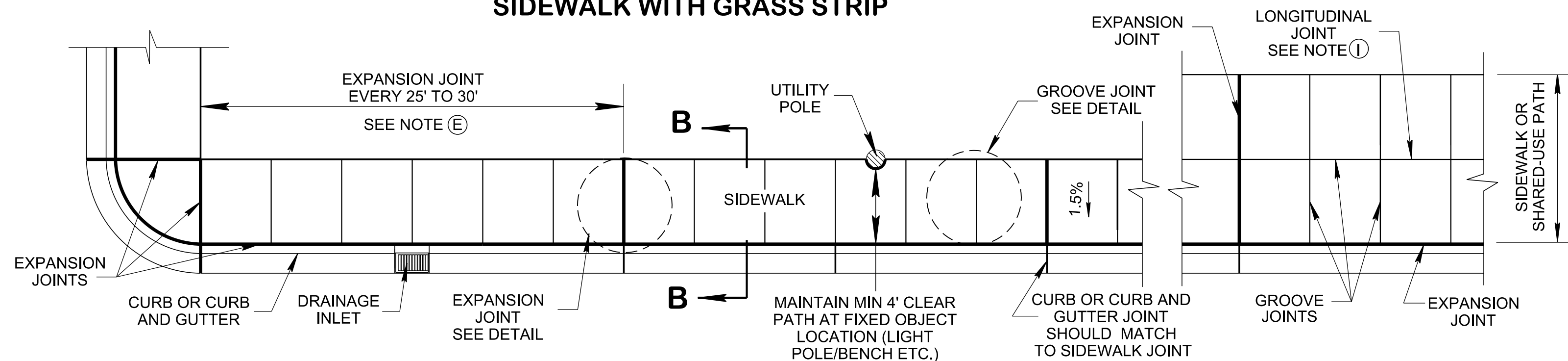
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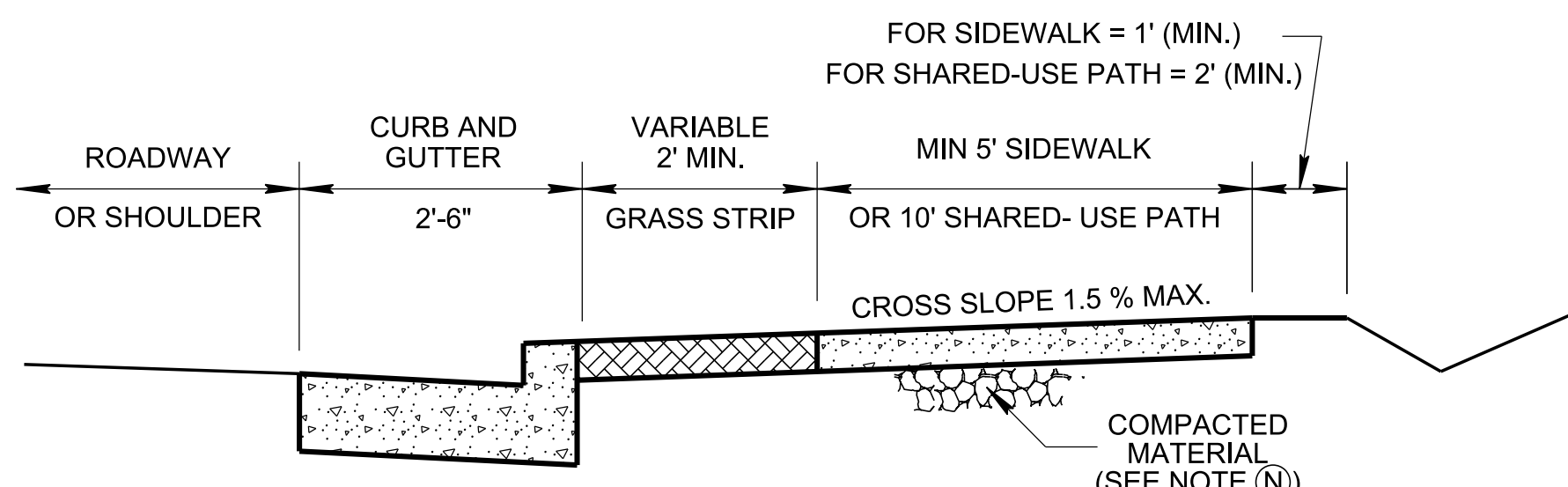
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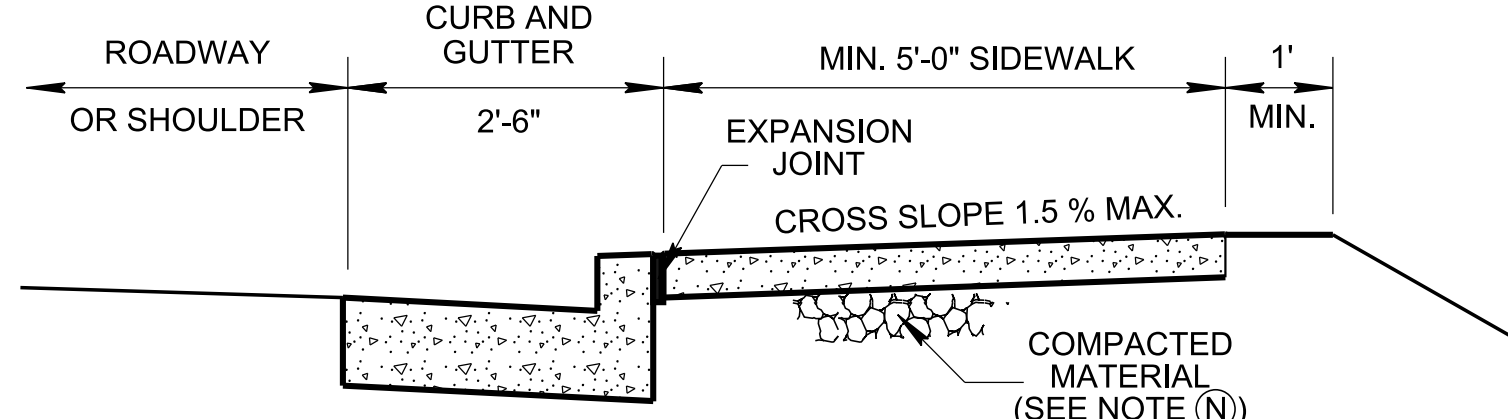
**PLAN VIEW  
SIDEWALK WITH GRASS STRIP**



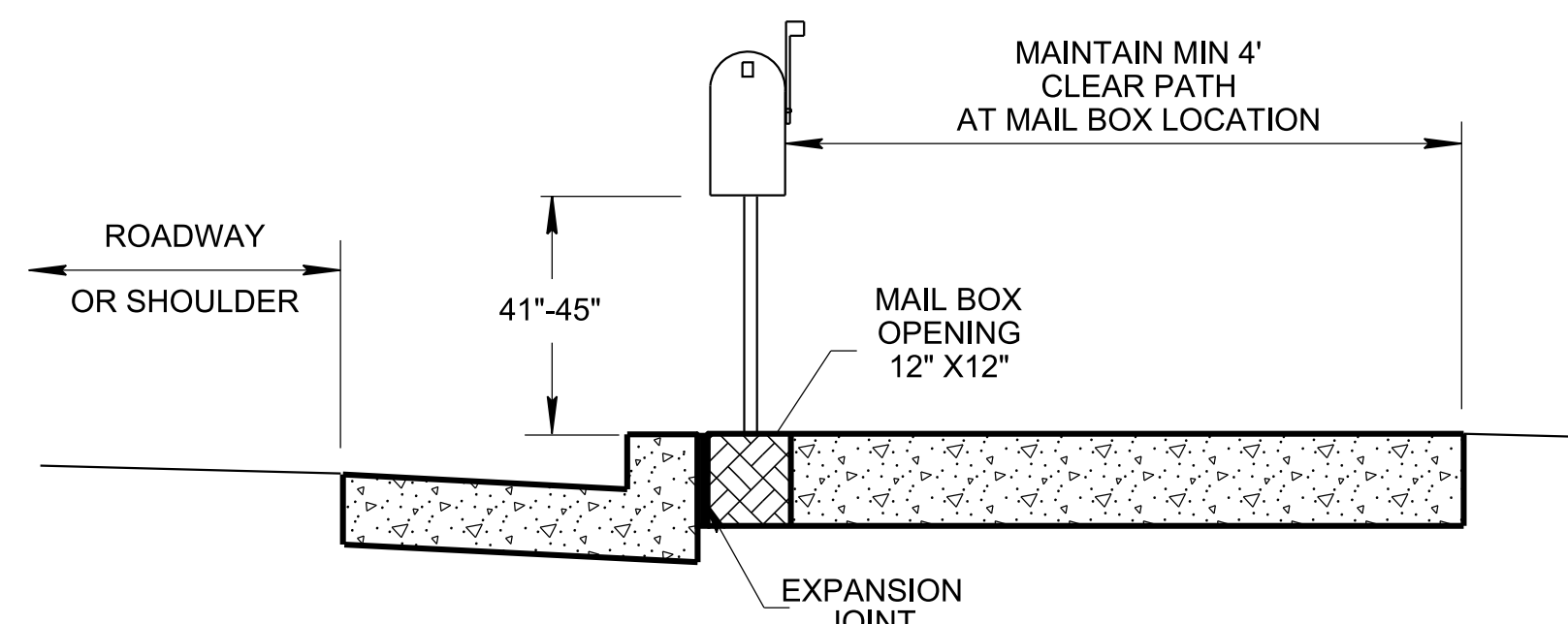
**PLAN VIEW  
SIDEWALK WITHOUT GRASS STRIP**  
(NOTE: WHEN NEEDED DUE TO EXTREME SITE CONDITIONS THE PLACEMENT OF SERVICE APPURTENANCES SHALL PROVIDE MINIMUM 4' CLEAR PATH.)



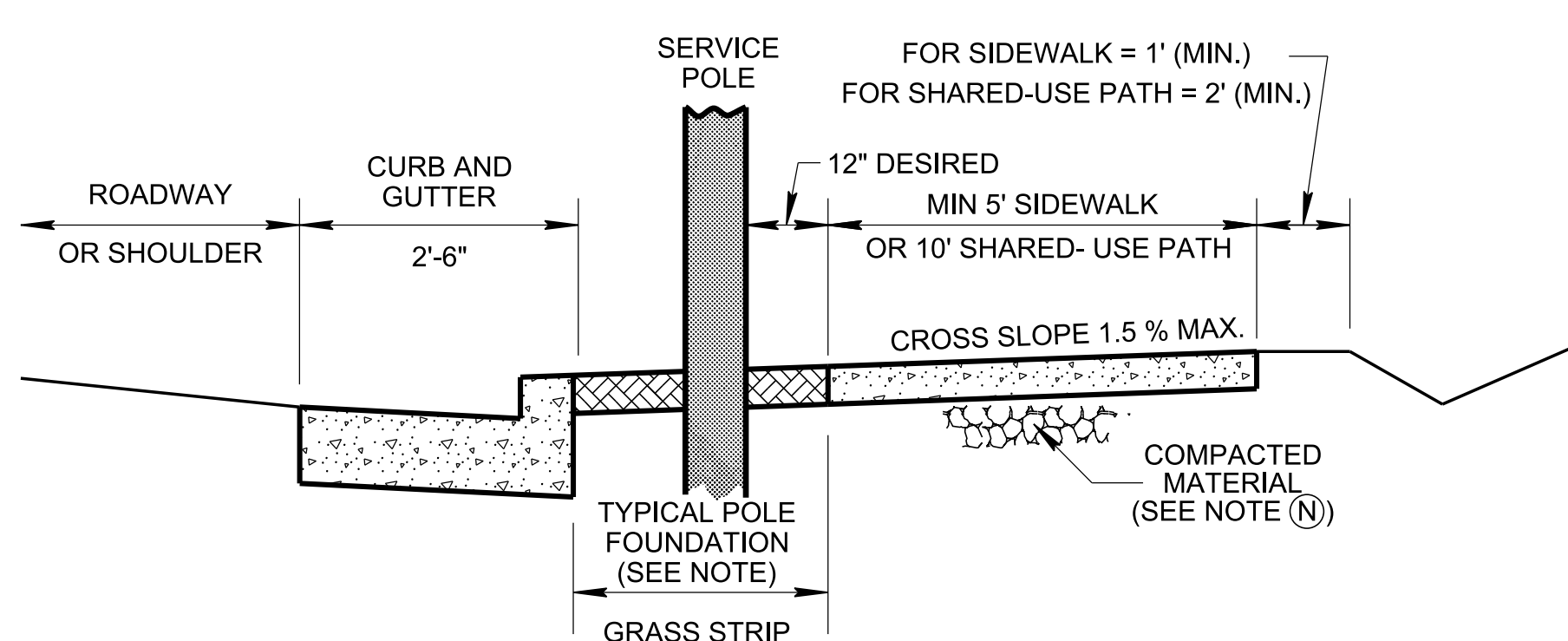
**SECTION A-A  
TYPICAL SIDEWALK CROSS SECTION  
WITH GRASS STRIP**



**SECTION B-B  
TYPICAL SIDEWALK CROSS SECTION  
WITHOUT GRASS STRIP**

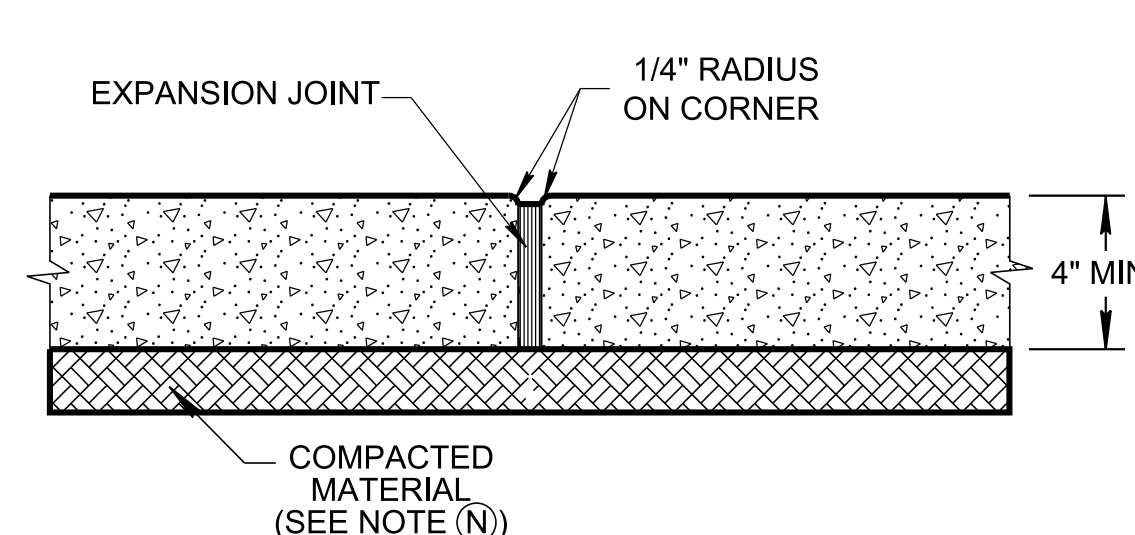


**MAILBOX DETAIL**

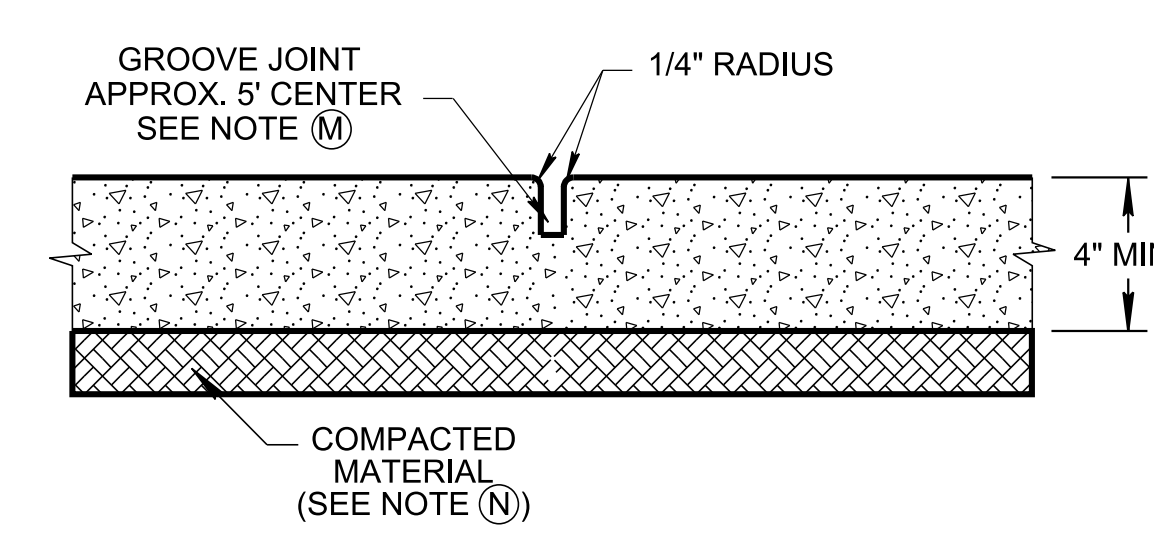


NOTE: IF SERVICE POLE IS PLACED IN GRASS STRIP THE POLE SHALL HAVE MIN. 3' OFFSET FROM TRAVELLED LANE. MINIMUM 36" DIAMETER AND 15' DEEP FOUNDATION SPACE SHALL BE EVALUATED TO ELIMINATE CONFLICTS. SEE STANDARD TRAFFIC OPERATION DRAWINGS T-SG-9 AND T-SG-10 FOR MORE INFORMATION.

SERVICE APPURTENANCES (LARGE SIGNS, STRUCTURES, SIGNAL, LUMINARY AND UTILITY POLES 2' DIAMETER OR LARGER) SHALL BE PLACED OUTSIDE THE PEDESTRIAN ACCESSIBLE SPACE, PREFERABLY OUTSIDE THE SIDEWALK AREA AND INSIDE THE RIGHT-OF-WAY.  
**SECTION C-C  
TYPICAL SIDEWALK CROSS SECTION  
WITH GRASS STRIP AND SERVICE APPURTENANCES**



**EXPANSION JOINT DETAIL**



**HAND TOOL GROOVE JOINT DETAIL**

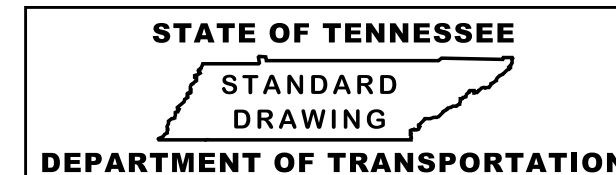
**REFERENCED STANDARD DRAWINGS**

- SEE T-M-4, FOR CROSS WALK MARKING
- SEE MM-CR SERIES FOR CURB RAMP DETAILS
- SEE MM-BPR-1, FOR PEDESTRIAN RAIL REQUIREMENTS & S-PL-6, FOR GUARDRAIL PLACEMENT
- SEE MM-SW-2, FOR ALTERNATE DETAILS FOR CONCRETE SIDEWALK (REHABILITATION)
- SEE RP-SC-1, FOR 6" SLOPING CONCRETE CURBS AND CONCRETE CURBS AND GUTTERS
- SEE RP-VC-10 OR 11, FOR VERTICAL CONCRETE CURB AND CONCRETE CURBS AND GUTTER DETAILS
- SEE MM-PM-1 THRU MM-PM-5, FOR BIKE LANE/ROUTE PAVEMENT MARKINGS
- SEE RP-D-15 & 16 FOR CONCRETE DRIVEWAYS
- SEE MM-TS-2 FOR PEDESTRIAN FACILITY LATERAL OFFSETS/ BUFFER GUIDANCE.
- SEE MM-TS-3 FOR SHARED USE TYPICAL SECTIONS

**GENERAL NOTES**

- (A) ALWAYS PLACE SIDEWALK AS FAR AS AWAY FROM THE TRAVELLED WAY WHEN POSSIBLE FOR SPECIFICATIONS SEE "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION" OF THE TENNESSEE DEPARTMENT OF TRANSPORTATION.
- (B) WHERE IT BECOMES NECESSARY TO REMOVE PARTS OF EXISTING CONCRETE SIDEWALKS OR RAMPS, THE RESULTING EDGES SHALL BE CUT TO A NEAT LINE, AND ANY OFFSETS IN SUCH LINES SHALL BE MADE AT RIGHT ANGLES.
- (C) SIDEWALK WIDTHS DO NOT INCLUDE THE SIX INCH CURB WIDTH OF PROPOSED TOP OF CURB.
- (D) MAXIMUM SIDEWALK CROSS SLOPE IS 1.5 %. ALL SIDEWALKS SHALL HAVE A BROOM FINISH AND SHALL BE 4" THICK UNLESS THE PLANS CALL FOR 6" THICKNESS. THE CONCRETE SHALL BE CLASS "A" AT 3000 PSI. ALL COST TO BE INCLUDED IN ITEM NO. 701-01.01, CONCRETE SIDEWALK (4"), S.F. OR 701-01.02, CONCRETE SIDEWALK (6"), S.F.
- (E) EXPANSION JOINTS ARE TO BE PLACED 25 TO 30 FEET APART DEPENDING ON TRANSVERSE JOINT MARKINGS AND NEED TO MATCH CURB EXPANSION JOINT WHERE SIDEWALK IS BUILT DIRECTLY AGAINST CURB, OR AS DIRECTED BY THE ENGINEER WHERE THE PROPOSED SIDEWALK IS IN CONTACT WITH THE STREET RETURNS, ON BUILDING LINES PRODUCED AT STREET INTERSECTIONS, WHERE WALKS LEAD TO HOUSE OR OTHER ENTRANCES AND AN OTHER LOCATIONS WHERE STRESSES MAY DEVELOP. THE COST OF ALL EXPANSION JOINTS IS TO BE INCLUDED IN THE UNIT PRICE BID FOR THE PROPOSED SIDEWALK.
- (F) CONCRETE JOINT MATERIAL TO BE FLUSH WITH THE SIDEWALK SURFACE, ONE INCH PREFORMED FILLER IN ACCORDANCE WITH SECTION 701.06 OF THE STANDARD SPECIFICATIONS.
- (G) ONE INCH EXPANSION JOINTS ARE TO BE PLACED WHERE THE PROPOSED SIDEWALK IS IN CONTACT WITH CIRCULAR CURBS, BUILDINGS AND/OR RETAINING WALLS.
- (H) HALF INCH EXPANSION JOINTS ARE TO BE USED AT ALL OTHER LOCATIONS.
- (I) LONGITUDINAL JOINT MARKINGS WILL NOT BE REQUIRED ON SIDEWALKS THAT ARE 5 FEET OR LESS IN WIDTH. ONE LONGITUDINAL JOINT MARKING WILL BE REQUIRED ON SIDEWALKS OVER 5 FEET BUT LESS THAN 9 FEET IN WIDTH. TWO LONGITUDINAL JOINT MARKINGS WILL BE REQUIRED ON SIDEWALKS OVER 9 FEET BUT LESS THAN 12 FEET IN WIDTH.
- (J) TRANSVERSE JOINT MARKERS ARE TO BE MADE TO FORM BLOCKS AS NEARLY TO SQUARE AS PRACTICAL.
- (K) WHEN LEAVING A SQUARE OPENING IN THE SIDEWALK, THE LENGTH OF THE SIDE OF THE SQUARE OPENING SHOULD BE EQUAL TO THE DIAMETER OF THE FIXED OBJECT PLUS SIXTEEN INCHES. IT WILL BE BORDERED BY HALF INCH EXPANSION JOINT.
- (L) WHEN NEW SIDEWALK IS PLACED ADJACENT TO EXISTING SIDEWALK THE CONTRACTOR SHALL CORRECT ALL ABRUPT CHANGES AND SLOPES TO PROVIDE A SMOOTH TRANSITION FROM THE LIMIT OF CONSTRUCTION TO EXISTING PEDESTRIAN FACILITY.
- (M) DIVIDE THE SURFACE OF SIDEWALKS INTO BLOCKS USING A GROOVING TOOL. SPACE THE GROOVES APPROXIMATELY 5 FEET APART TO PRODUCE SQUARE BLOCKS UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
- (N) SHAPE AND COMPACT THE SUBGRADE TO A FIRM, EVEN SURFACE IN REASONABLY CLOSE CONFORMITY WITH THE GRADE AND CROSS-SECTION SHOWN ON THE PLANS. REMOVE ALL SOFT AND YIELDING MATERIAL, REPLACE IT WITH ACCEPTABLE MATERIAL, AND COMPACT IT AS DIRECTED BY THE ENGINEER.

(Replaced Std Dwg RP-S-7)



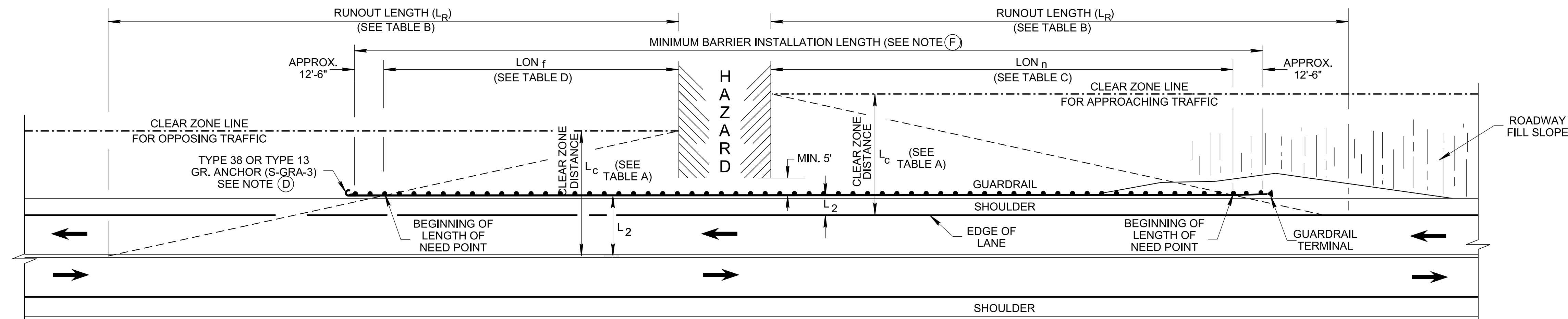
**DETAILS  
FOR  
CONCRETE  
SIDEWALK**

REV. 06-28-19: REVISED GENERAL NOTES (B), (D), (G) & (H) ALONG WITH DETAIL NOTES FOR "TYPICAL SIDEWALK CROSS SECTION WITH GRASS STRIP AND SERVICE APPURTENANCES" AND "SIDEWALK CONSTRUCTION DETAILS WITHOUT GRASS STRIP". ADDED NOTE TO MAILBOX DETAIL.  
REV. 03-01-2023: SIDEWALK PLAN VIEWS AND GROOVE JOINT DETAIL WERE ADDED. REMOVED GENERAL NOTE (E), AND ADDED GENERAL NOTES (M) AND (N) SIDEWALK CONSTRUCTION DETAIL WAS REMOVED. SECTION C-C NOTE WAS REVISED.

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

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



THE VARIABLES (L<sub>C</sub> AND L<sub>2</sub>) FOR THE LENGTH OF NEED FOR THE FAR SIDE APPROACH (LON<sub>f</sub>) ARE TO BE MEASURED FROM THE CENTERLINE OR THE INSIDE EDGE OF THE LANE FOR DIVIDED ROADS.

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

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

THE VARIABLES (L<sub>C</sub> AND L<sub>2</sub>) FOR THE LENGTH OF NEED FOR THE NEARSIDE APPROACH (LON<sub>n</sub>) ARE TO BE MEASURED FROM THE NEARSIDE EDGE OF LANE.

TABLE A	
MAXIMUM CLEAR ZONE DISTANCE (L <sub>C</sub> ) (FT)	
DESIGN SPEED (MPH)	DESIGN TRAFFIC VOLUME (ADT) OVER 6000
70	46
65	46
60	44
55	32
50	28
45	24
40	18
35	16
30	14
25	12
20	10

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

TABLE B				
RUNOUT LENGTHS (L <sub>R</sub> ) FOR BARRIER DESIGN (FT)				
DESIGN SPEED (MPH)	TRAFFIC VOLUME (ADT)			
	OVER 10000	5000- 10000	1000- 5000	UNDER 1000
70	360	330	290	250
65	330	290	250	225
60	300	250	210	200
55	265	220	185	175
50	230	190	160	150
45	195	160	135	125
40	160	130	110	100
35	135	110	95	85
30	110	90	80	70
25	85	70	60	50
20	60	50	35	25

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

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

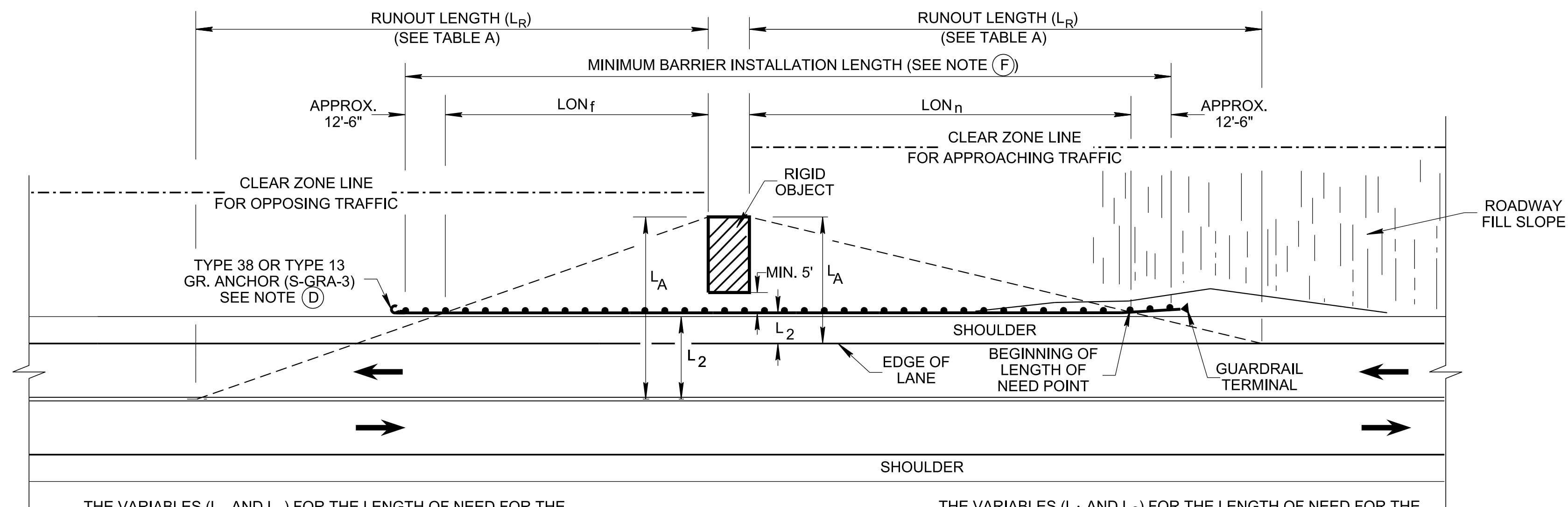
NOTE: SUGGESTED LON SHOWN ABOVE ON TABLES C AND D ARE BASED ON THE MAXIMUM CLEAR ZONE DISTANCE (L<sub>C</sub>) FROM TABLE A, SUGGESTED RUNOUT LENGTH (L<sub>R</sub>) SHOWN ON TABLE B AND USED 6' SHOULDER. FOR LOCATIONS WITH 0'-2' SHOULDER, USE THE FORMULA TO DETERMINE THE LENGTH OF NEED.

TABLE D				
SUGGESTED LENGTH OF NEED (LON <sub>f</sub> ) (FT) FOR FAR SIDE TRAFFIC				
DESIGN SPEED (MPH)	TRAFFIC VOLUME (ADT)			
	OVER 10000	5000- 10000	1000- 5000	UNDER 1000
70	266	244	214	185
65	244	214	185	166
60	218	182	153	145
55	166	138	116	109
50	131	109	91	86
45	98	80	68	63
40	53	43	37	33
35	34	28	24	21
30	16	13	11	10

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

BARRIER LENGTH OF NEED (LON) CALCULATION	
$LON_f \text{ or } LON_n = \frac{L_C - L_2}{L_C / L_R}$ <p>SEE "ROADSIDE DESIGN GUIDE" SECTION 5.6.4, AASHTO, 2011, FOR ADDITIONAL INFORMATION.</p>	<p><b>LEGEND</b></p> <p>L<sub>C</sub> = THE CLEAR ZONE DISTANCE AS DETERMINED IN TABLE "A" ON S-CZ-1.</p> <p>L<sub>2</sub> = DISTANCE FROM EDGE OF TRAVELED WAY TO BARRIER.</p> <p>L<sub>R</sub> = RUNOUT LENGTH.</p>
<p>NOTES: 1 THE EQUATION FOR LON FOR THE NEARSIDE AND FAR SIDE APPROACHES IS THE SAME. THE ONLY DIFFERENCE IS THE FAR SIDE VARIABLES ARE MEASURED FROM THE CENTERLINE OR THE INSIDE EDGE OF THE LANE FOR DIVIDED ROADS.</p> <p>2 AS A CONSERVATIVE APPROACH DESIGNER MAY USE RUNOUT LENGTH (L<sub>R</sub>) DIMENSIONS WHEN DETERMINING LENGTH OF NEED.</p>	

GENERAL NOTES	
(A)	EVERY LOCATION WHERE GUARDRAIL IS REQUIRED MUST BE INVESTIGATED SEPARATELY. THE HAZARD MUST BE IDENTIFIED AND THE "POINT OF NEED" CALCULATED TO DETERMINE THE BEST TREATMENT FOR PROTECTION OF VEHICLES FROM THE HAZARD.
(B)	LENGTH OF NEED STARTS FROM THE THIRD POST OF THE END TREATMENT.
(C)	IF THE CLEAR ZONE FALLS INSIDE OF 3:1 SLOPE OR STEEPER, EXTEND THE CLEAR ZONE TO THE TOE OF THE SLOPE.
(D)	TRAILING END GUARDRAIL ANCHORS (TYPE 13) MAY ONLY BE USED FOR DIVIDED ROADWAYS, ONE WAY ROADS, OR TWO WAY MULTI-LANE ROADS WHERE LOCATION IS OUTSIDE THE CLEAR ZONE FOR THE OPPOSING DIRECTION TRAFFIC.
(E)	SEE THE FOLLOWING STANDARD DRAWINGS : <ul style="list-style-type: none"> <li>S-PL-1A: SAFETY PLAN FOR BARRIER LENGTH OF NEED (FOR RIGID OBJECTS)</li> <li>S-PL-1B: SAFETY PLAN FOR BARRIER LENGTH OF NEED ON CURVED ROADWAYS</li> <li>S-PL-3: SAFETY PLAN MINIMUM INSTALLATION AT BRIDGE ENDS</li> <li>S-PL-4: SAFETY PLAN FOR BRIDGE PIERS IN CLEAR ZONE</li> <li>S-PL-5: SAFETY PLAN FOR BRIDGE ENDS IN MEDIANS</li> <li>S-PL-6: SAFETY PLAN SAFETY HARDWARE PLACEMENT ON OUTSIDE EDGE</li> <li>S-PL-6A: SAFETY PLAN SAFETY HARDWARE PLACEMENT IN MEDIAN</li> <li>S-GRS-7 &amp; S-GRS-7A: SHORT- RADIUS GUARDRAIL SYSTEM AND DETAILS</li> <li>S-GRT SERIES FOR GUARDRAIL TERMINALS.</li> </ul>
(F)	THE MINIMUM BARRIER INSTALLATION LENGTH IS EQUAL TO THE LON <sub>n</sub> + LON <sub>f</sub> + THE LENGTH OF THE HAZARD + (2 x 12.5'). CALCULATE THE FINAL GUARDRAIL QUANTITY IN AN INCREMENT OF 12'-6".



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

THE VARIABLES ( $L_A$  AND  $L_2$ ) FOR THE LENGTH OF NEED FOR THE NEAR SIDE APPROACH ( $LON_n$ ) ARE TO BE MEASURED FROM THE NEAR SIDE EDGE OF LANE.

### BARRIER LENGTH OF NEED FOR A TRAVERSABLE RIGID OBJECT (LIGHT POLE, SIGN STRUCTURE ETC.) LOCATED INSIDE THE CLEAR ZONE

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

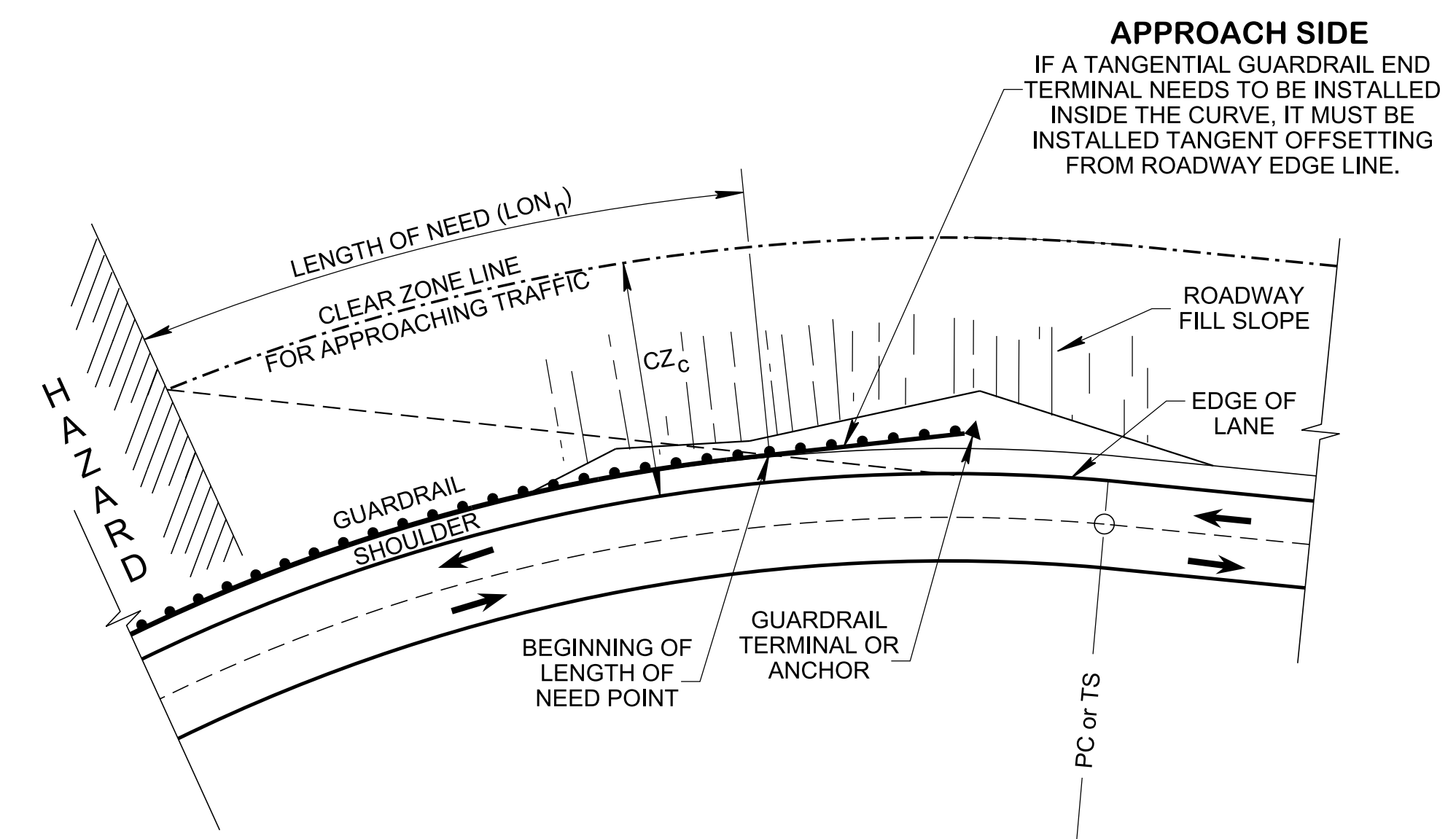
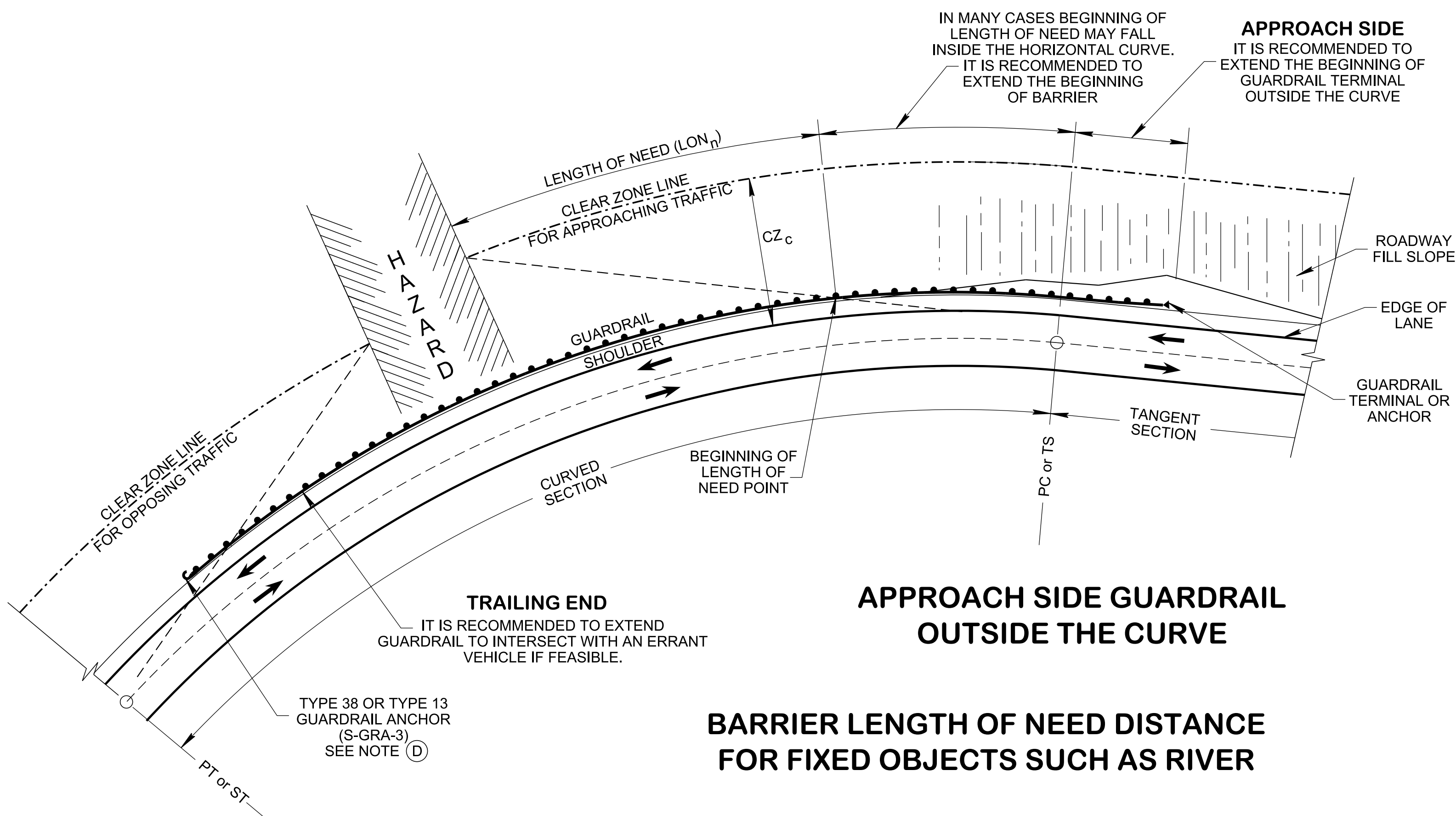
NOTE: SEE "ROADSIDE DESIGN GUIDE", AASHTO, 2011, FOR MORE INFORMATION.

BARRIER LENGTH OF NEED CALCULATION FOR TANGENT ROADS WITH RIGID OBJECT	
$LON_f \text{ or } LON_n = \frac{L_A - L_2}{L_A / L_R}$ <p>SEE "ROADSIDE DESIGN GUIDE" SECTION 5.6.4, AASHTO, 2011, FOR ADDITIONAL INFORMATION.</p>	<p><b>LEGEND</b></p> <p><math>L_A</math> = DISTANCE FROM EDGE OF TRAVELED WAY (EDGE OF PAVEMENT) TO THE LATERAL EXTENT OF OBSTACLE. NOTE: <math>L_A \leq L_C</math>.</p> <p><math>L_C</math> = THE CLEAR ZONE DISTANCE AS DETERMINED IN TABLE "A" ON S-CZ-1.</p> <p><math>L_2</math> = DISTANCE FROM EDGE OF TRAVELED WAY TO BARRIER.</p> <p><math>L_R</math> = RUNOUT LENGTH (SEE TABLE A FOR VALUE).</p>
<p>NOTES: 1. THE EQUATION FOR LON FOR THE NEAR SIDE AND FAR SIDE APPROACHES IS THE SAME. THE ONLY DIFFERENCE IS THE FAR SIDE VARIABLES ARE MEASURED FROM THE CENTERLINE OR THE INSIDE EDGE OF THE LANE FOR DIVIDED ROADS.</p> <p>2. RIGID OBJECTS OUTSIDE THE CLEAR ZONE SHOULD BE EVALUATED BASED ON CRASH SEVERITY OR CONSEQUENCES TO OPERATION.</p> <p>3. AS A CONSERVATIVE APPROCH DESIGNER MAY USE RUNOUT LENGTH (<math>L_R</math>) DIMENSIONS WHEN DETERMINING LENGTH OF NEED.</p>	

GENERAL NOTES	
(A)	EVERY LOCATION WHERE GUARDRAIL IS REQUIRED MUST BE INVESTIGATED SEPARATELY. THE OBJECT MUST BE IDENTIFIED AND THE "POINT OF NEED" CALCULATED TO DETERMINE THE BEST TREATMENT FOR PROTECTION OF VEHICLES FROM THE OBJECT.
(B)	LENGTH OF NEED STARTS FROM THE THIRD POST OF THE END TREATMENT.
(C)	IF THE CLEAR ZONE FALLS INSIDE OF 3:1 SLOPE OR STEEPER, EXTEND THE CLEAR ZONE TO THE TOE OF THE SLOPE.
(D)	TRAILING END GUARDRAIL ANCHORS (TYPE 13) MAY ONLY BE USED FOR DIVIDED ROADWAYS, ONE WAY ROADS, OR TWO WAY MULTI-LANE ROADS WHERE LOCATION IS OUTSIDE THE CLEAR ZONE FOR THE OPPOSING DIRECTION TRAFFIC.
(E)	SEE THE FOLLOWING STANDARD DRAWINGS : <ul style="list-style-type: none"> <li>S-PL-1: SAFETY PLAN FOR BARRIER LENGTH OF NEED</li> <li>S-PL-1B: SAFETY PLAN FOR BARRIER LENGTH OF NEED ON CURVED ROADWAYS</li> <li>S-PL-3: SAFETY PLAN MINIMUM INSTALLATION AT BRIDGE ENDS</li> <li>S-PL-4: SAFETY PLAN FOR BRIDGE PIERS IN CLEAR ZONE</li> <li>S-PL-5: SAFETY PLAN FOR BRIDGE ENDS IN MEDIANS</li> <li>S-PL-6: SAFETY PLAN SAFETY HARDWARE PLACEMENT ON OUTSIDE EDGE</li> <li>S-PL-6A: SAFETY PLAN SAFETY HARDWARE PLACEMENT IN MEDIAN</li> <li>S-GRS-7 &amp; S-GRS-7A: SHORT- RADIUS GUARDRAIL SYSTEM AND DETAILS</li> <li>S-GRT SERIES FOR GUARDRAIL TERMINALS.</li> </ul>
(F)	THE MINIMUM BARRIER INSTALLATION LENGTH IS EQUAL TO THE $LON_n + LON_f +$ THE LENGTH OF RIGID OBJECT $+ (2 \times 12.5)$ . CALCULATE THE FINAL GUARDRAIL QUANTITY IN AN INCREMENT OF 12'-6".

STATE OF TENNESSEE  
STANDARD DRAWING  
DEPARTMENT OF TRANSPORTATION

**SAFETY PLAN FOR BARRIER LENGTH OF NEED (FOR RIGID OBJECTS)**



**APPROACH SIDE GUARDRAIL TANGENT TERMINAL INSTALLATION INSIDE THE CURVE**  
(NOT RECOMMENDED FOR THE DEGREES OF CURVATURE GREATER THAN 5°)

**BARRIER LENGTH OF NEED DISTANCE FOR FIXED OBJECTS SUCH AS RIVER**

**TABLE A**

**ADJUSTED CLEAR ZONE DISTANCE (CZ<sub>c</sub>) (FT)**

$CZ_c = K_{CZ} * L_c$

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

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

**TABLE B**

**SUGGESTED LENGTH OF NEED (LON<sub>n</sub>) (FT) FOR APPROACHING TRAFFIC**

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

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

**LEGEND**

CZ<sub>c</sub> = THE CLEAR ZONE DISTANCE AS DETERMINED BY THE CURVE EQUATION ON S-CZ-1:  
 $CZ_c = (L_c) (K_{CZ})$

WHERE L<sub>c</sub> = THE CLEAR ZONE DISTANCE AS DETERMINED IN TABLE "A" ON S-CZ-1.  
K<sub>CZ</sub> = THE CURVE CORRECTION FACTOR FOUND IN TABLE "B" ON S-CZ-1.

- GENERAL NOTES**
- (A) EVERY LOCATION WHERE GUARDRAIL IS REQUIRED MUST BE INVESTIGATED SEPARATELY. THE OBJECT MUST BE IDENTIFIED AND THE "POINT OF NEED" CALCULATED TO DETERMINE THE BEST TREATMENT FOR PROTECTION OF VEHICLES FROM THE OBJECT. THIS DRAWING SHOWS ONLY ONE DIRECTION.
  - (B) LENGTH OF NEED STARTS FROM THE THIRD POST OF THE END TREATMENT.
  - (C) IF THE CLEAR ZONE FALLS INSIDE OF 3:1 SLOPE OR STEEPER, EXTEND THE CLEAR ZONE TO THE TOE OF THE SLOPE.
  - (D) TRAILING END GUARDRAIL ANCHORS (TYPE 13) MAY ONLY BE USED FOR DIVIDED ROADWAYS, ONE WAY ROADS, OR TWO WAY MULTI-LANE ROADS WHERE LOCATION IS OUTSIDE THE CLEAR ZONE FOR THE OPPOSING DIRECTION TRAFFIC.
  - (E) SEE THE FOLLOWING STANDARD DRAWINGS :
    - S-PL-1: SAFETY PLAN FOR BARRIER LENGTH OF NEED
    - S-PL-1A: SAFETY PLAN FOR BARRIER LENGTH OF NEED (FOR RIGID OBJECTS)
    - S-PL-3: SAFETY PLAN MINIMUM INSTALLATION AT BRIDGE ENDS
    - S-PL-4: SAFETY PLAN FOR BRIDGE PIERS IN CLEAR ZONE
    - S-PL-5: SAFETY PLAN FOR BRIDGE ENDS IN MEDIANS
    - S-PL-6: SAFETY PLAN SAFETY HARDWARE PLACEMENT ON OUTSIDE EDGE
    - S-PL-6A: SAFETY PLAN SAFETY HARDWARE PLACEMENT IN MEDIAN
    - S-GRS-7 & S-GRS-7A : SHORT- RADIUS GUARDRAIL SYSTEM AND DETAILS
    - S-GRT SERIES FOR GUARDRAIL TERMINALS.
  - (F) THE MINIMUM BARRIER INSTALLATION LENGTH IS EQUAL TO THE LON<sub>n</sub> + LON<sub>f</sub> + THE LENGTH OF HAZARD + (2 x 12.5'). CALCULATE THE FINAL GUARDRAIL QUANTITY IN AN INCREMENT OF 12'-6".

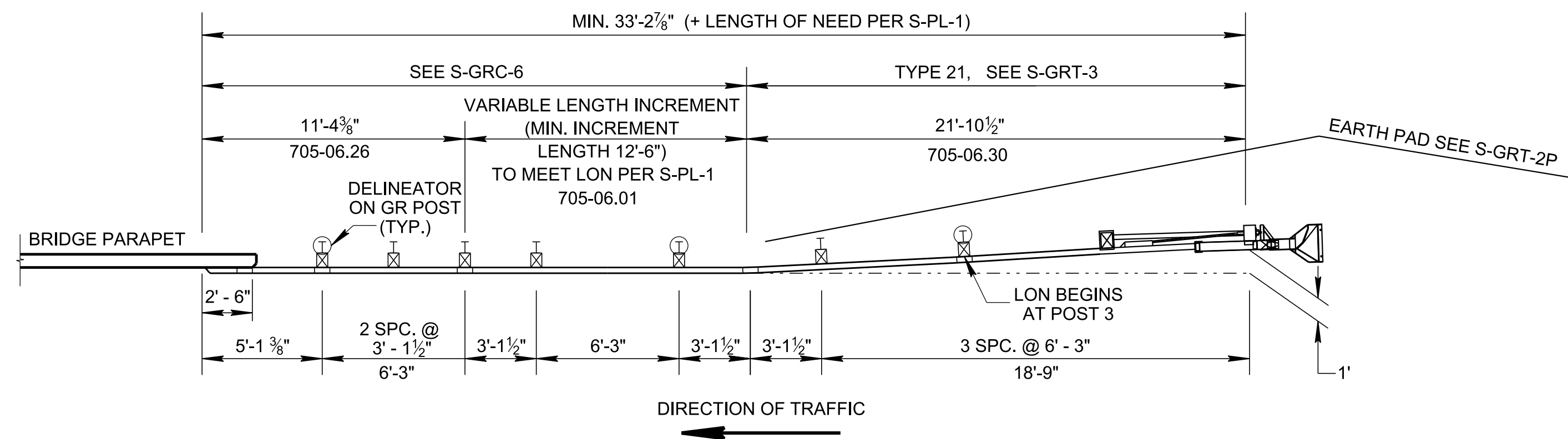
STATE OF TENNESSEE  
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DEPARTMENT OF TRANSPORTATION

**SAFETY PLAN FOR BARRIER LENGTH OF NEED ON CURVED ROADWAYS**

01-28-2022 S-PL-1B

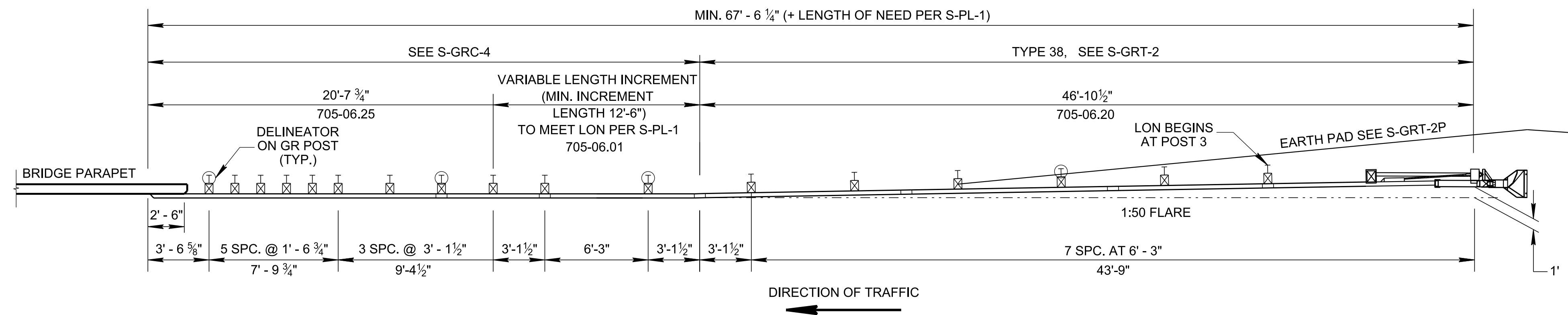
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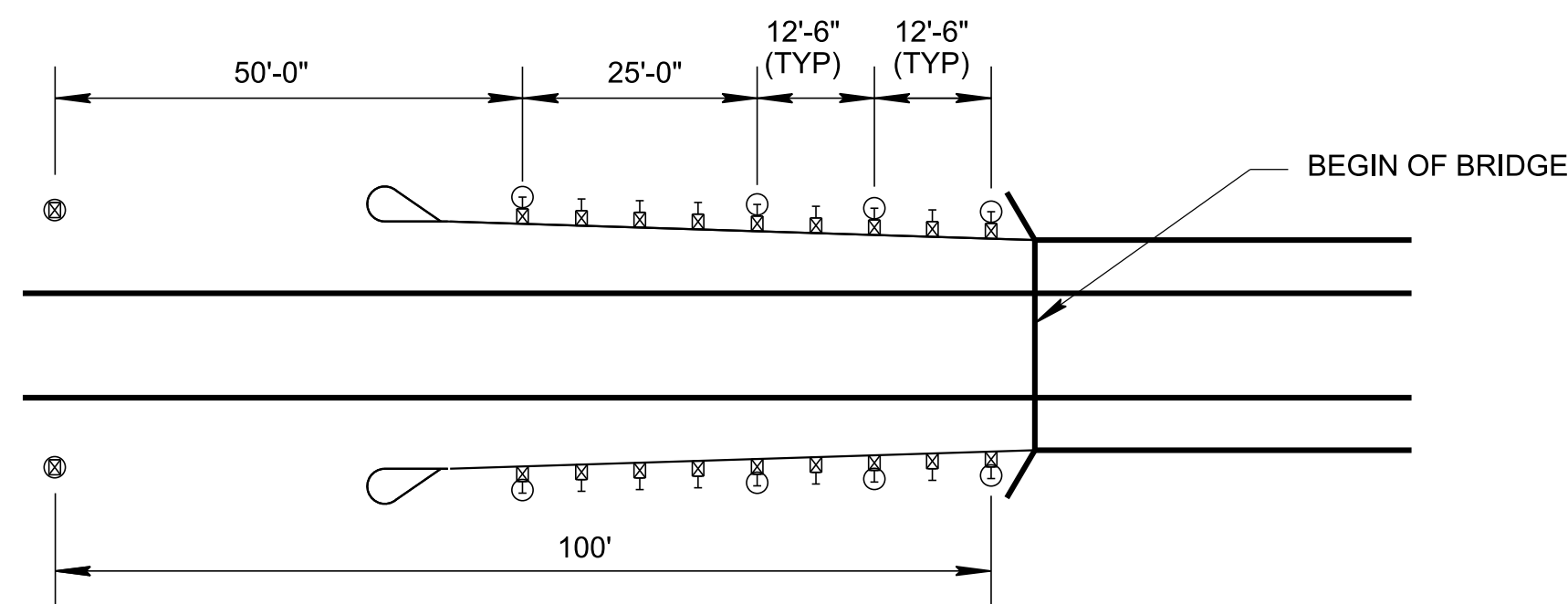
**PLAN FOR TYPE 21**  
**MINIMUM INSTALLATION LENGTH FOR TL-2 GUARDRAIL TERMINAL**  
**(FOR LOW SPEED FACILITIES V < 45 MPH)**

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-6 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 IN 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.



**MIN. DELINEATOR PLACEMENT**  
**AT BRIDGE APPROACHES INSTALLED**  
**ON GUARDRAIL POSTS**

LEGEND	
	DELINEATOR ON GUARDRAIL POST
	DELINEATOR

GENERAL NOTES	
(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.
(B)	SEE S-GRC SERIES FOR DETAILS AND SPECIFICATIONS REGARDING INSTALLATION OF PROTECTIVE GUARDRAIL AT BRIDGE ENDS AND S-GRT SERIES FOR GUARDRAIL END TERMINAL DETAILS.
(C)	IF A FIELD EVALUATION DISCOVERS A SECONDARY HAZARD, THEN S-PL-1 SHALL BE USED TO DETERMINE LENGTH OF NEED.
(D)	AT 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 SHORT-RADIUS GUARDRAIL SYSTEM (S-GRS-7 & S-GRS-7A) OR INTRODUCING A NON-GATING ATTENUATOR.
(E)	SEE T-M-18 FOR FLEXIBLE DELINEATOR DETAILS. DELINEATORS PLACEMENT ON BRIDGE APPROACHES ARE AS SHOWN IN THIS DRAWING OR AS DIRECTED BY REGIONAL TRAFFIC ENGINEER. FOR ADDITIONAL INFORMATION SEE SECTION 3F OF THE MUTCD (CURRENT EDITION)

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.

REV. 06-15-21: REVISED THE DRAWINGS. REMOVED DELINEATOR NOTES AND STEEL POST DETAIL. REVISED GENERAL NOTE (B) AND ADDED GENERAL NOTE (E).

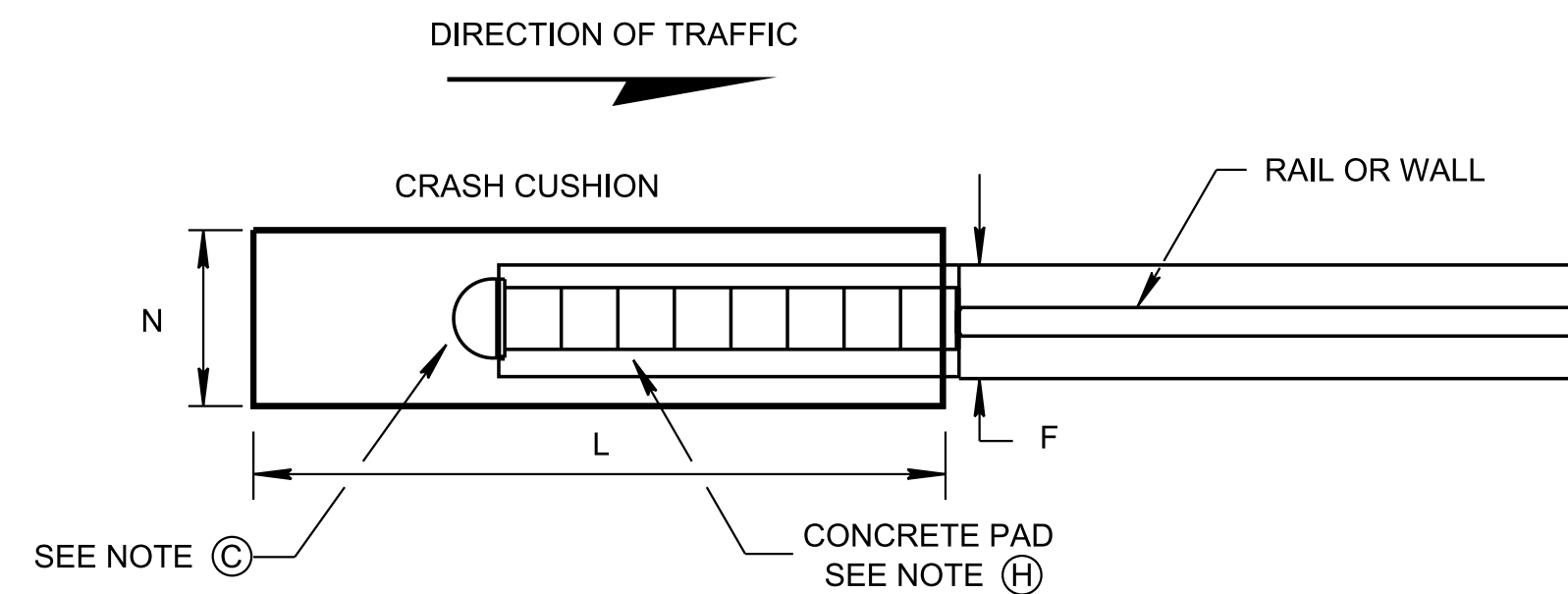
REV. 03-01-23: REPLACED S-PL-2 WITH S-GRS-7 AND S-GRS-7A ON GENERAL NOTE (D).

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED

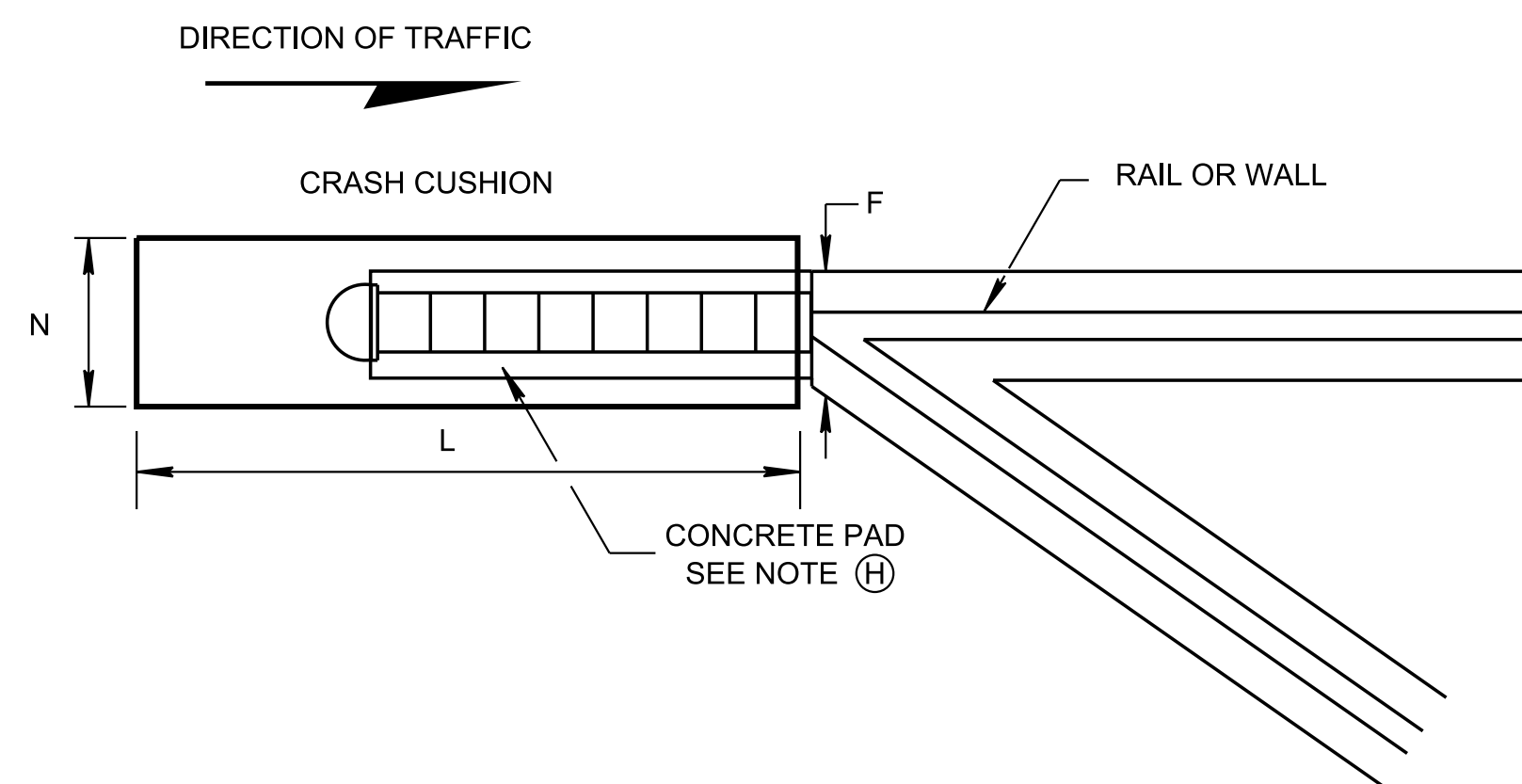
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SAFETY PLAN  
 MINIMUM  
 INSTALLATION  
 AT BRIDGE  
 ENDS

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**CRASH CUSHION AT THE END OF GUARDRAIL OR BARRIER WALL**



**CRASH CUSHION AT THE END OF DIVERGING GUARDRAILS OR BARRIER WALLS**

LEGEND	
N:	APPROXIMATE WIDTH OF SPACE NECESSARY FOR THE PLACEMENT OF A CRASH CUSHION.
L:	APPROXIMATE LENGTH.
F:	WIDTH OF A FIXED OBJECT THAT WILL BE SHIELDED WITH A CRASH CUSHION.

MINIMUM CRASH CUSHION RESERVE AREA (FT)						
DESIGN SPEED MPH (MAIN LINE)	MINIMUM DIMENSIONS ①				DESIRABLE DIMENSIONS	
	RESTRICTED DIMENSIONS ②		UNRESTRICTED DIMENSIONS			
	N	L	N	L	N	L
30	6	8	8	11	12	17
50	6	17	8	25	12	33
70	6	28	8	45	12	55

- ① MINIMUM DIMENSIONS SHOULD ONLY BE USED AT LOCATIONS WHERE IT IS INFEASIBLE TO PROVIDE THE DESIRABLE AREA. IN CASES WHEN MORE THAN THE MINIMUM AREA CAN BE PROVIDED, AS MUCH SPACE AS POSSIBLE SHOULD BE PROVIDED.
- ② RESTRICTED MINIMUM DIMENSIONS SHOULD ONLY BE USED IF THE MINIMUM UNRESTRICTED DIMENSIONS ARE UNATTAINABLE.

LEGEND:  CRASH CUSHION

**CRASH CUSHION CLASSIFICATION AND SELECTION CRITERIA OF DEVICES**

**SELF-RESTORING:** THIS DEVICE SHOULD BE CONSIDERED FOR MOST LOCATIONS WHERE A CRASH CUSHION IS REQUIRED. SELF-RESTORING CRASH CUSHIONS ARE DESIGNED TO WITHSTAND MULTIPLE IMPACTS (EQUAL TO OR GREATER THAN 3 PER YEAR) WITH MINIMAL REPAIRS (WITH REDUCED CAPACITY), WHERE ADT IS EQUAL TO OR GREATER THAN 25000 VEHICLES/DAY AT LOCATIONS WHERE IMPACTS OCCUR FREQUENTLY, AND RESPONSE TIME IS CRUCIAL.

**LOW-MAINTENANCE:** LOW-MAINTENANCE CRASH CUSHIONS ARE DESIGNED TO BE USED AT LOCATIONS WHERE THE IMPACTS ARE EXPECTED TO BE 1-2 PER YEAR. THE DEVICE IS DESIGNED TO BE EASILY RESET AFTER IMPACT WITH MINIMAL REPAIR AND USED AT LOCATIONS WITH FREQUENT IMPACTS.

**REUSABLE:** THIS DEVICE IS DESIGNED THAT CAN BE REPAIRED BY SALVAGING MOST OF THE MAJOR COMPONENTS.

**GENERAL NOTES**

- (A) CRASH CUSHIONS SHOULD ONLY BE USED IF LIMITED SPACE (SUCH AS A GORE AREA) PRECLUDES THE USE OF GUARDRAIL END TERMINALS OR AT OTHER LOCATIONS WHERE GUARDRAIL END TERMINAL WILL NOT FUNCTION.
- (B) CRASH CUSHIONS SHALL BE INSTALLED PER MANUFACTURERS SHOP DRAWINGS. SYSTEMS APPEARING ON THE QPL 45, SECTION C, ONLY MAY BE USED FOR THE SPECIFIED CATEGORY DETERMINED.
- (C) THE NOSE OR FIRST BARREL OF THE CRASH CUSHION SHALL BE MARKED WITH OBJECT MARKER STRIPING TYPE 3 INCLUDED IN THE COST OF THE SYSTEM.
- (D) SYSTEMS SHALL BE INSTALLED ON HARD, SMOOTH SURFACES WITH SLOPES LESS THAN 5% AND VARIATION OF CROSS SLOPE LESS THAN 2% CHANGE FOR THE LENGTH OF RESERVE AREA.
- (E) MASH TL-2 OR TL-3 CRASH CUSHION SHALL BE USED ON TDOT PROJECTS.
- (F) CURBS SHALL NOT BE INSTALLED IN AREAS NEAR CRASH CUSHIONS, EXISTING CURBS TO BE REMOVED UNLESS OTHERWISE SPECIFIED.
- (G) IF A CRASH CUSHION WOULD COMPROMISE SIGHT DISTANCE A SYSTEM WITH REDUCED HEIGHT (LESS THAN 36" HEIGHT) MAY BE SPECIFIED.
- (H) ALL PERMANENT INSTALLATIONS REQUIRE CONCRETE FOUNDATION AS SHOWN ON MANUFACTURERS SHOP DRAWINGS.
- (I) NON-GATING CRASH CUSHIONS SHALL BE PAID FOR UNDER ITEM NOS.:

REUSABLE CRASH CUSHION:		
705-20.22	REUSABLE CRSH CUSHION NARW (MASH TL-3)	EACH
705-20.23	REUSABLE CRASH CUSHION WIDE (MASH TL-3)	EACH
705-20.59	REUSABLE CRSH CUSHION NARW (MASH TL-2)	EACH
705-20.60	REUSABLE CRASH CUSHION WIDE (MASH TL-2)	EACH

LOW-MAINTENANCE CRASH CUSHION:		
705-20.20	LOW MAINT CRASH CUSHN NARROW (MASH TL-3)	EACH
705-20.21	LOW MAINT CRASH CUSHION WIDE (MASH TL-3)	EACH
705-20.57	LOW MAINT CRASH CUSHN NARROW (MASH TL-2)	EACH
705-20.58	LOW MAINT CRASH CUSHION WIDE (MASH TL-2)	EACH

SELF-RESTORING CRASH CUSHION:		
705-20.61	SELF RESTORING CRASH CUSHN NARROW (MSH TL-2)	EACH
705-20.62	SELF RESTORING CRASH CUSHN WIDE (MSH TL-2)	EACH
705-20.71	SELF RESTORING CRASH CUSHN NARROW (MSH TL-3)	EACH
705-20.72	SELF RESTORING CRASH CUSHN WIDE (MSH TL-3)	EACH

THE PAYMENT OF PERMANENT CRASH CUSHION INCLUDES CONCRETE FOUNDATION.

TEMPORARY WORK ZONE (ALL PERMANENT CRASH CUSHIONS MAY BE USED IN TEMPORARY WORK ZONES)

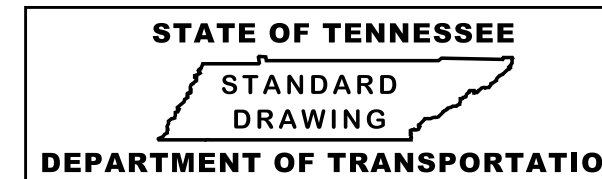
712-02.60 TEMPORARY WORK ZONE CRASH CUSHION (MASH TL-3), EACH

IN-SERVICE NCHRP-350 TL-3 DEVICES (QPL 34) MAY BE USED FOR TEMPORARY WORK ZONE APPLICATIONS, FOR PERMANENT INSTALLATIONS USE ONLY MASH DEVICES (QPL 45).

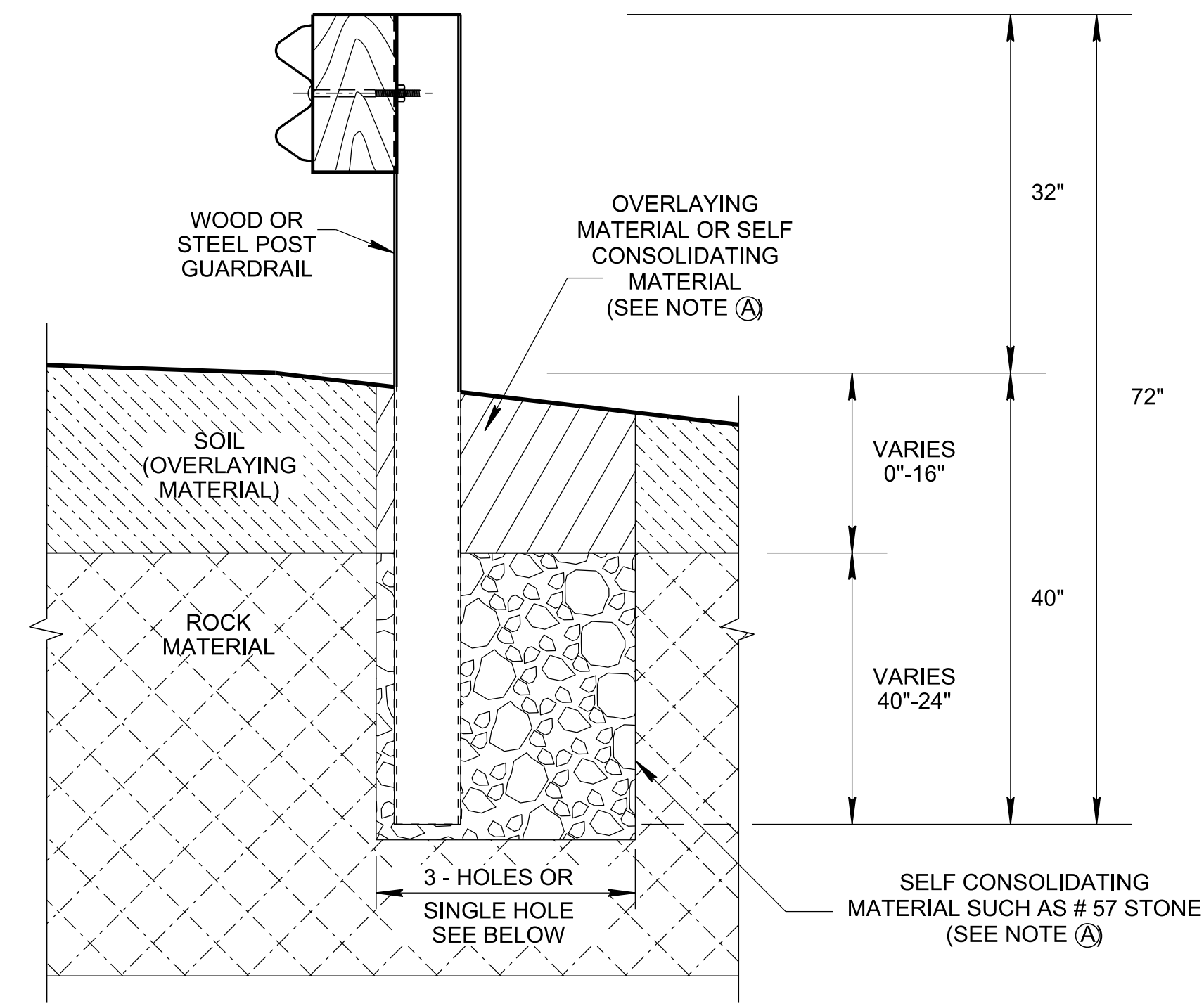
- (J) PRODUCTS EVALUATED UNDER NCHRP 350 TL-3 MAY CONTINUE TO BE USED THROUGHOUT THEIR NORMAL SERVICE LIFE (DAMAGE BEYOND REPAIR) AFTER DECEMBER 31, 2018. SEE QPL 34 FOR APPROVED NCHRP 350 TL-3 CRASH CUSHION AND QPL 45 FOR MASH APPROVED CRASH CUSHION.
- (K) AT LOCATIONS WHERE THE INSTALLATION OF CRASH CUSHION NARROWS THE ROADWAY TYPICAL SECTION SHOULDER WIDTH (SUCH AS IN GORE AREAS CRASH CUSHION OFFSET TO THE EDGE OF TRAVELLED WAY IS LESS THAN THE SHOULDER WIDTH), INSTALL TYPE 3 OBJECT MARKER STRIPING PATTERN (OM3-L, OM3-C OR OM3-R) COVERING BLUNT FACE OF THE DEVICE. THE USE OF DELINEATION OTHER THAN OBJECT MARKER TYPE 3 MAY BE ACCEPTABLE AT ALL OTHER LOCATIONS.

- REV. 08-26-15: ADDED NOTE (B) AND REVISED NOTE (I)
- REV. 03-28-17: CHANGED PAY ITEM NUMBERS.
- REV. 06-28-19: DELETED SACRIFICIAL DEVICES FROM THE ATTENUATOR CLASSES DESCRIPTION BOX. ADDED GENERAL NOTE (J) AND MODIFIED NOTES (A), (E) AND (I). REDREW SHEET.
- REV. 03-04-21: CHANGED TEMPORARY WORK ZONE CRASH CUSHION PAY ITEM NUMBER.
- REV. 10-29-2021: REVISED GENERAL NOTE (I)
- REV. 03-01-2023: ADDED GENERAL NOTE (K) AND PAY ITEM NUMBERS FOR MASH TL-2 AND SELF RESTORING CRASH CUSHIONS ON GENERAL NOTE (I). REVISED GENERAL NOTES (B) AND (E). ADDED CRASH CUSHION DEVICES DESCRIPTION AND REMOVED THE CRASH CUSHION SELECTION FLOWCHART FROM THE STANDARD DRAWING.

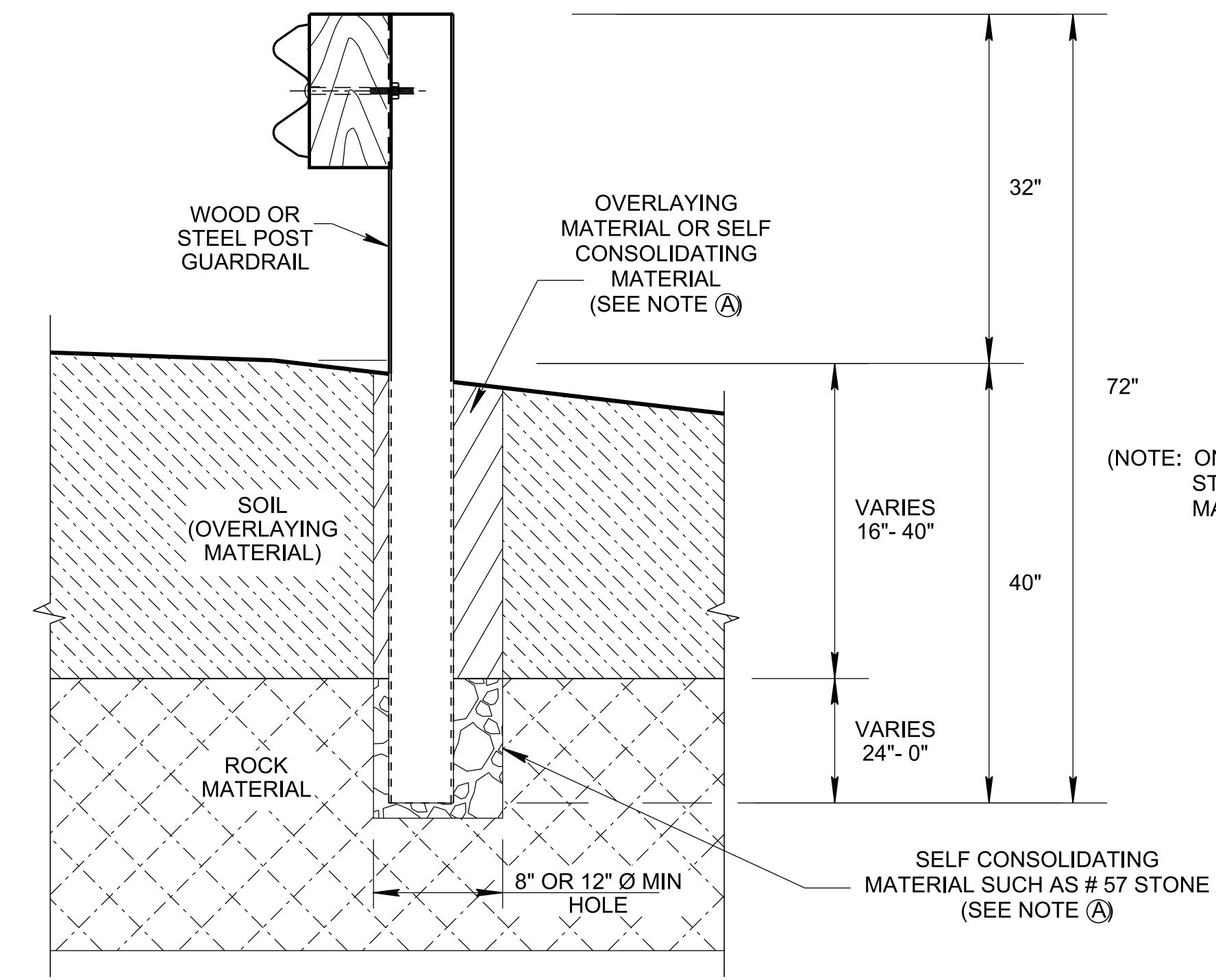
MINOR REVISION -- FHWA APPROVAL NOT REQUIRED



**CRASH CUSHION**

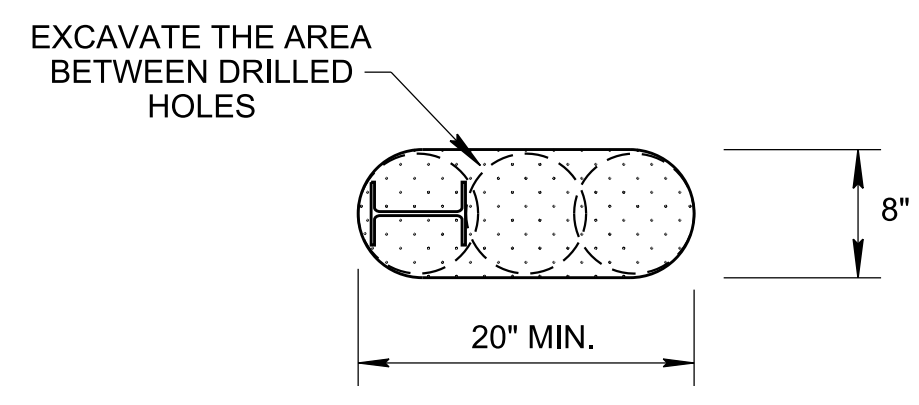


**ELEVATION**  
**GUARDRAIL POST IN ROCK**  
**INSTALLATION DETAIL**  
 (WHEN SOIL DEPTH IS 16" OR LESS)



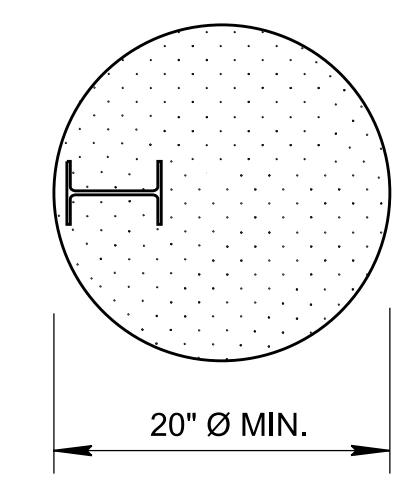
**ELEVATION**  
**GUARDRAIL POST IN ROCK**  
**INSTALLATION DETAIL**  
 (WHEN SOIL DEPTH IS GREATER THAN 16")

(NOTE: ON FILL SLOPES 2:1 OR  
 STEEPER 8' GUARDRAIL  
 MAY BE USED)



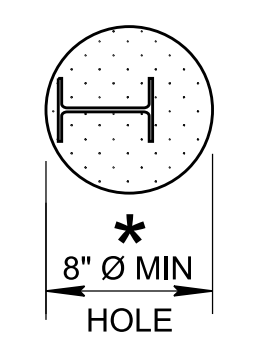
**3- OVERLAPPING HOLES 8" Ø**

**PLAN VIEW**  
**FOR STEEL POST**

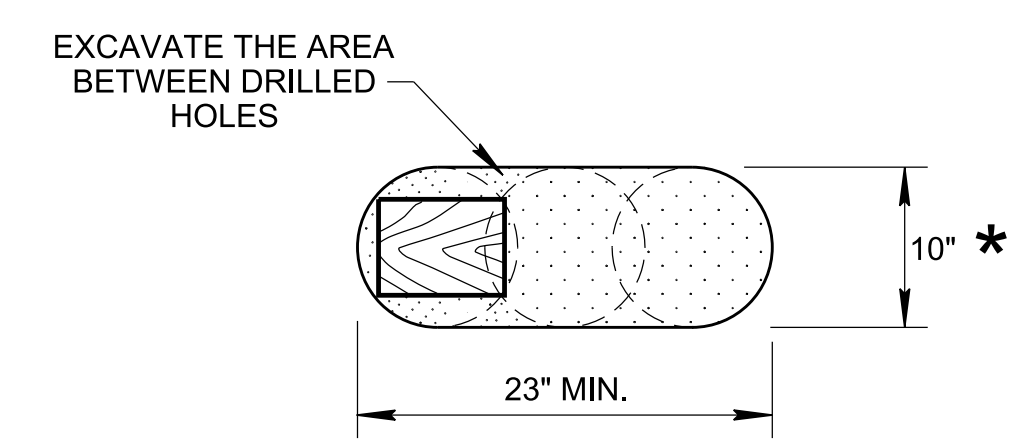


**ALTERNATIVE**  
**SINGLE 20" Ø HOLE**

\* THIS WIDTH MAY BE INCREASED  
 TO 15 IN. TO ACCOMMODATE  
 CONSTRUCTION TOLERANCES.

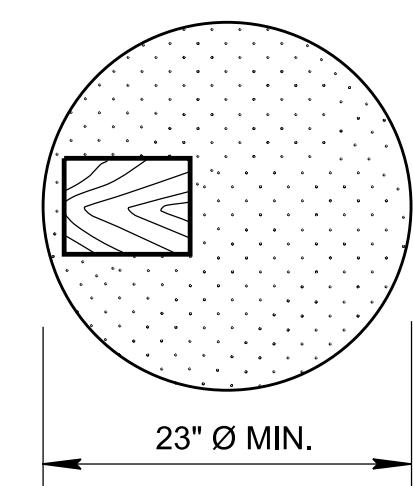


**PLAN VIEW**  
**FOR STEEL POST**

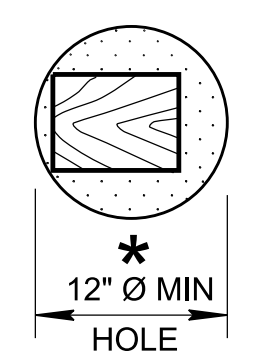


**3- OVERLAPPING HOLES 10" Ø**

**PLAN VIEW**  
**FOR WOOD POST**



**ALTERNATIVE**  
**SINGLE 23" Ø HOLE**



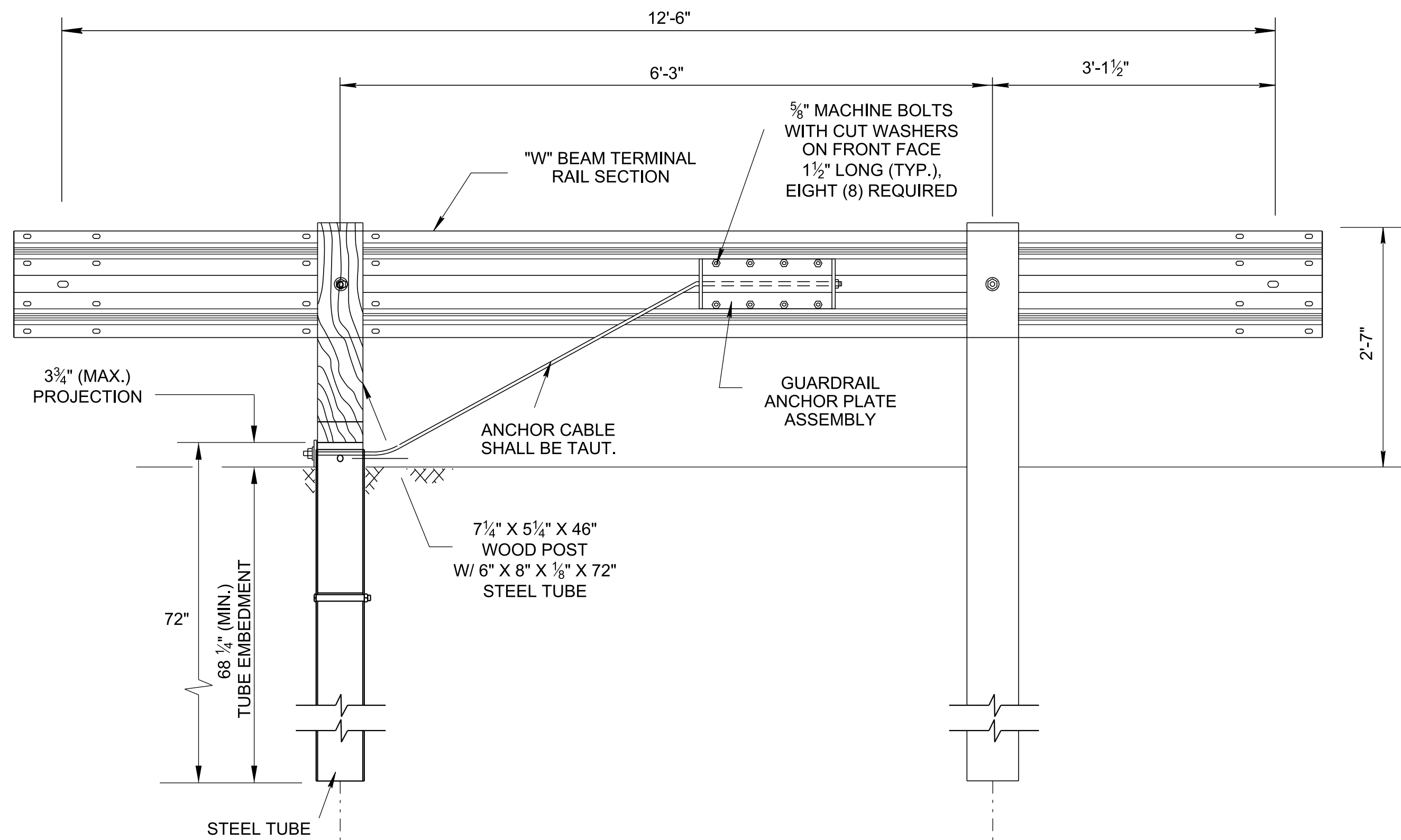
**PLAN VIEW**  
**FOR WOOD POST**

**GENERAL NOTES**

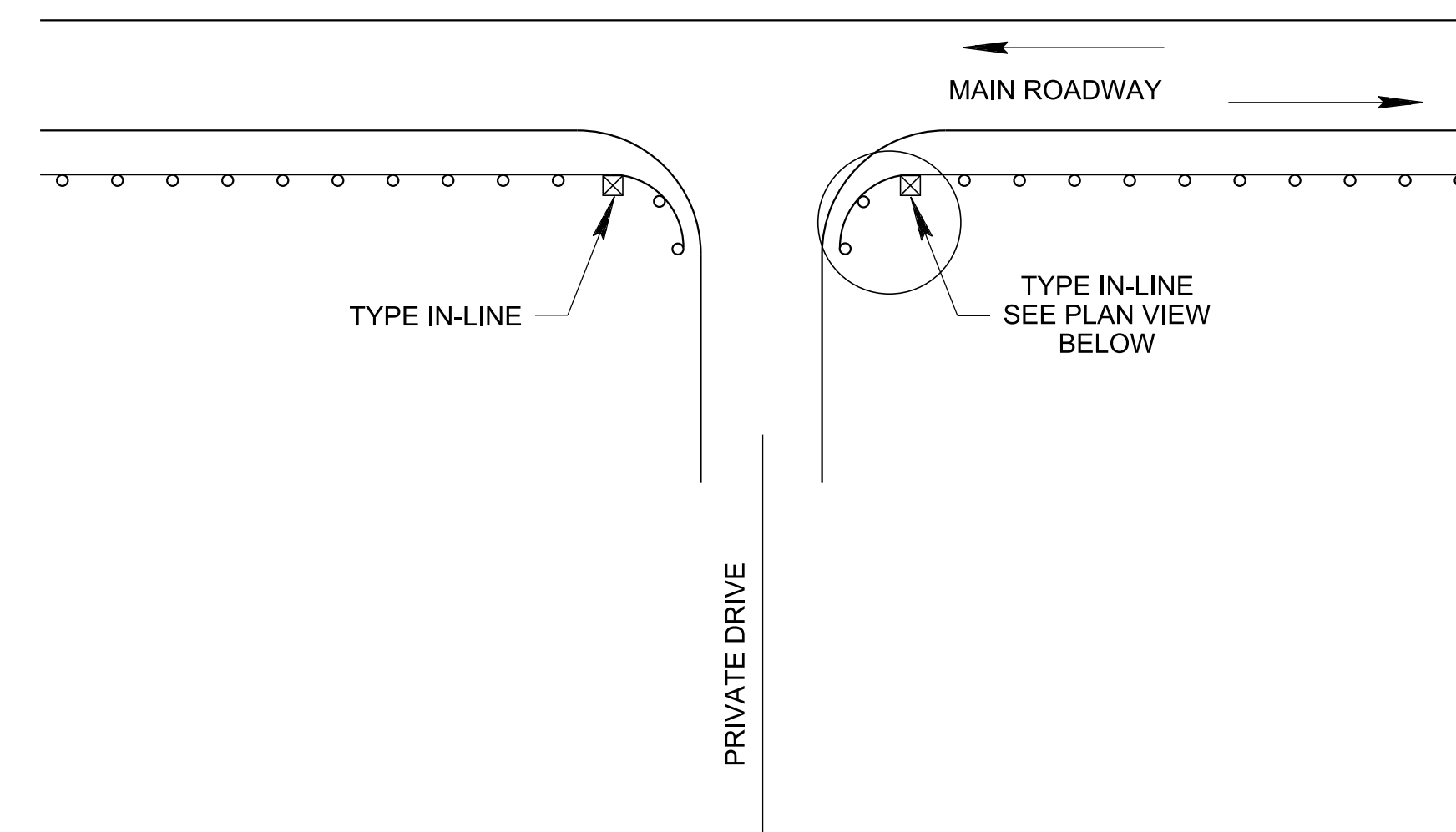
- (A) DURING INSTALLATION OF GUARDRAIL POSTS IN ROCK, GUARDRAIL POSTS SHALL NOT BE CUT.
- (B) USE THIS STANDARD DRAWING WHEN POSTS CANNOT BE EMBEDDED TO THE MINIMUM DEPTH SHOWN ON STANDARD DRAWING S-GR31-1C.
- (C) UNLESS OTHERWISE SPECIFIED USE EITHER THE CIRCULAR OR THE OBLONG HOLE CONFIGURATION WHEN THE SOIL DEPTH IS 16 INCHES OR LESS.
- (D) ANY EXCESS POST LENGTH, AFTER MEETING THESE DEPTHS, MAY BE FIELD CUT TO ENSURE PROPER GUARDRAIL MOUNTING HEIGHT AND TREAT FIELD CUT GALVANIZED STEEL POST SURFACES THAT EXPOSE THE BASE METAL WITH TWO COATS OF ZINC-OXIDE PAINT.
- (E) PLACEMENT OF GUARDRAIL POSTS IN ROCK HAS BEEN EVALUATED BY THE MIDWEST ROADSIDE SAFETY FACILITY AND MEET MASH TL-3 STANDARDS, AND THE EVALUATION HAS BEEN DOCUMENTED IN THE MIDWEST ROADSIDE MIDWEST STATES POOLED FUND RESEARCH REPORT NO. TRP-03-119-03.
- (F) SEE STANDARD DRAWINGS S-PL-6 FOR GUARDRAIL PLACEMENT AND S-GR31-1 SERIES FOR GUARDRAIL DETAILS.
- (G) PAYMENT OF ROCK DRILLING INCLUDING MINERAL AGGREGATE BACKFILL WILL BE MADE PER TDOT STANDARD SPECIFICATION SUBSECTION 705.10 BASIS OF PAYMENT.

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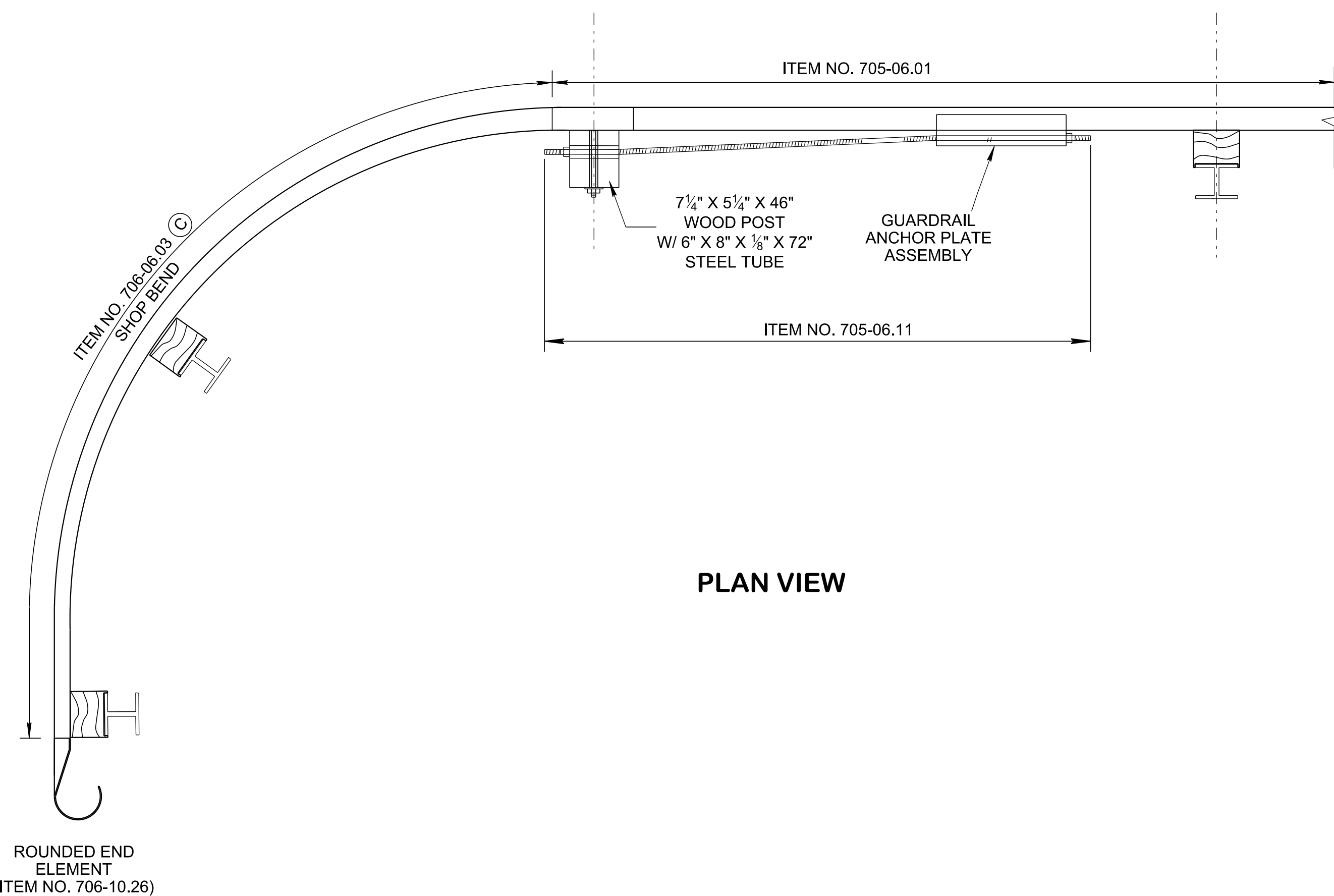
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**ELEVATION VIEW FROM BEHIND GUARDRAIL**  
(SEE S-GRA-3 FOR HARDWARE DETAILS)



**GUARDRAIL TERMINAL ANCHOR (TYPE IN-LINE) APPLICATION**



**PLAN VIEW**

- REV. 5-27-16: REVISED POST SIZE IN PLAN VIEW. ADDED DIMENSIONS, REVISED DETAIL, REVISED NOTES.
- REV. 3-28-17: CHANGED PAY ITEM NUMBER.
- REV. 7-5-17: COMBINED THE TWO PLAN VIEWS. ADDED (A) DIMENSION TO THE ELEVATION VIEW.
- REV. XX-XX-18: ADJUSTED LIMITS OF PAY ITEM NUMBER 705-06.11.
- REV. 06-28-2019: REDREW SHEET.
- REV. 03-01-2023: REVISED NOTE TO DESIGNER NOTE. ADDED GENERAL NOTE (C). ITEM NUMBER FOR SHOP BENT W-BEAM RAIL WAS CHANGED ON THE PLAN VIEW.

**NOTE TO DESIGNER**

DO NOT USE ON NATIONAL HIGHWAY SYSTEM (NHS), USE S-GRS-7 & 7A ON NHS  
DO NOT USE WITHOUT ALSO REFERENCING S-GRA-3 .

**GENERAL NOTES**

(A) THIS ANCHORAGE MAY ONLY BE USED ON THE TRAILING END OF A BARRIER WHICH IS NOT EXPOSED TO DIRECT VEHICULAR IMPACT OR IS OUTSIDE THE CLEAR ZONE (ONLY DIVIDED HIGHWAYS OR ROADS WITH ONE WAY TRAFFIC) USE S-PL-1 TO DETERMINE LENGTH OF NEED.

(B) IN-LINE GUARDRAIL TERMINAL TO BE PAID FOR UNDER ITEM NUMBER: PAY ITEM NO. 705-06.11 GR TERMINAL (IN-LINE) MASH TL3 PER EACH COST TO INCLUDE WOOD POST, STEEL TUBE, ANCHOR CABLE, AND GUARDRAIL ANCHOR PLATE ASSEMBLY.

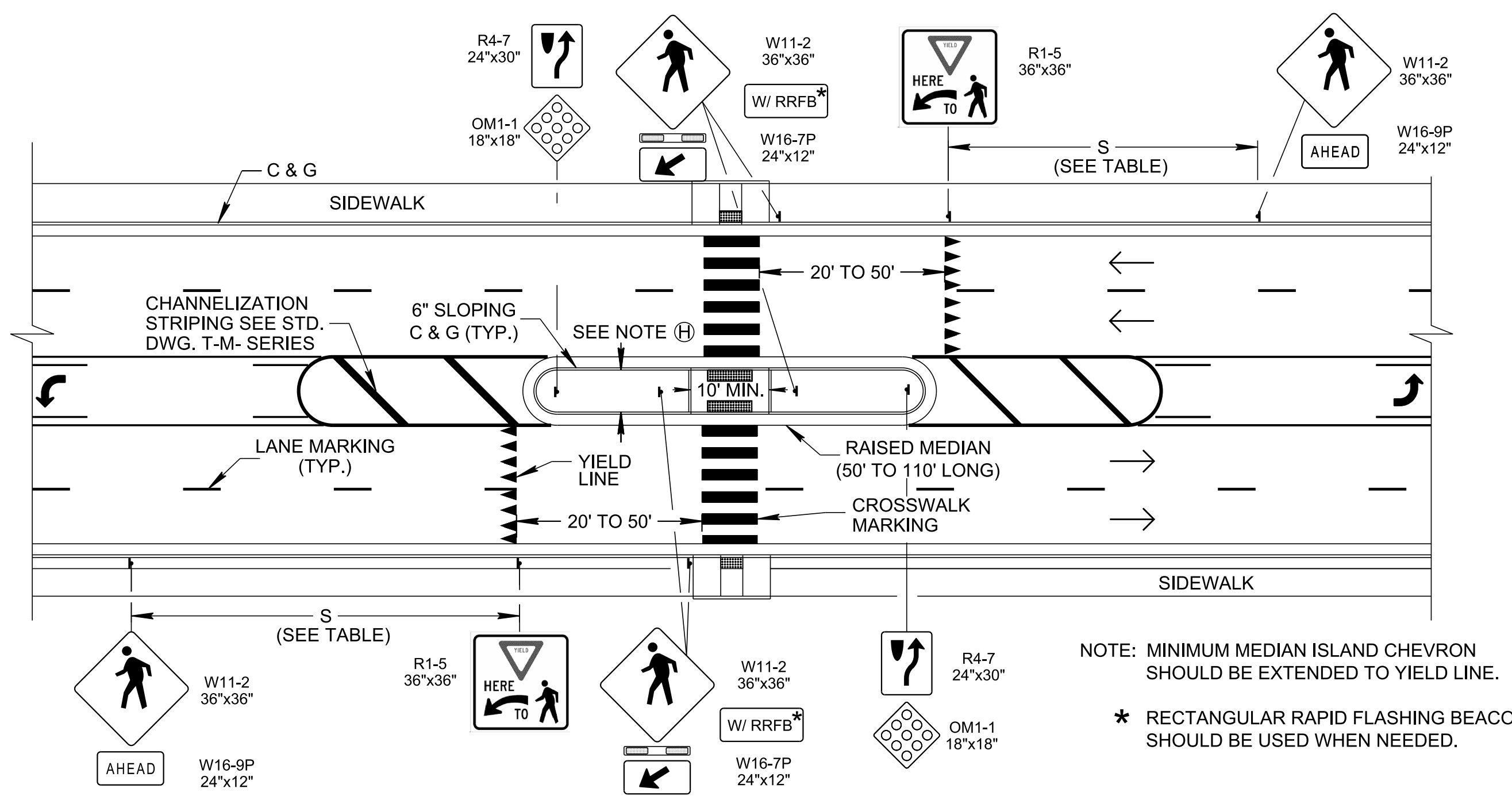
(C) FOR RADIUS LESS THAN OR EQUAL TO 150', USE SHOP BENT W-BEAM ITEM NO. 706-06.03 INSTEAD OF ITEM NO. 705-06.01.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED

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STANDARD DRAWING  
DEPARTMENT OF TRANSPORTATION

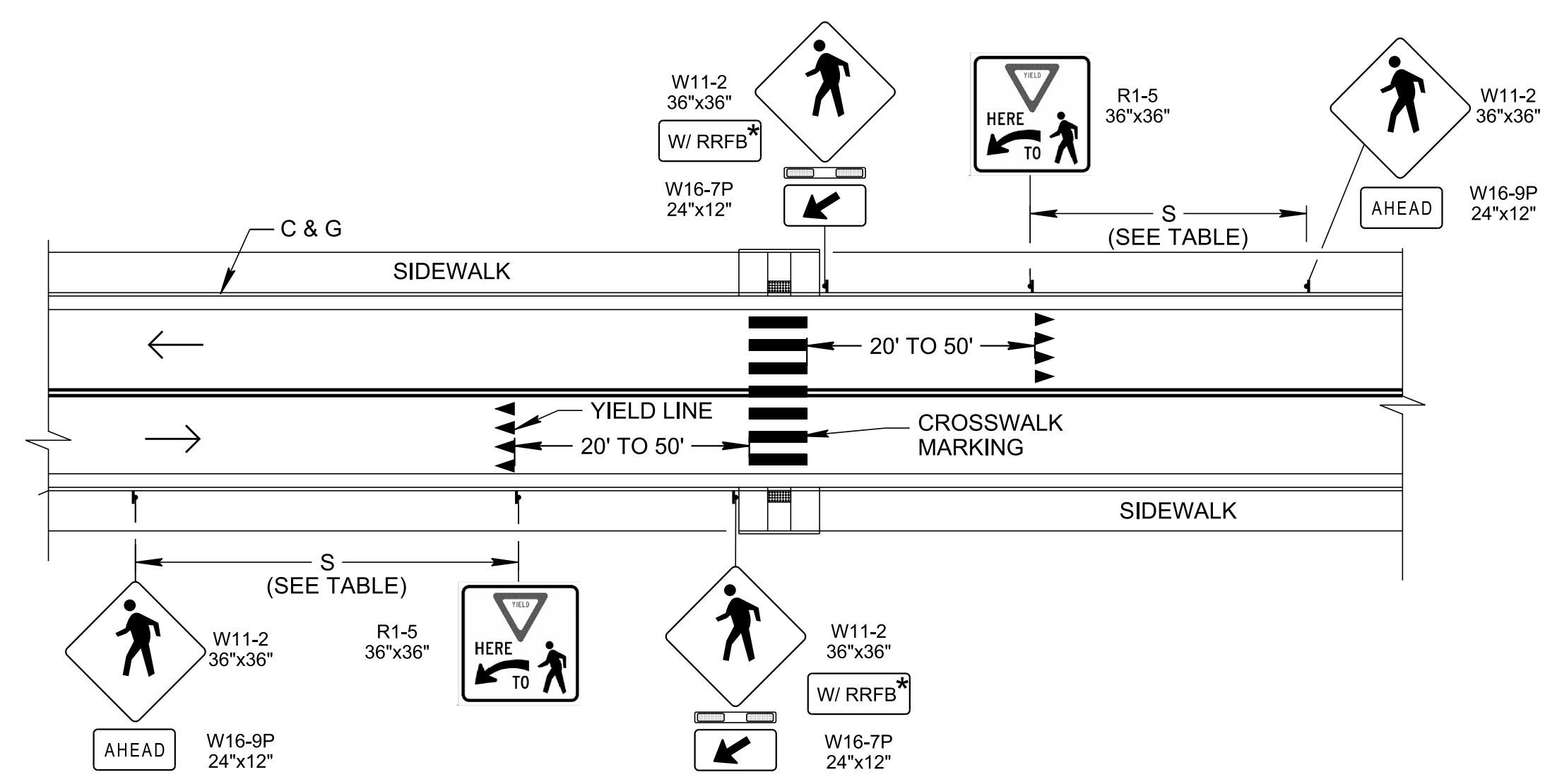
**IN-LINE GUARDRAIL ANCHOR TO PRIVATE DRIVE**



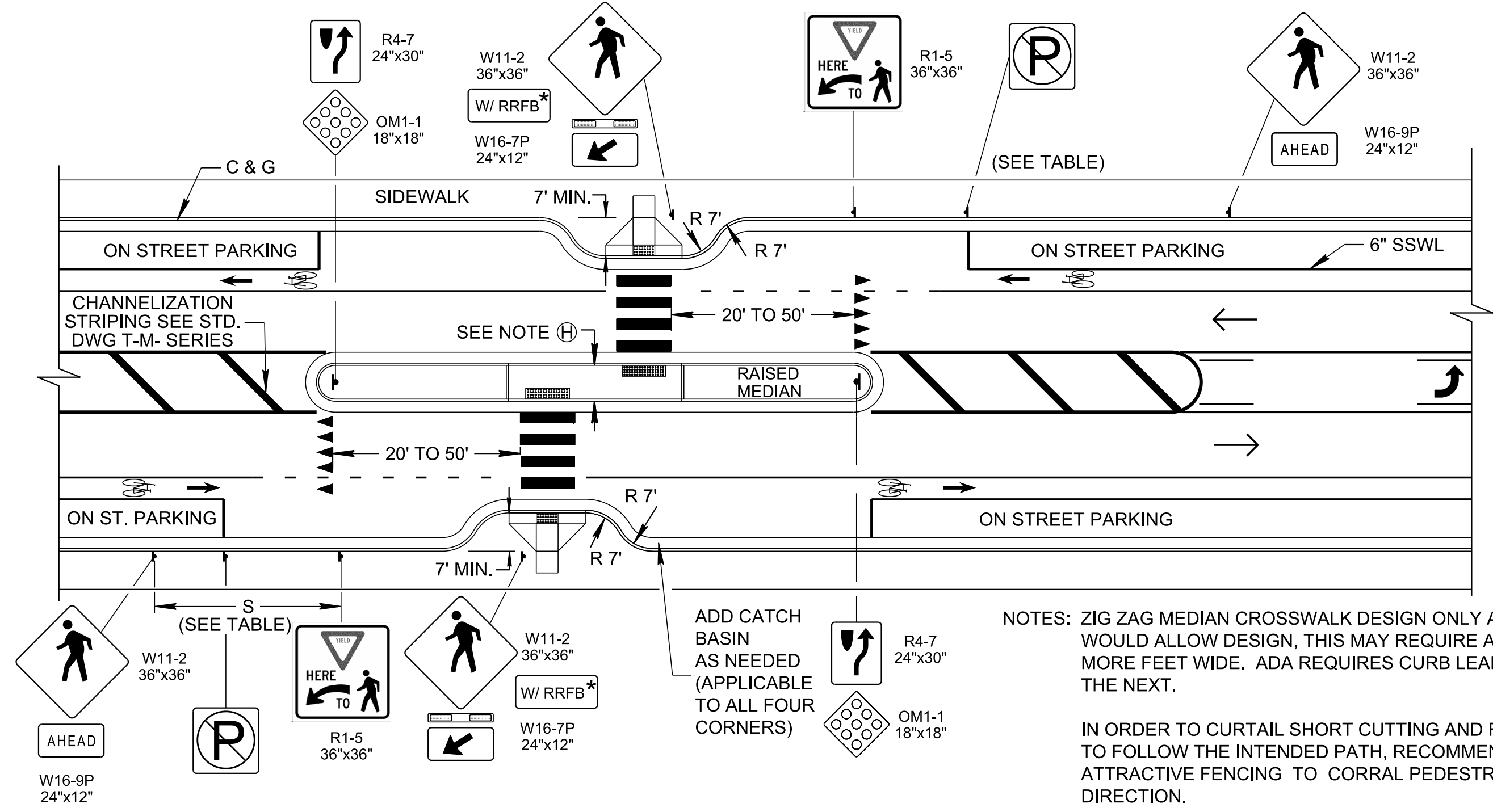


**5 LANES WITH RECTANGULAR RAPID FLASHING BEACON  
MID-BLOCK CROSSING**

NOTE: MINIMUM MEDIAN ISLAND CHEVRON SHOULD BE EXTENDED TO YIELD LINE.  
\* RECTANGULAR RAPID FLASHING BEACON SHOULD BE USED WHEN NEEDED.



**2 LANES WITH RECTANGULAR RAPID FLASHING BEACON  
MID-BLOCK CROSSING**



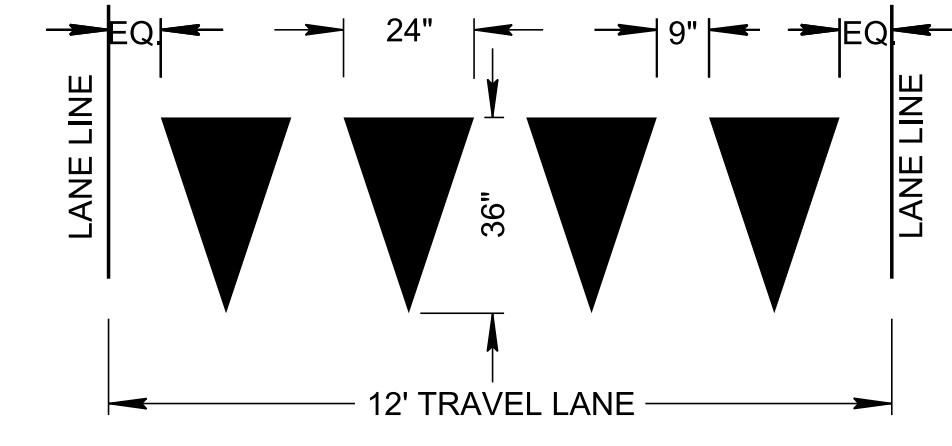
**2 LANES WITH RECTANGULAR RAPID FLASHING BEACON  
ALT. MID-BLOCK CROSSING**

NOTES: ZIG ZAG MEDIAN CROSSWALK DESIGN ONLY ALLOWED IF WIDTH WOULD ALLOW DESIGN, THIS MAY REQUIRE A MEDIAN OF 10 OR MORE FEET WIDE. ADA REQUIRES CURB LEAD FROM ONE RAMP TO THE NEXT.  
IN ORDER TO CURTAIL SHORT CUTTING AND FORCE PEDESTRIANS TO FOLLOW THE INTENDED PATH, RECOMMEND MEDIAN WITH ATTRACTIVE FENCING TO CORRAL PEDESTRIANS IN THE CORRECT DIRECTION.

MINIMUM ADVANCE PLACEMENT OF PEDESTRIAN WARNING SIGNS	
POSTED SPEED	WARNING SIGNS MINIMUM ADVANCE PLACEMENT DISTANCE - S
≤ 35 MPH	100 FT
40 MPH	125 FT

NOTE: WHERE THE SPEED LIMIT EXCEEDS 40 MPH, MARKED CROSSWALKS ALONE SHOULD NOT BE USED AT UNSIGNALIZED (NO SIGNAL) LOCATIONS.

LEGEND	
	GROUND MOUNT SIGN
	DETECTABLE WARNING SURFACE
	RECTANGULAR RAPID FLASHING BEACON
	PAVEMENT MARKING SYMBOLS
	DIRECTION OF TRAFFIC



**RECOMMENDED YIELD LINE LAYOUTS**

NOTES: YIELD LINES MAY BE SMALLER THAN SUGGESTED WHEN INSTALLED ON MUCH NARROWER, SLOW SPEED FACILITIES SUCH AS SHARED-USE PATHS.  
AREA OF EACH TRIANGLE A BASE OF 24 INCHES AND A HEIGHT OF 36 INCHES IS = 3 SF.

**GENERAL NOTES**

- (A) DETAILS SHOWN ON THIS STANDARD DRAWING APPLY TO THE CONSTRUCTION OR RECONSTRUCTION OF MID-BLOCK CROSSINGS AND MODIFICATION OF STREETS, CURBS, OR SIDEWALKS ASSOCIATED WITH IT. SEE TDOT-RDG FOR ADDITIONAL INFORMATION FOR SITE SELECTION, NEW CONSTRUCTION OR RECONSTRUCTION DURING PEDESTRIAN SAFETY INITIATIVE, SPOT SAFETY IMPROVEMENTS AT LOCATIONS MAX 45 MPH. OTHER LOCATIONS WILL NEED SITE SPECIFIC ANALYSIS.
- (B) FOR NEW CONSTRUCTION A TRAFFIC ENGINEERING STUDY WILL HAVE TO BE CONDUCTED TO DETERMINE IF A MID-BLOCK CROSSING IS WARRANTED. MID-BLOCK CROSSINGS SHALL BE INSTALLED DURING RECONSTRUCTION PROJECTS AND REPAVING PROJECTS AT LOCATIONS WHERE EXISTING PEDESTRIAN SAFETY IS A CONCERN.
- (C) PEDESTRIAN IN CROSSWALK SIGNS (W11-2) SHALL BE INSTALLED AT EACH END OF THE CROSSWALK LOCATION. THE SIGNS SHALL BE PLACED IN ADVANCE OF THE CROSSWALK ADJACENT TO THE TRAVEL LANE AND FACING THE DRIVER. REFER TO THE MUTCD FOR ADDITIONAL WARNING SIGNS, TYPE AND LOCATION.
- (D) FOR CURB RAMPS, THE DETECTABLE WARNING SURFACE, PAVEMENT MARKINGS, AND CROSSWALK MARKING DETAILS, SEE STD. DWG. SERIES MM-CR AND MM-PM RESPECTIVELY. FOR MARKING STANDARDS AND CONCRETE CURB AND GUTTER SEE STD. DWG T-M-SERIES AND RP-VC SERIES RESPECTIVELY.
- (E) WHILE LOCATION OF SIGN OR PEDESTRIAN SIGNAL MAY VARY BASED ON SITE CONDITIONS, ANY PEDESTRIAN PUSHBUTTON SHALL MEET ALL REQUIREMENTS FOR HEIGHT AND REACH RANGE PER PROWAG. 4FT BY 4FT LANDINGS (MAX 2% SLOPE) SHALL BE ADJACENT TO ANY PUSHBUTTON. PEDESTRIAN PUSHBUTTON SHALL BE INSTALLED IN COMPLIANCE WITH SECTION 4E.08 OF THE MUTCD. AND REFER TO STANDARD DRAWING T-SG-6 FOR PEDESTRIAN PUSHBUTTON POST DETAILS.
- (F) SEE SECTION 3B.18 OF THE MUTCD FOR UNSIGNALIZED MIDBLOCK CROSSWALKS.
- (G) A DEVICE THAT MAY BE USED TO ASSIST PEDESTRIANS CROSSING IN A MARKED CROSSWALK AT AN UNSIGNALIZED INTERSECTION IS A RECTANGULAR RAPID FLASHING BEACON (RRFB). RRFB'S ARE PARTICULARLY EFFECTIVE AT MULTILANE CROSSINGS WITH SPEED LIMITS LESS THAN 40 MPH. CONSIDER THE PEDESTRIAN HYBRID BEACON (PHB) INSTEAD OF RRFB'S FOR ROADWAYS SPEED LIMITS ARE EQUAL TO OR GREATER THAN 40 MPH SEE STANDARD DRAWING T-M-4B FOR SIGNALIZED MID-BLOCK CROSSING.
- (H) A MEDIAN SHOULD BE AT LEAST 8.0 FEET WIDE TO ALLOW THE PEDESTRIAN TO WAIT COMFORTABLY IN THE CENTER, IF THE DESIRED 8 FEET CANNOT BE ACHIEVED, USE A MINIMUM WIDTH OF 6 FEET. THE PEDESTRIAN CROSSWALK MEDIAN ISLAND ARE ADA-APPROVED RAMPS (1:12 GRADE) SHOULD BE USED. IT IS BEST TO PROVIDE A SLIGHT GRADE 2 PERCENT TO PERMIT WATER AND SILT TO DRAIN FROM THE AREA. DRAINAGE STRUCTURES SHALL NOT BE PLACED IN LINE WITH RAMPS. INSTALL CATCH BASINS ON UPSTREAM SIDE OF RAMP FOR ROADS WITH GRADES LESS THAN 2%.
- (I) PARKING AND OTHER SIGHT OBSTRUCTIONS SHOULD BE PROHIBITED FOR AT LEAST 100 FEET IN ADVANCE OF AND AT LEAST 20 FEET BEYOND THE MARKED CROSSWALK, OR SITE ACCOMMODATIONS SHOULD BE MADE THROUGH CURB EXTENSIONS OR OTHER TECHNIQUES TO PROVIDE ADEQUATE SIGHT DISTANCE. THE INSTALLATION SHOULD INCLUDE SUITABLE STANDARD SIGNS AND PAVEMENT MARKINGS.
- (J) DESIGNERS OF MIDBLOCK CROSSINGS SHOULD ALSO CONSIDER ADDING OR ENHANCING STREET ILLUMINATION TO IMPROVE PEDESTRIAN SAFETY.
- (K) MIDBLOCK CROSSWALKS SHOULD BE LOCATED AT LEAST 100 FEET FROM THE NEAREST SIDE STREET OR DRIVEWAY SO THAT DRIVERS TURNING ONTO THE MAJOR STREET HAVE A CHANCE TO NOTICE PEDESTRIANS AND PROPERLY YIELD TO PEDESTRIANS WHO ARE CROSSING THE STREET.
- (L) ADD CHANNELIZING DEVICES AT MID-BLOCK PEDESTRIAN CROSSINGS IN CONJUNCTION WITH IN STREET PEDESTRIAN CROSSING (R1-6 SERIES) SIGNS AS NEEDED.
- (M) PAYMENT
 

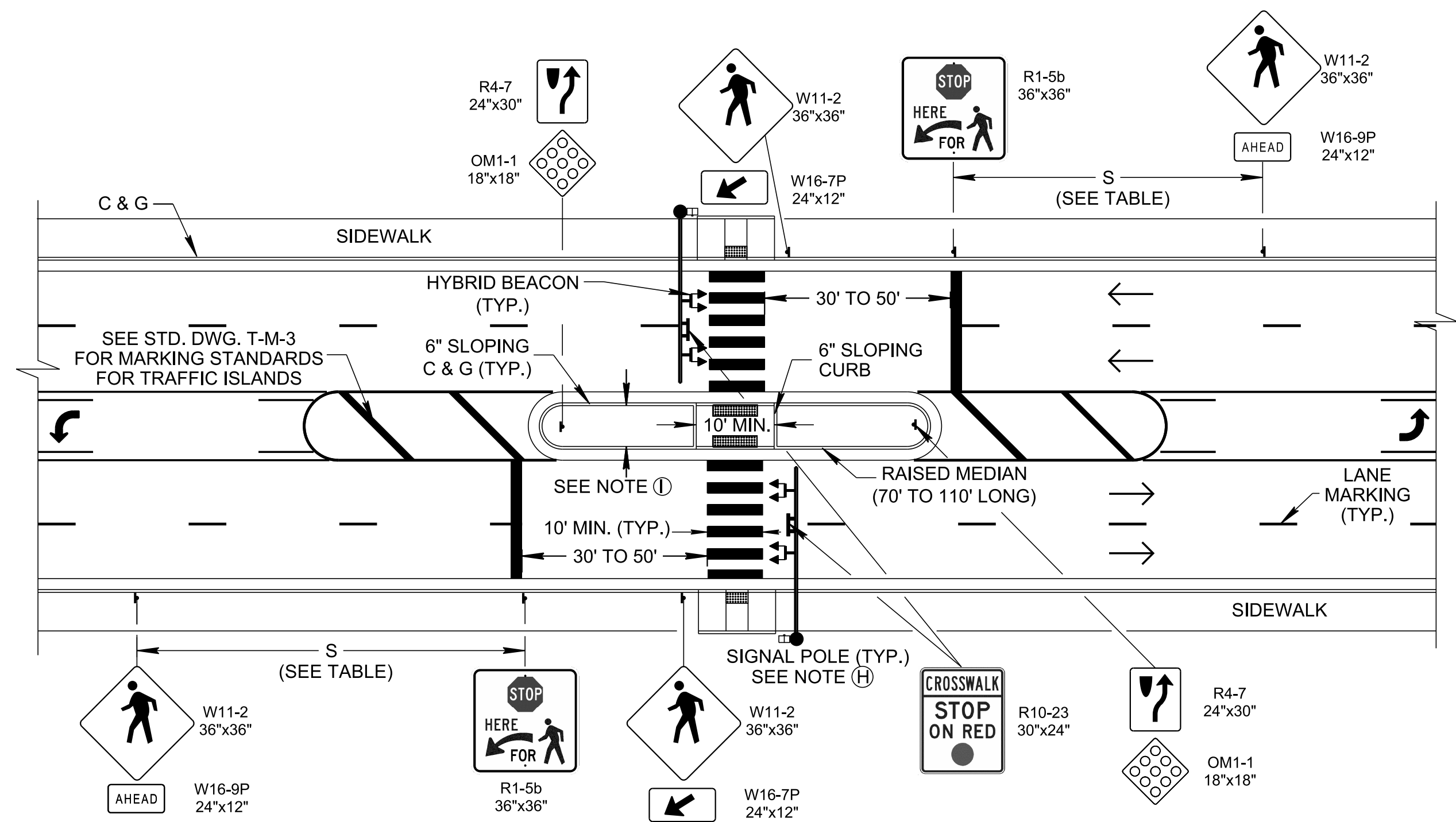
702-01, 702-03, 713-15.40, 716-02.03 716-02.04, 716-02.05, 716-04.12, 730-26.07, 730-50.20, 730-50.21,	CONCRETE CURB, CONCRETE COMBINED CURB AND GUTTER, SIGN INSTALLATION (DESCRIPTION), PLASTIC PAVEMENT MARKING (CROSS-WALK), PLASTIC PAVEMENT MARKING (CHANNELIZATION STRIPING), PLASTIC PAVEMENT MARKING (STOP LINE), PLASTIC PAVEMENT MARKING (YIELD LINE), FLASHING WARNING BEACON (DESCRIPTION), RECTANGULAR RAPID FLASHING BEACON ASSEMBLY (SOLAR POWERED), RECTANGULAR RAPID FLASHING BEACON ASSEMBLY (HARD-WIRED),	PER C.Y., PER C.Y., PER LS., PER L.F., PER S.Y., PER L.F., PER S.F., PER EACH, PER EACH, PER EACH
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REV. 07-17-20: REMOVED RIGHT TURN ARROWS FROM THE MIDDLE LANE.  
REV. 11-30-20: REVISED CROSSWALK SIGN ON GENERAL NOTE (C). ADDED GENERAL NOTE (M)  
REV. 06-15-21: REVISED GENERAL NOTE (E)  
REV. 05-04-22: REVISED DOWNWARD DIAGONAL ARROW SIGN DESIGNATION.  
REV. 03-01-23: ITEM NUMBERS 730-50.20 AND 730-50.21 WERE ADDED ON GENERAL NOTE (M). ADDED DIRECTION OF TRAFFIC AND PM SYMBOLS UNDER LEGEND. CHANGED W11-2 SIZE FROM 30"x30" TO 36"x36" FOR SINGLE LANE ROADS. ADDED RRFB CELL ON THE DRAWINGS. REMOVED YIELD AHEAD PM.  
REVISED GENERAL NOTES (E), (F), (H) AND (K). DELETED GENERAL NOTE (G) AND REARRANGED GENERAL NOTE NUMBERS.

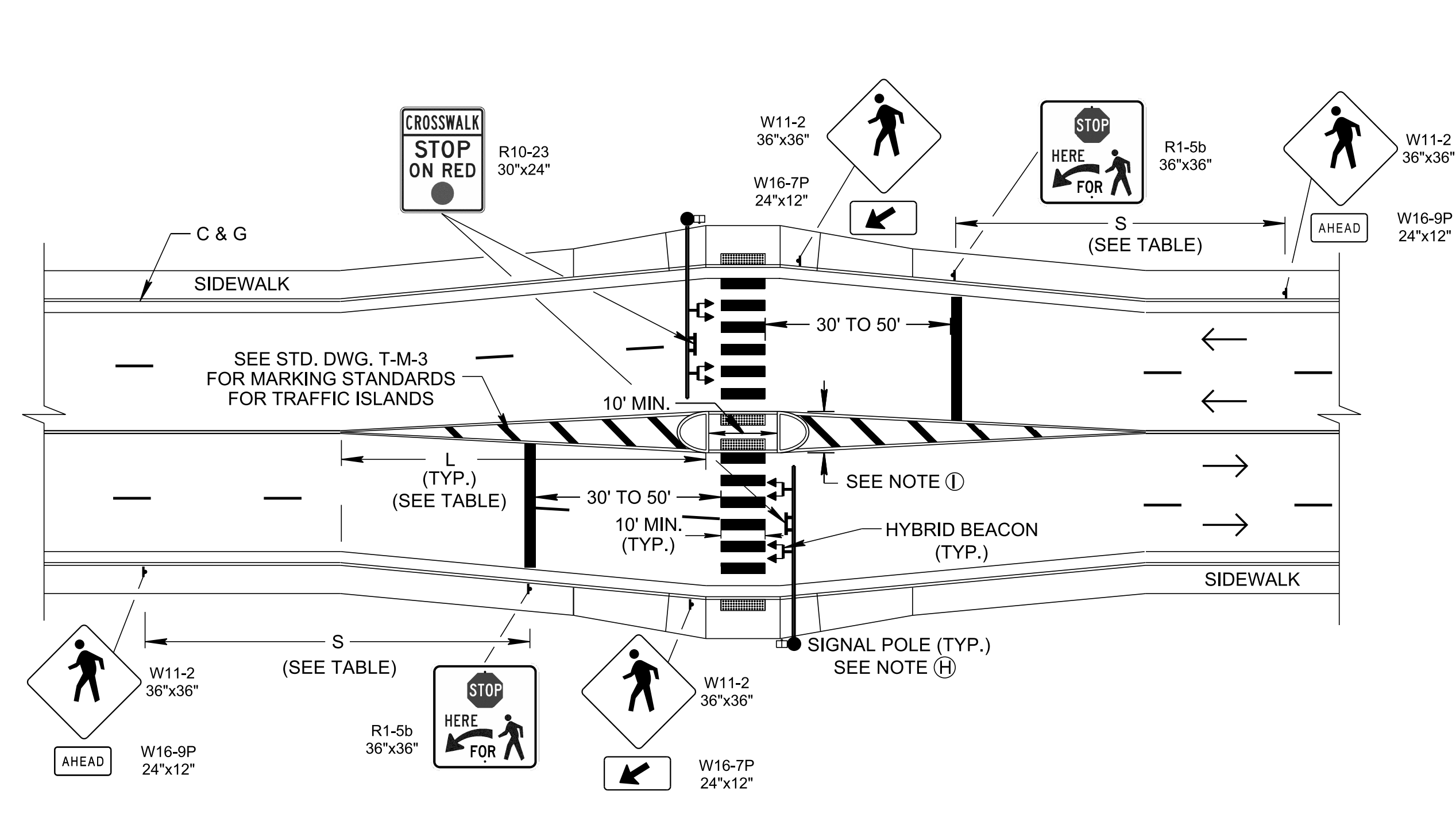
**STATE OF TENNESSEE**  
STANDARD DRAWING  
DEPARTMENT OF TRANSPORTATION

**STANDARD UNSIGNALIZED MID-BLOCK CROSSING**

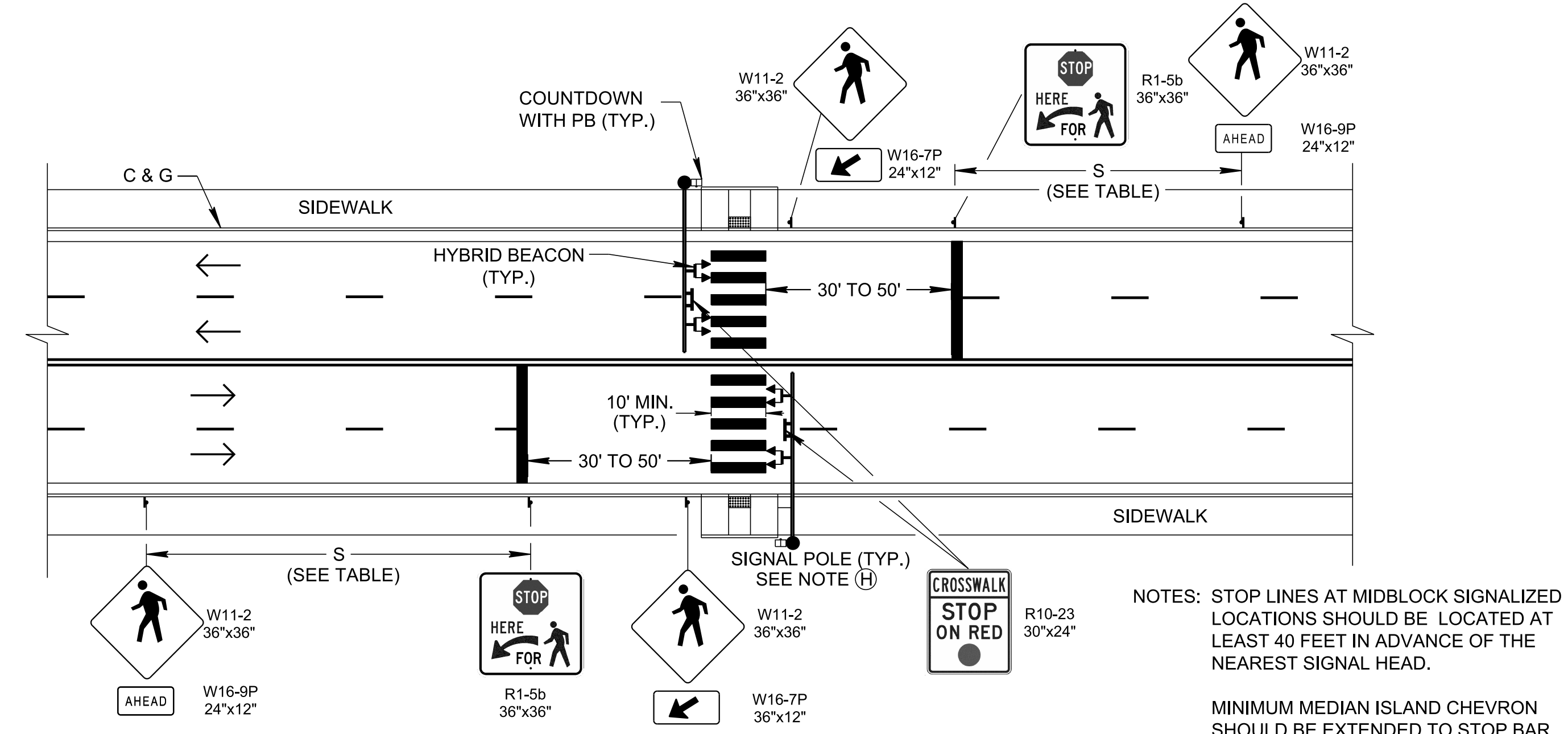
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**5 LANES WITH MEDIAN ISLANDS AND PEDESTRIAN HYBRID BEACON MID-BLOCK CROSSING**



**4 LANES WITH MEDIAN ISLANDS AND PEDESTRIAN HYBRID BEACON MID-BLOCK CROSSING**



**4 LANES WITH PEDESTRIAN HYBRID BEACON MID-BLOCK CROSSING**

NOTES: STOP LINES AT MIDBLOCK SIGNALIZED LOCATIONS SHOULD BE LOCATED AT LEAST 40 FEET IN ADVANCE OF THE NEAREST SIGNAL HEAD.  
MINIMUM MEDIAN ISLAND CHEVRON SHOULD BE EXTENDED TO STOP BAR LOCATION.

MINIMUM ADVANCE PLACEMENT OF PEDESTRIAN WARNING SIGNS	
POSTED SPEED	WARNING SIGNS MINIMUM ADVANCE PLACEMENT DISTANCE - S
≤ 35 MPH	100 FT
40 MPH	125 FT
45 MPH	175 FT

THE APPROPRIATE TAPER LENGTH (L)	
$L = \frac{WS^2}{60}$	40 MPH OR LESS
$L = WS$	45 MPH OR MORE

WHERE:  
L = TAPER LENGTH IN FEET  
W = WIDTH OF OFFSET IN FEET  
S = POSTED SPEED

LEGEND	
	PEDESTRIAN HYBRID BEACON
	GROUND MOUNT SIGN
	MAST ARM SIGNAL POLE
	COUNTDOWN PEDESTRIAN SIGNAL HEAD WITH PUSH BUTTON AND SIGN
	DETECTABLE WARNING SURFACE
	PAVEMENT MARKING SYMBOLS
	DIRECTION OF TRAFFIC

### GENERAL NOTES

(A) DETAILS SHOWN ON THIS STANDARD DRAWING APPLY TO THE CONSTRUCTION OR RECONSTRUCTION OF MID-BLOCK CROSSINGS AND MODIFICATION OF STREETS, CURBS, OR SIDEWALKS ASSOCIATED WITH IT. SEE TDOT-RDG FOR ADDITIONAL INFORMATION FOR SITE SELECTION, NEW CONSTRUCTION OR RECONSTRUCTION DURING PEDESTRIAN SAFETY INITIATIVE, SPOT SAFETY IMPROVEMENTS AT LOCATIONS MAX 45 MPH. OTHER LOCATIONS WILL NEED SITE SPECIFIC ANALYSIS.

(B) FOR NEW CONSTRUCTION A TRAFFIC ENGINEERING STUDY WILL HAVE TO BE CONDUCTED TO DETERMINE IF A MID-BLOCK CROSSING IS WARRANTED. MID-BLOCK CROSSINGS SHALL BE INSTALLED DURING RECONSTRUCTION PROJECTS AND REPAVING PROJECTS AT LOCATIONS WHERE EXISTING PEDESTRIAN SAFETY IS A CONCERN.

(C) PEDESTRIAN IN CROSSWALK SIGNS (W11-2) SHALL BE INSTALLED AT EACH END OF THE CROSSWALK LOCATION. THE SIGNS SHALL BE PLACED IN ADVANCE OF THE CROSSWALK ADJACENT TO THE TRAVEL LANE AND FACING THE DRIVER. REFER TO THE MUTCD FOR ADDITIONAL WARNING SIGNS, TYPE AND LOCATION.

(D) FOR CURB RAMPS, THE DETECTABLE WARNING SURFACE, PAVEMENT MARKINGS, AND CROSSWALK MARKING DETAILS. SEE STD. DWG. SERIES MM-CR AND MM-PM RESPECTIVELY. FOR MARKING STANDARDS AND CONCRETE CURB AND GUTTER SEE STD. DWG T-M- SERIES AND RP-VC SERIES RESPECTIVELY.

(E) SEE STANDARD DRAWINGS T-SG-14 AND T-SG-15 FOR PEDESTRIAN HYBRID BEACON DETAILS.

(F) STOP LINES SHOULD BE PLACED AT A SUFFICIENT DISTANCE (30' TO 50') FROM THE CROSSWALK TO ENSURE VISIBILITY IS PROVIDED FOR BOTH MOTORISTS AND PEDESTRIANS. STOP LINES AT MID-BLOCK SIGNALIZED LOCATIONS SHOULD BE PLACED AT LEAST 40 FEET IN ADVANCE OF THE NEAREST SIGNAL INDICATION. STOP HERE FOR PEDESTRIANS (R1-5 SERIES) SIGNS SHALL BE USED.

(G) SEE STANDARD DRAWING T-M-4A FOR UNSIGNALIZED MID-BLOCK CROSSING.

(H) SPECIFIC SIGHT CONDITIONS MAY RESTRICT LOCATIONS FOR HAWK SIGNALS TO BE INSTALLED. THE SIGNAL POLES SHOULD GENERALLY BE INSTALLED AS CLOSE AS POSSIBLE TO THE PHYSICAL PEDESTRIAN CROSSING. WHEN LUMINARIES ARE INSTALLED ON THE POLE, THE POLE SHOULD BE LOCATED IN ADVANCE OF THE CROSSWALK MARKING FOR BETTER PEDESTRIAN VISIBILITY.

(I) A MEDIAN SHOULD BE AT LEAST 8 FEET WIDE TO ALLOW THE PEDESTRIAN TO WAIT COMFORTABLY IN THE CENTER, IF THE DESIRED 8 FEET CANNOT BE ACHIEVED, USE A MINIMUM WIDTH OF 6 FEET. THE PEDESTRIAN CROSSWALK MEDIAN ISLANDS ARE ADA-APPROVED RAMPS (1:12 GRADE) AND SHOULD BE USED. IT IS BEST TO PROVIDE A SLIGHT GRADE 2 PERCENT TO PERMIT WATER AND SILT TO DRAIN FROM THE AREA. DRAINAGE STRUCTURES SHALL NOT BE PLACED IN LINE WITH RAMPS. INSTALL CATCH BASINS ON UPSTREAM SIDE OF RAMP FOR ROADS WITH GRADES LESS THAN 2%.

(J) MID BLOCK CROSSWALKS SHOULD BE LOCATED AT LEAST 100 FEET FROM THE NEAREST SIDE STREET OR DRIVEWAY SO THAT DRIVERS TURNING ONTO THE MAJOR STREET HAVE A CHANCE TO NOTICE PEDESTRIANS AND PROPERLY YIELD TO PEDESTRIANS WHO ARE CROSSING THE STREET.

(K) ADD CHANNELIZING DEVICES AT MID-BLOCK PEDESTRIAN CROSSINGS IN CONJUNCTION WITH IN STREET PEDESTRIAN CROSSING (R1-6 SERIES) SIGNS AS NEEDED.

(L) PAYMENT

702-01, 702-03, 713-15.40, 716-02.03 716-02.04, 716-02.05, 730-50.25,	CONCRETE CURB, CONCRETE COMBINED CURB AND GUTTER, SIGN INSTALLATION (DESCRIPTION), PLASTIC PAVEMENT MARKING (CROSSWALK), PLASTIC PAVEMENT MARKING (CHANNELIZATION STRIPING), PAVEMENT MARKING (STOP LINE), PEDESTRIAN HYBRID BEACON ASSEMBLY,	PER C.Y., PER C.Y., PER L.S., PER L.F., PER S.Y., PER L.F., PER EACH.
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REV. 07-17-20: REMOVED RIGHT TURN ARROWS FROM THE MIDDLE LANE.

REV. 11-30-20: REVISED CROSSWALK SIGN ON GENERAL NOTE (C). ADDED GENERAL NOTE (P).

REV. 06-15-21: REVISED GENERAL NOTES (E) AND (I). REMOVED MINIMUM ADVANCE PLACEMENT TABLE NOTE.

REV. 10-29-21: REMOVED PHB SIGN AND ADDED TN-70 AND R10-23 SIGNS ON THE DRAWINGS. REVISED GENERAL NOTE K.

REV. 01-28-22: REVISED MARKING STANDARDS FOR TRAFFIC ISLANDS ON 4 LANES WITH MEDIAN ISLANDS AND PEDESTRIAN HYBRID BEACON MID-BLOCK CROSSING DRAWING.

REV. 05-04-22: REVISED DOWNWARD DIAGONAL ARROW SIGN DESIGNATION.

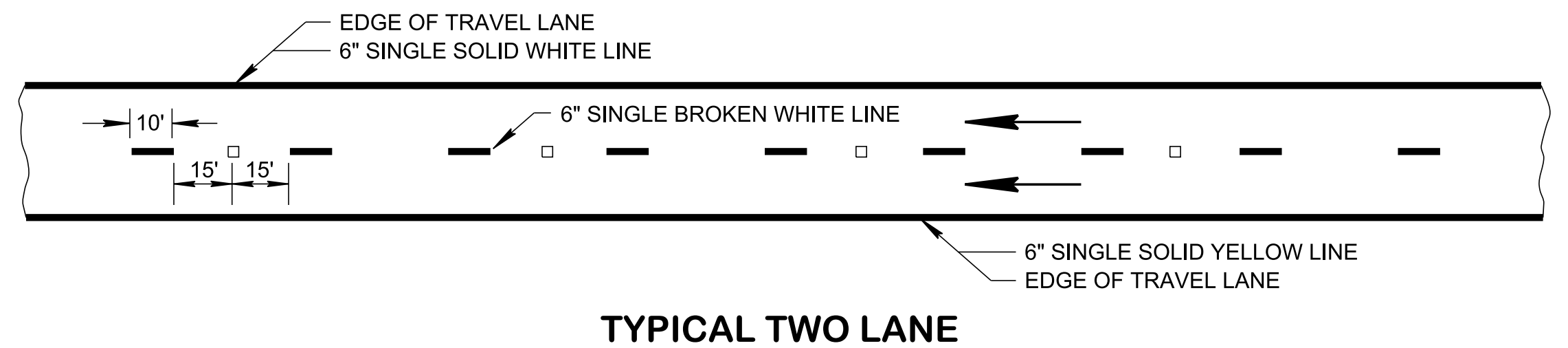
REV. 03-01-23: REMOVED TN-70 SIGN AND ADDED R10-23 SIGNS ON THE DRAWINGS. REVISED GENERAL NOTE (K). DIRECTION OF TRAFFIC AND PM SYMBOLS WERE ADDED UNDER LEGEND. REMOVED SIGNAL AHEAD PM. REVISED GENERAL NOTES (E), (F) AND (I). ADDED NEW GENERAL NOTE (H). DELETED GENERAL NOTES (G), (H), (L) AND (M). AND REARRANGED GENERAL NOTE NUMBERS.

STATE OF TENNESSEE  
STANDARD DRAWING  
DEPARTMENT OF TRANSPORTATION

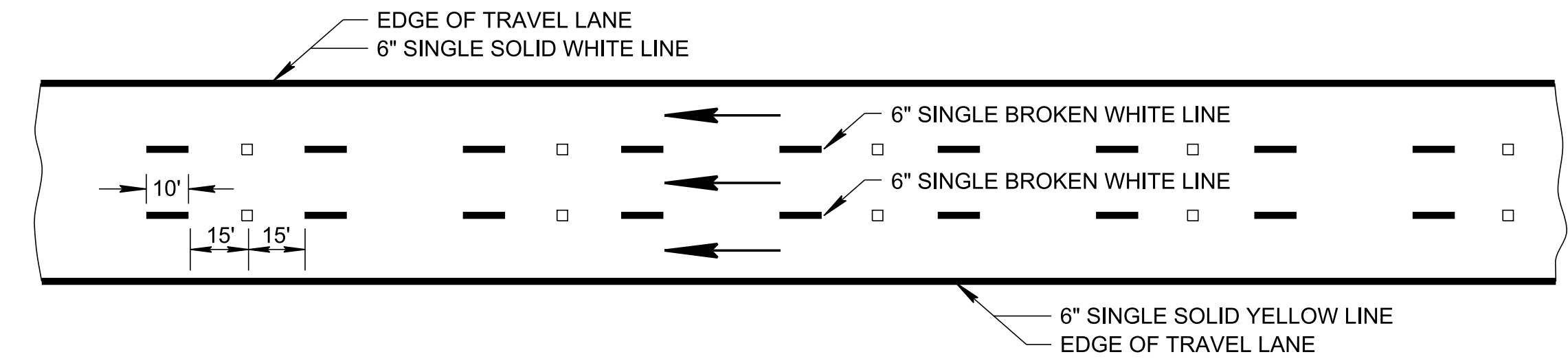
STANDARD SIGNALIZED MID-BLOCK CROSSING

04-08-2020 T-M-4B

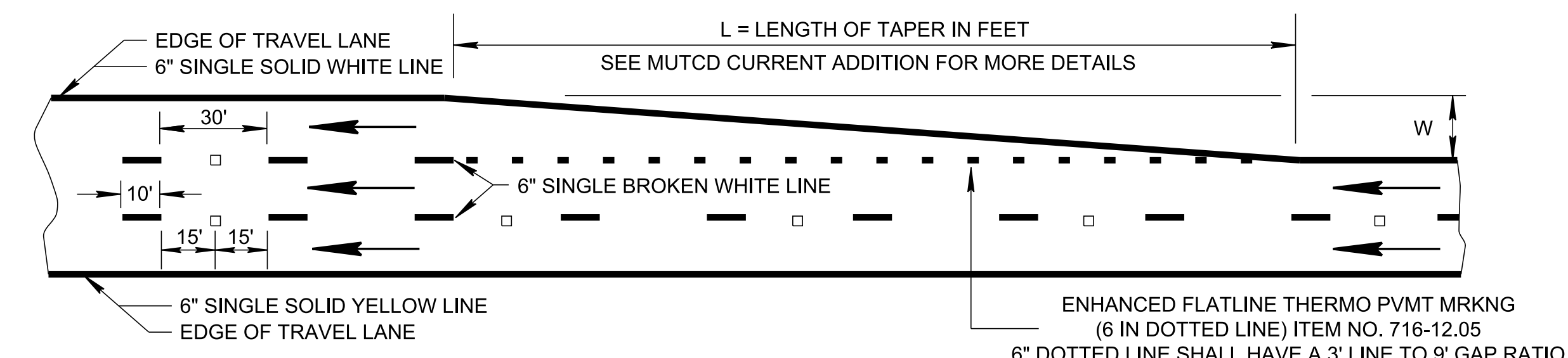
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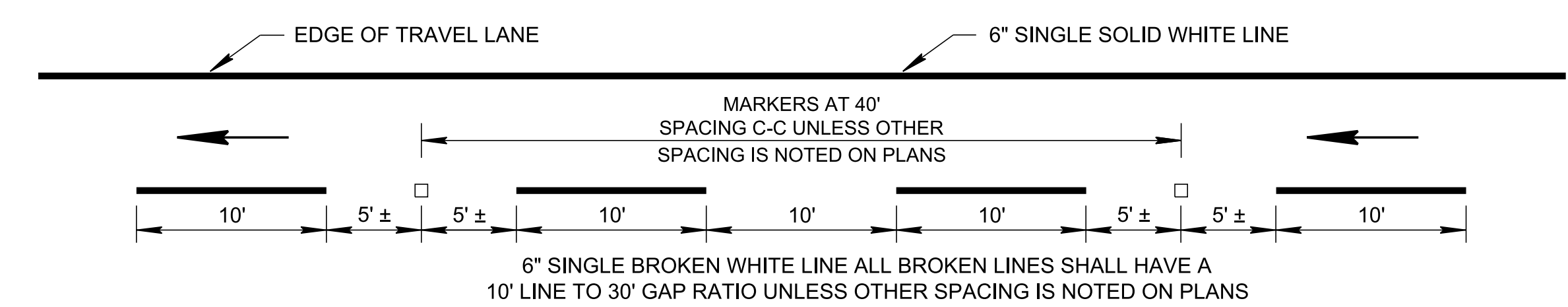
**TYPICAL TWO LANE**



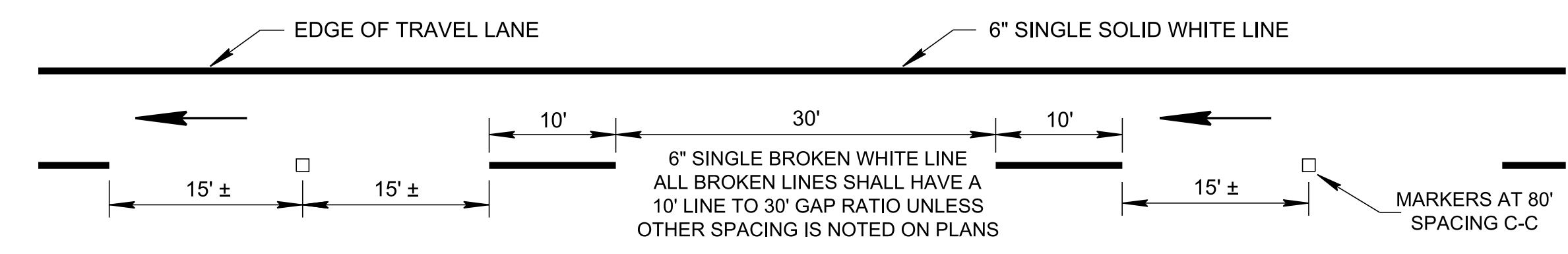
**TYPICAL THREE LANE**



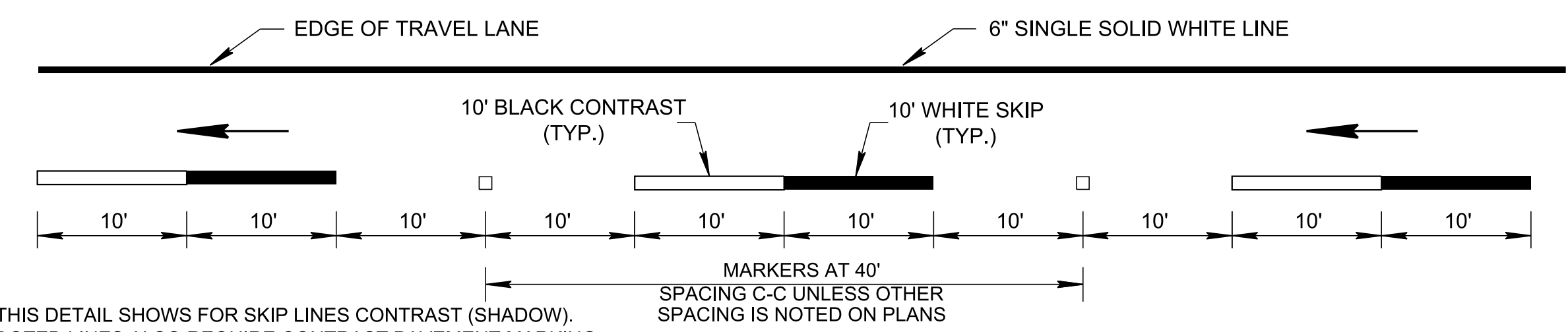
**TYPICAL SHOWING BEGINNING OF ADDITIONAL LANE**



**SPACING DETAILS FOR HOV TRAFFIC LANE**

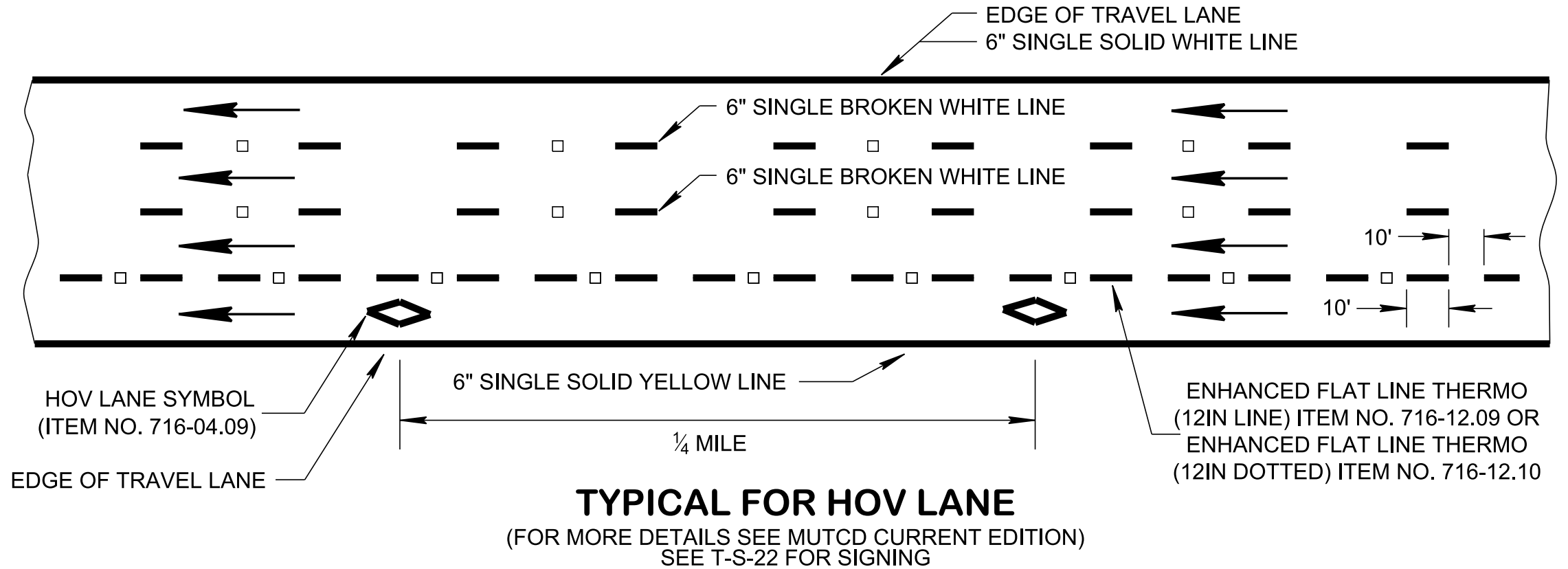


**SPACING DETAILS FOR REGULAR TRAFFIC LANE**

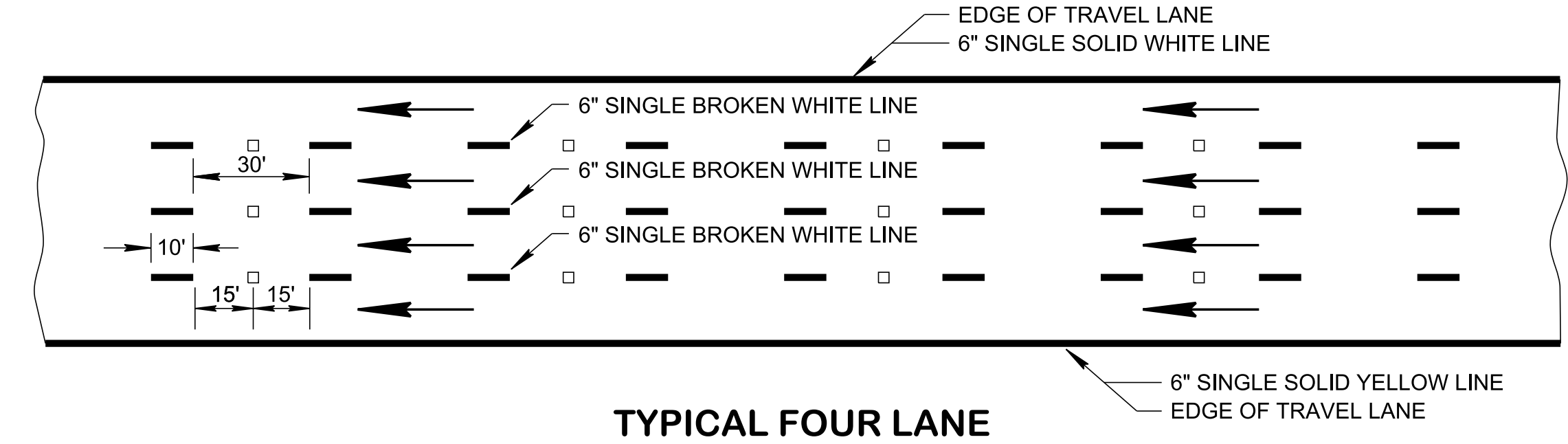


**SPACING DETAILS FOR CONCRETE PAVEMENT TRAFFIC LANE**  
(ITEM NUMBER 716-09.94 CONTRAST PAVEMENT SHADOW MARKING 6", L.M.)

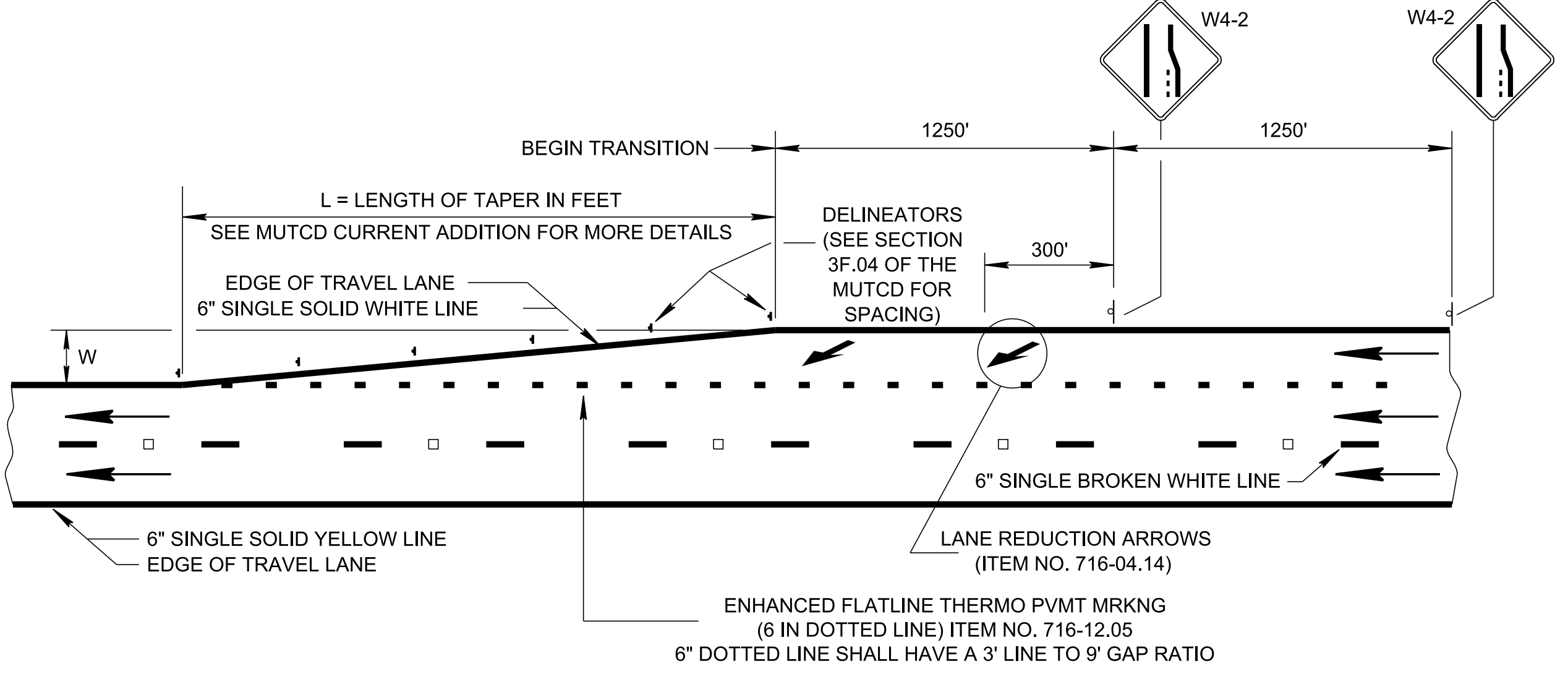
NOTE: THIS DETAIL SHOWS FOR SKIP LINES CONTRAST (SHADOW). DOTTED LINES ALSO REQUIRE CONTRAST PAVEMENT MARKING.



**TYPICAL FOR HOV LANE**  
(FOR MORE DETAILS SEE MUTCD CURRENT EDITION) SEE T-S-22 FOR SIGNING



**TYPICAL FOUR LANE**



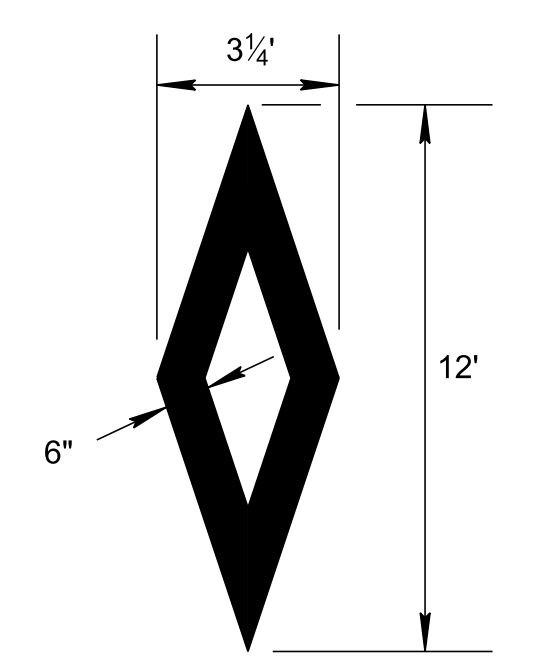
**TYPICAL LANE REDUCTION TRANSITION**

L = W x S FOR SPEEDS OF 45 MPH OR MORE  
W = OFFSET IN FEET  
S = POSTED, 85 TH-PERCENTILE, OR STATUTORY SPEED IN MPH

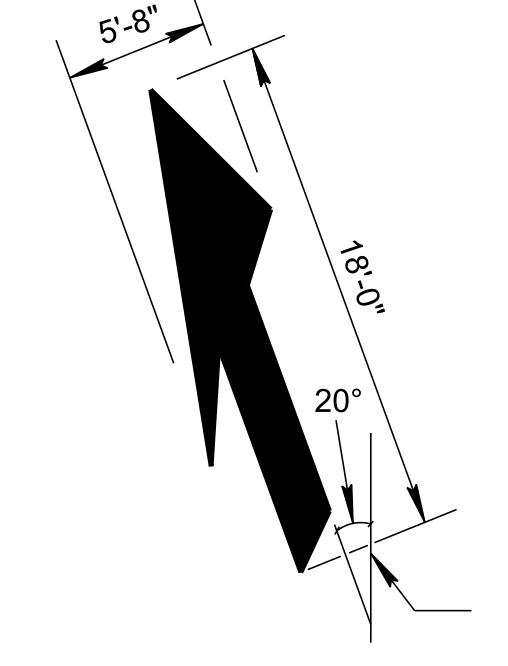
**LEGEND**

□ BI-DIRECTIONAL MARKERS  
ITEM NO. 716-01.23, 2-COLOR

NOTE: ALL 6" EDGE OF TRAVEL LINE AND 6" SINGLE BROKEN LINE PAVEMENT MARKINGS SHALL BE ENHANCED FLATLINE THERMO PVMT MRKNG (6IN LINE) ITEM NO. 716-12.02.



**HOV LANE SYMBOL**  
ITEM NO. 716-04.09  
PLASTIC PAVEMENT MARKING (H.O.V. DIAMOND), EACH



**LANE-REDUCTION ARROW**  
ITEM NO. 716-04.14  
PLASTIC PAVEMENT MARKING (LANE REDUCTION ARROW), EACH

REV. 02-22-88: REVISED TO SHOW RAISED REFLECTIVE PAVEMENT MARKERS CENTERED BETWEEN BROKEN LINES. CHANGED DRAWING NO. FROM T-M-2 TO T-M-5.

REV. 03-20-91: CHANGED TYPE 2 PAVEMENT MARKERS (CLEAR) TO MONO-DIRECTIONAL PAVEMENT MARKERS (CLEAR). REDREW SHEET.

REV. 10-26-92: ADDED GENERAL NOTE (A).

REV. 07-29-98: CHANGED WIDTH OF CENTERLINES, EDGE LINES, AND DOTTED WHITE LANE LINES FROM 4 TO 6 INCHES.

REV. 04-15-04: CHANGED W4-2 SIGNS AND TRANSITION NOTE IN LOWER RIGHT CORNER TO COMPLY WITH 2003 MUTCD.

REV. 09-05-04: IN TYPICAL SHOWING ENDING OF ADDITIONAL LANE CHANGE NOTE (1).

REV. 11-01-11: ADDED HOV SIGNS AND PAVEMENT MARKING DETAILS. ADDED LANE REDUCTION ARROWS WITH DETAILS, REVISED PAVEMENT MARKINGS TYPICAL DETAILS.

REV. 01-12-12: CHANGED SNOW PLOWABLE MARKERS FROM MONO-DIRECTIONAL TO BI-DIRECTIONAL 2-COLOR.

REV. 05-24-12: REMOVED BROKEN LINE FROM TRANSITION AREA ON BEGINNING OF ADDITIONAL LANE.

REV. 08-16-12: REMOVED HOV SIGNS.

REV. 04-23-13: CHANGED HOV LANE LINE MARKING.

REV. 06-28-19: ADDED PAVEMENT MARKINGS AND ITEM NOS. FOR ENHANCED FLATLINE THERMO PVMT MRKNG (6IN LINE) ITEM NO. 716-12.02 AND ENHANCED FLATLINE THERMO PVMT MRKNG (6 IN DOTTED LINE) ITEM NO. 716-12.05 TO DRAWING. ADDED ITEM NOS. 716-04.09 AND 716-04.14. REDREW SHEET.

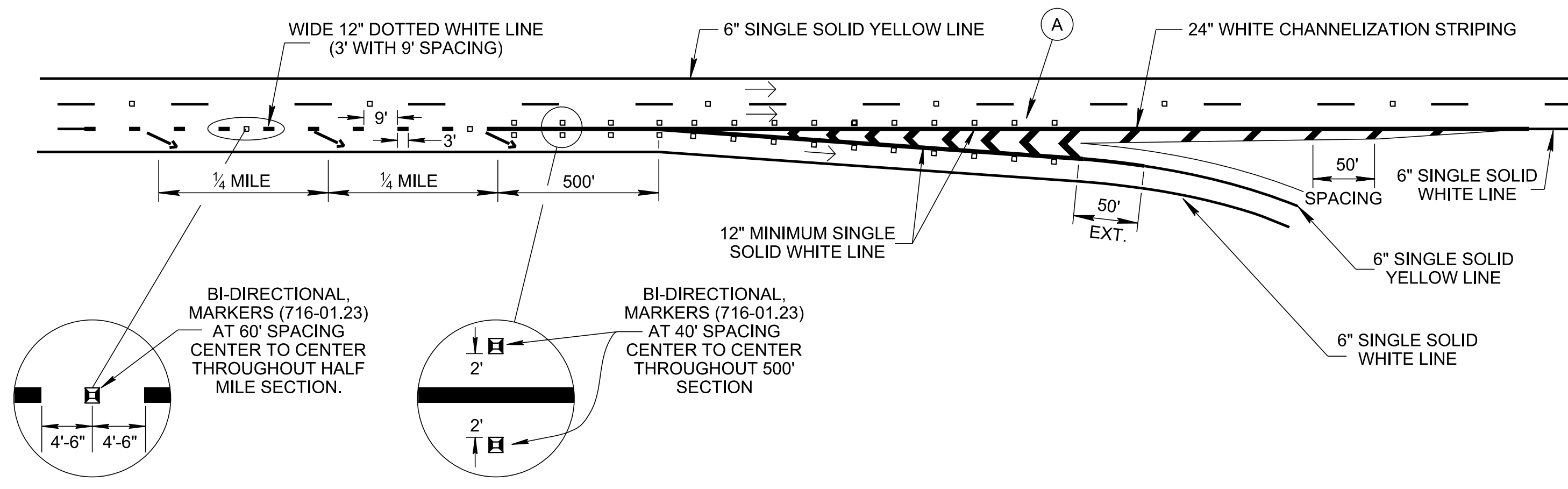
REV. 03-01-23: ADDED SPACING DETAILS FOR CONCRETE PAVEMENT TRAFFIC LANE DRAWING. ADDED NOTE FOR ENHANCED FLATLINE THERMO PVMT MRKNG ITEM NUMBER AND REMOVED LABEL #1 FROM THE DRAWINGS.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED

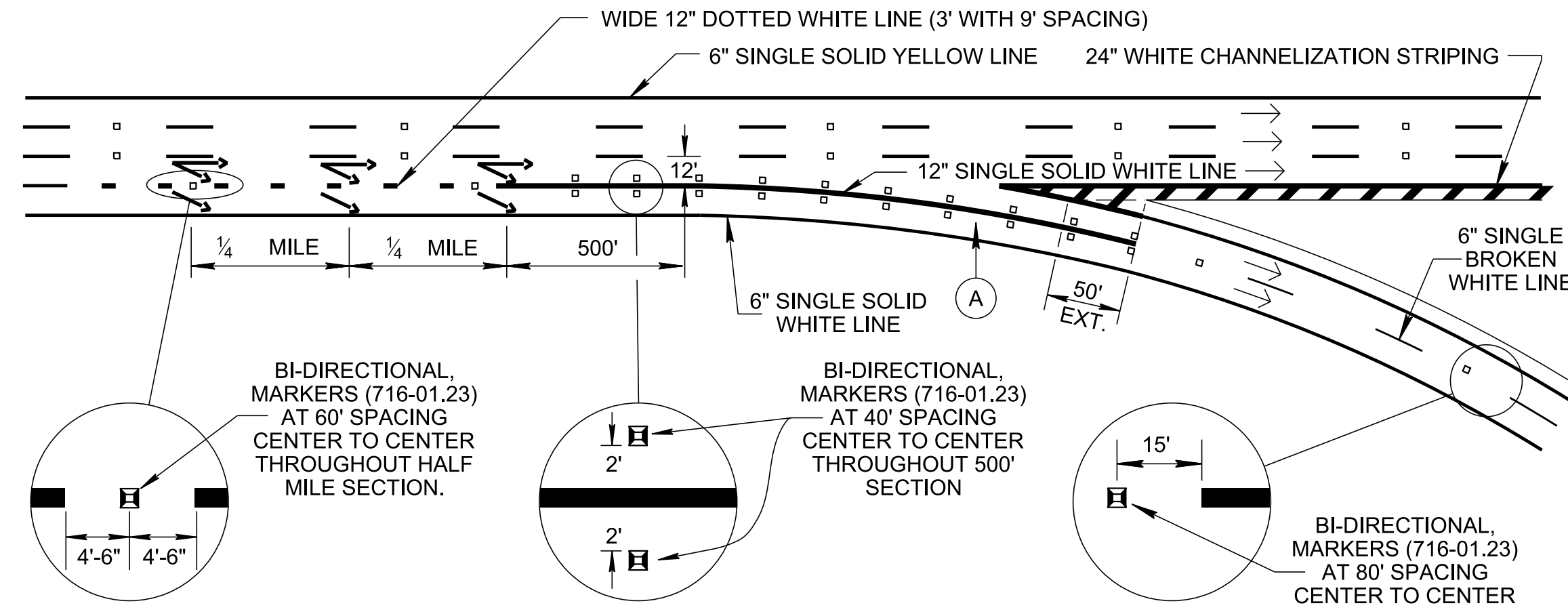
STATE OF TENNESSEE  
STANDARD DRAWING  
DEPARTMENT OF TRANSPORTATION

MARKING DETAIL FOR FREEWAYS

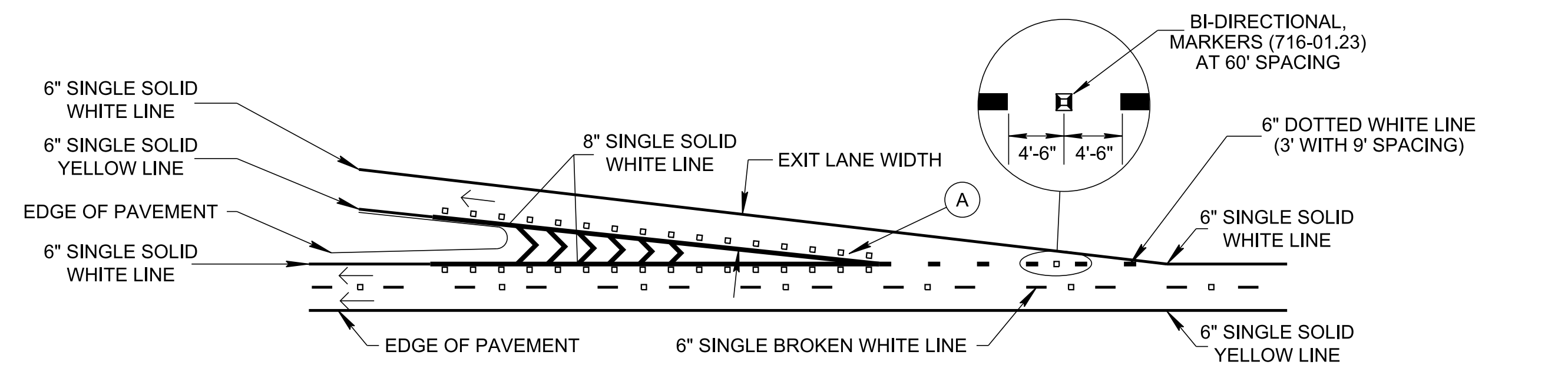
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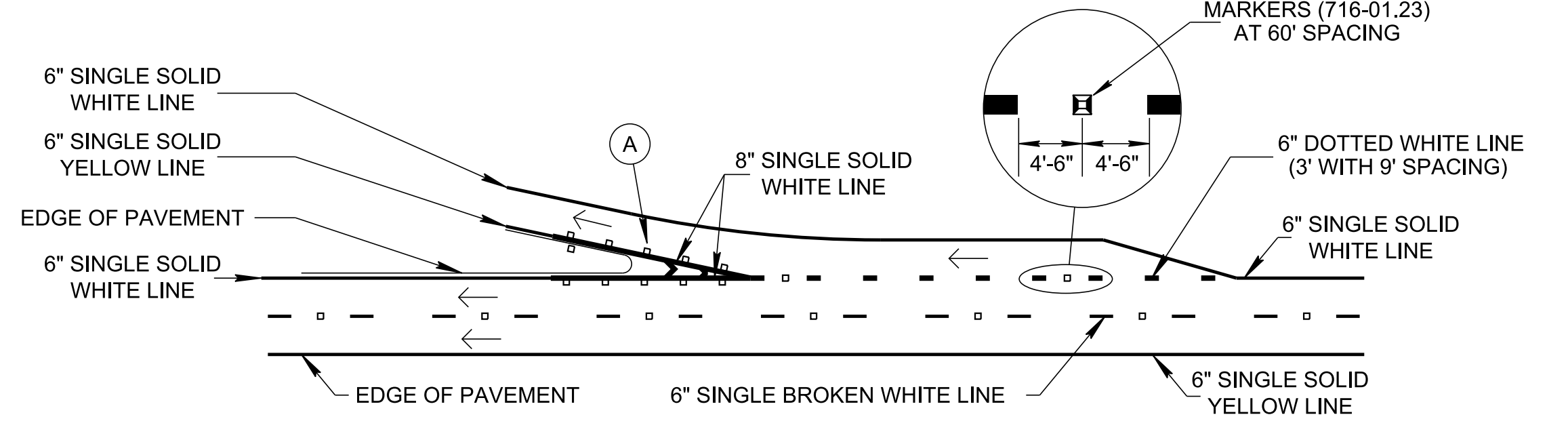
**EXIT ONLY LANE**



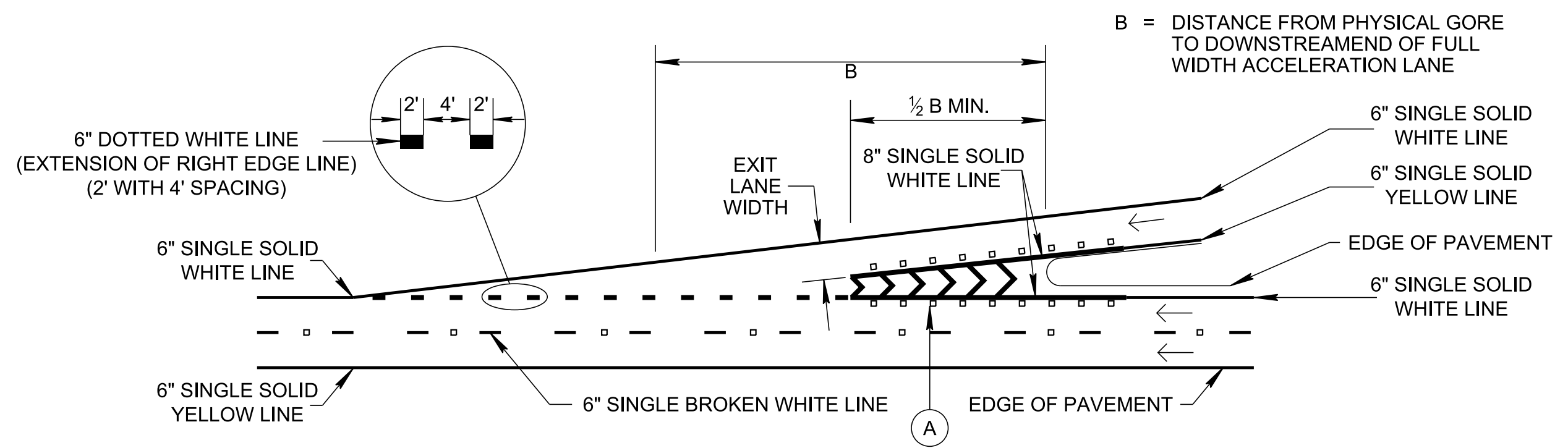
**EXIT ONLY LANE WITH OPTIONAL LANE**



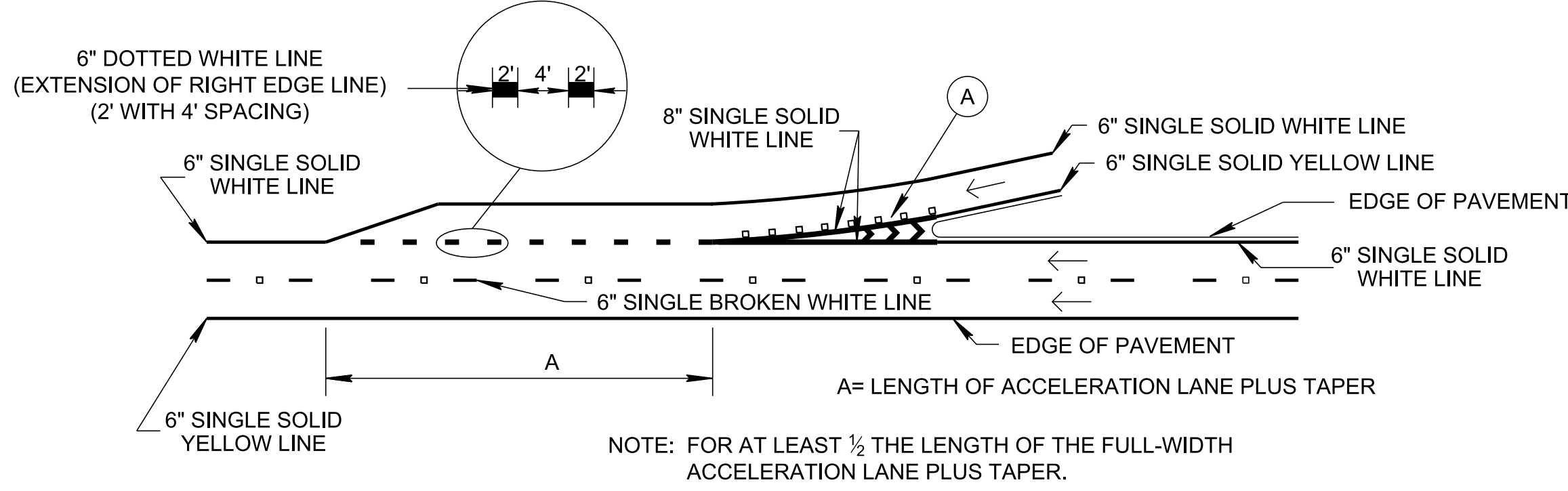
**TAPERED DECELERATION LANE EXIT RAMP**



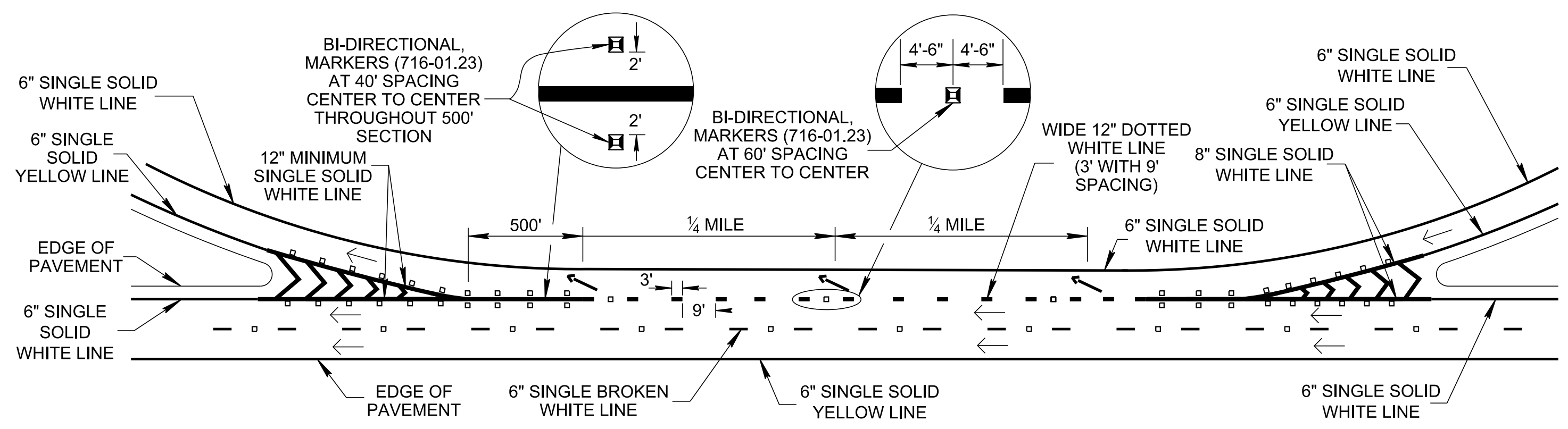
**PARALLEL DECELERATION LANE**



**TAPERED ACCELERATION LANE ENTRANCE RAMP**

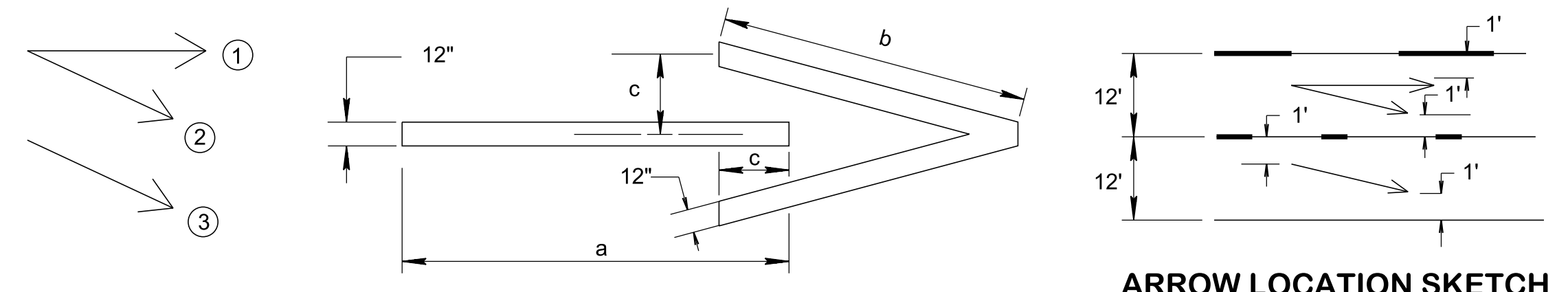


**PARALLEL ACCELERATION LANE**



**AUXILIARY LANE AT CLOSELY SPACED RAMP**

NOTE: USE THIS DETAIL WHERE DISTANCE FROM THEORETICAL GORE OF ENTRANCE RAMP TO THEORETICAL GORE OF EXIT RAMP IS LESS THAN OR EQUAL TO 1/4 MILE.



**ARROW LOCATION SKETCH**

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 EACH  
 716-04.05, PLASTIC PAVEMENT MARKING (STRAIGHT ARROW), EACH EACH  
 716-04.07, PLASTIC PAVEMENT MARKING (EXIT ONLY ARROW), EACH EACH

**LEGEND**  
 TRAFFIC FLOW ARROW  
 PLASTIC PAVEMENT MARKING ARROW

**FOOTNOTE**  
 (A) SEE STANDARD DRAWING NO. T-M-7 FOR GORE MARKING DETAILS.

- REV. 2-22-82: 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. 03-29-91: 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. 03-29-91: 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.
- REV. 06-15-21: ADDED AUXILIARY LANE AT CLOSELY SPACED RAMP DETAIL.
- REV. 03-01-23: THE FULL 3RD LANE WAS SHOWN ON THE EXIT ONLY LANE DRAWINGS.

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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SILT FENCE WITH WIRE BACKING FABRIC SPECIFICATIONS	
FABRIC PROPERTY AND TEST METHODS	REQUIRED PHYSICAL PROPERTIES (MARV VALUES OF TEST DATA)
GEOTEXTILE FABRIC TYPE	WOVEN MONOFILAMENT (PER AASHTO M288)
APPARENT OPENING SIZE (ASTM D4751)	# 70 TO # 100 STANDARD SIEVE
WATER FLUX (ASTM D4491)	≥ 18 GPM/FT <sup>2</sup>
TENSILE STRENGTH (ASTM D4632)	≥ 310 LB. (WARP DIRECTION) X 200 LB. (FILL DIRECTION)
ULTRAVIOLET STABILITY (AFTER 500 HRS PER ASTM D4355)	≥ 90%
BURST STRENGTH (ASTM D3786)	≥ 400 PSI
PUNCTURE STRENGTH (ASTM D4833)	≥ 105 LB.
TRAPEZOIDAL TEAR (ASTM D4533)	≥ 100 LB. (WARP DIRECTION) X 60 LB. (FILL DIRECTION)

REV. 12-18-03: MODIFIED TABLE 2 AND GENERAL NOTE (E)

REV. 7-29-04: CHANGED VALUES IN TABLE 2 FROM MEAN TO MARV VALUES.

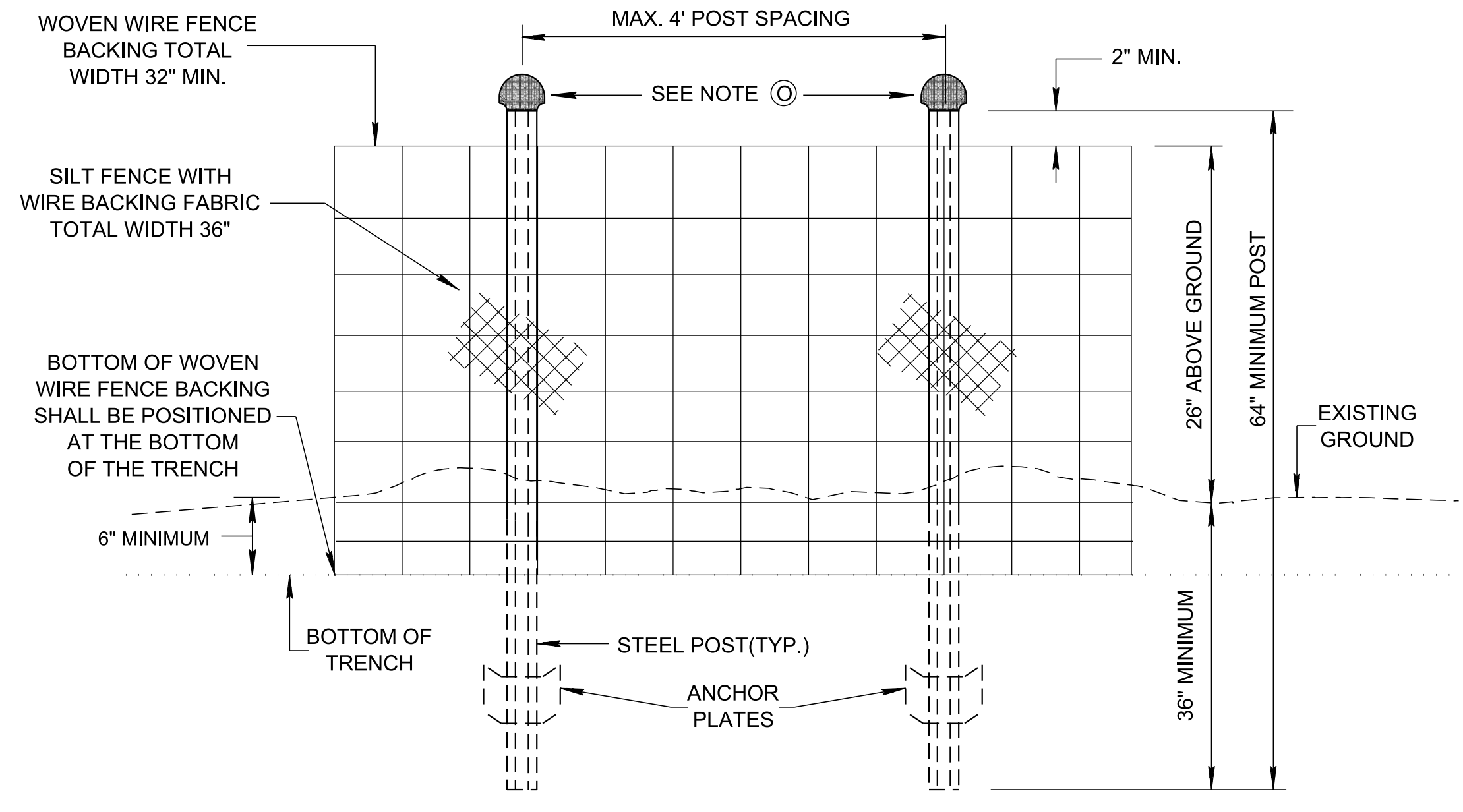
REV. 4-15-06: MODIFIED FABRIC HEIGHT. ADDED NOTES (J) AND (K). REVISED TABLE TITLE. REORDERED GENERAL NOTES. REFORMATTED SHEET. REVISED NOTES. MISC. EDITS TO DRAWING.

REV. 4-1-08: REMOVED TEMPORARY REFERENCE, REVISED NOTES, AND MISC. EDITS TO DRAWING.

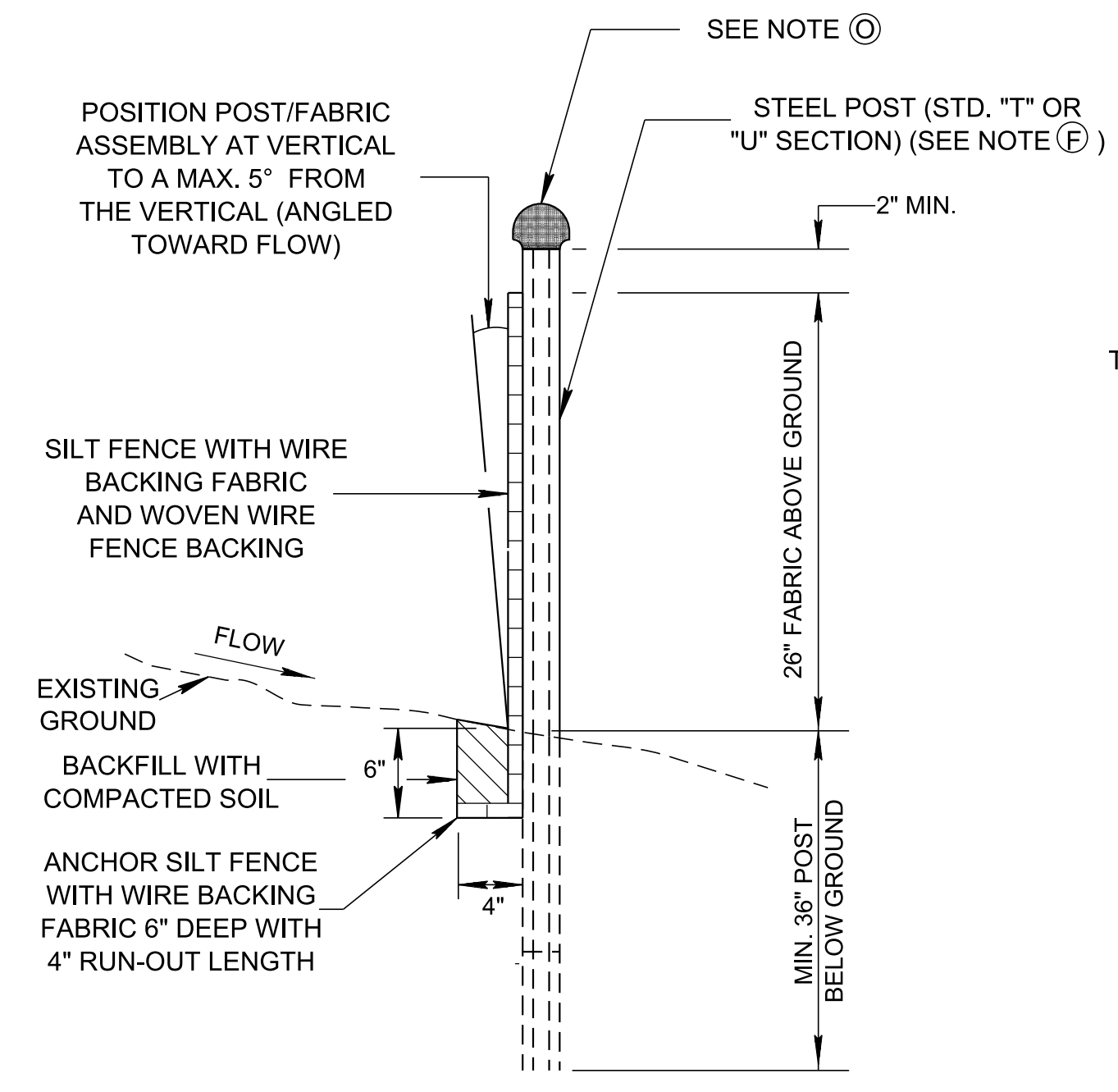
REV. 8-1-12: MINOR EDITS TO GENERAL NOTES.

REV. 06-28-2019: ADDED NOTE (O). REDREW SHEET.

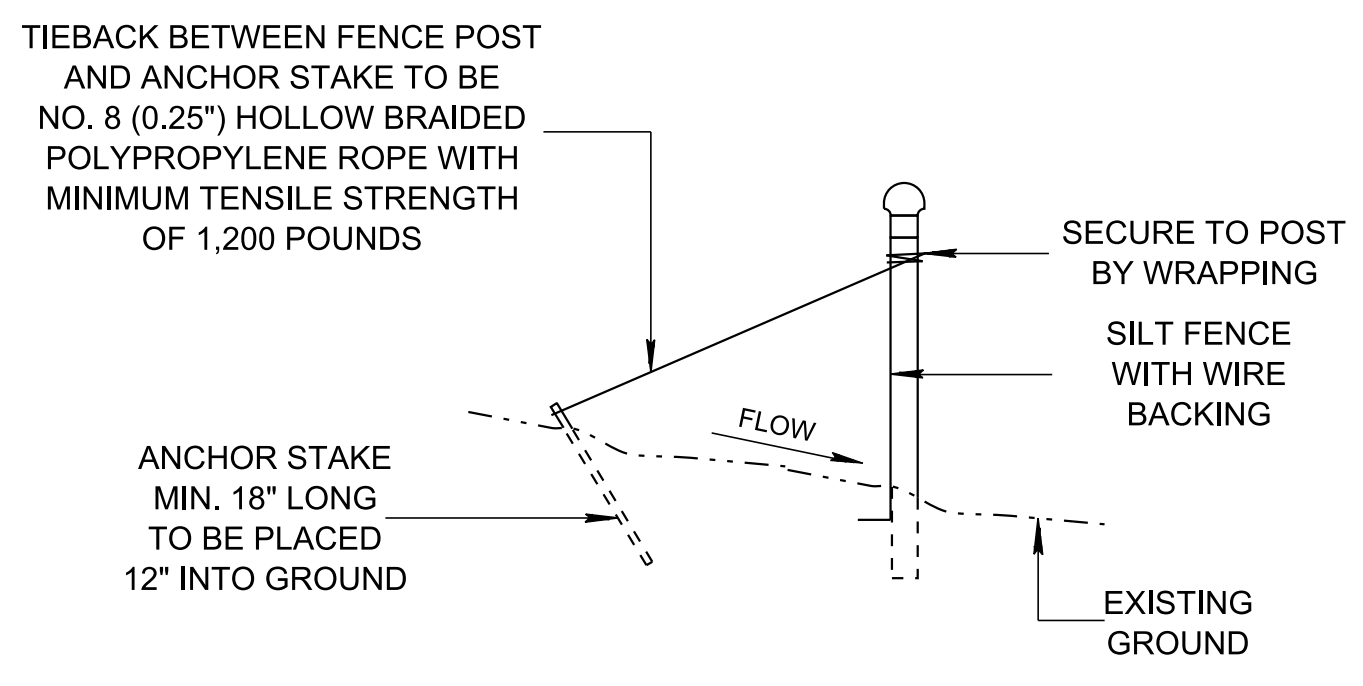
REV. 03-01-2023: REVISED GENERAL NOTE (O). ADDED METAL POST CAPS LEGEND.



**ELEVATION VIEW**



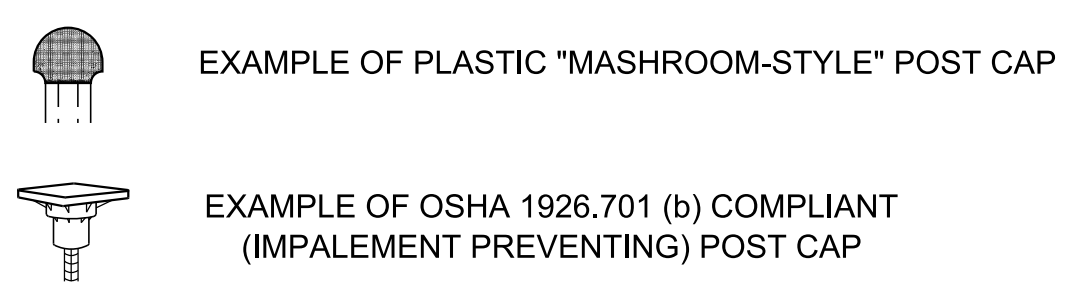
**SECTIONAL VIEW**



**SILT FENCE TIEBACK**

(WHEN REQUIRED BY THE ENGINEER OR NOTED IN THE PLANS. COST TO BE INCLUDED IN THE ITEMS FOR SILT FENCE WITH WIRE BACKING)

**METAL POST CAPS**



**SILT FENCE WITH WIRE BACKING**

**SILT FENCE WITH WIRE BACKING GENERAL NOTES**

- (A) SILT FENCE WITH WIRE BACKING IS USED TO INTERCEPT SMALL AMOUNTS OF SEDIMENT AND REDUCE VELOCITY FROM SHEET FLOW ONLY. USE SILT FENCE WITH WIRE BACKING UP-GRADIENT TO, AND ALONG THE PERIMETER OF STREAMS, WETLANDS, PONDS, SPRINGS, OR OTHER NATURAL WATER RESOURCES LOCATED WITHIN OR ADJACENT TO THE PROJECT RIGHT-OF-WAY AND AT LARGE FILL SLOPES.
- (B) THE MAXIMUM DRAINAGE AREA SIZE FOR CONTINUOUS SILT FENCE WITH BACKING SHALL BE 1 ACRE PER 150 LINEAR FEET OF FENCE LENGTH. MAXIMUM SLOPE LENGTH BEHIND FENCE ON UP SLOPE SIDE SHALL BE 290 FEET (AS MEASURED ALONG THE GROUND SURFACE).
- (C) WHEN INSTALLED AT THE TOE OF A SLOPE SILT FENCE WITH WIRE BACKING SHOULD BE PLACED 5 FEET TO 10 FEET AWAY FROM THE TOE TO ALLOW SPACE FOR PONDING OF WATER, COLLECTION OF SEDIMENT, AND EASE OF MAINTENANCE AND REMOVAL.
- (D) WHEN TWO SECTIONS OF SILT FENCE WITH WIRE BACKING FABRIC ADJOIN EACH OTHER, THEY SHALL BE JOINED ACCORDING TO THE DETAILS ON STANDARD DRAWING EC-STR-3E.
- (E) MAINTENANCE SHALL BE PERFORMED AS NEEDED; CAPTURED SOIL MATERIAL SHALL BE REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE AND/OR WHEN EVIDENCE OF FILTER CLOGGING IS OBSERVED.
- (F) STEEL POSTS SHALL BE ROLLED FROM HIGH CARBON STEEL AND SHALL HAVE A MINIMUM WEIGHT OF 1.25 LB/FT. POSTS SHALL BE HOT-DIPPED GALVANIZED OR PAINTED WITH HIGH GRADE WEATHER RESISTANT STEEL PAINT. STEEL POSTS SHALL BE EQUIPPED WITH AN ANCHOR PLATE HAVING A MINIMUM AREA OF 14 SQUARE INCHES. POSTS SHALL BE STUDDED, EMBOSSED, OR PUNCHED TO AID IN THE ATTACHMENT OF THE WIRE BACKING. POSTS AND ANCHOR PLATES SHALL CONFORM TO THE REQUIREMENTS OF ASTM A702.
- (G) STEEL POSTS SHALL HAVE A PROJECTION FOR FASTENING WIRE TO THEM. WOVEN WIRE FENCE BACKING TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES. THE WIRE FASTENERS SHOULD BE EVENLY SPACED WITH AT LEAST SIX PER POST.
- (H) FABRIC SHALL BE FASTENED SECURELY TO WOVEN WIRE FENCE BACKING WITH THE TIES SPACED EVERY 24 INCHES ALONG TOP AND MIDSECTION.
- (I) WOVEN WIRE FENCE BACKING SHALL MEET THE REQUIREMENTS FOR AASHTO SPECIFICATIONS.
- (J) SILT FENCE WITH BACKING SHOULD BE PLACED ALONG OR NEAR THE GROUND CONTOURS. THE BOTTOM OF THE FENCE AT GROUND LINE SHOULD BE ON A ZERO PERCENT (0%) GRADE, PLUS OR MINUS ONE HALF PERCENT (± 0.5%). THE END OF A ROW OF SILT FENCE WITH WIRE BACKING SHOULD BE TURNED UP SLOPE FORMING A J-HOOK TO FILTER ANY CONCENTRATED FLOW BEHIND FENCE.
- (K) FOR TRENCH-BASED INSTALLATIONS, SILT FENCING WITH WIRE BACKING SHALL BE INSTALLED PER THE FOLLOWING STEPS AND IN THE FOLLOWING ORDER:
  1. EXCAVATE TRENCH A MAXIMUM OF 4 INCHES WIDE AND 6 INCHES DEEP. THE TRENCH SHALL BE HAND-CLEANED FOLLOWING EXCAVATION TO REMOVE BULKY DEBRIS SUCH AS ROCKS, STICKS, AND SOIL CLOUDS FROM THE TRENCH.
  2. DRIVE AND SET SUPPORT POSTS PER SPACING REQUIREMENTS GIVEN ON THE APPLICABLE FENCE DETAIL.
  3. ATTACH WOVEN WIRE FENCE BACKING TO POSTS AND FABRIC TO THE WIRE BACKING USING WIRE TIES. SPACING AND DENSITY OF TIES SHALL BE INSTALLED ACCORDING TO NOTES (G) AND (H).
  4. INSTALL FABRIC IN TRENCH.
  5. BACKFILL TRENCH (OVER-FILL) WITH SOIL PLACED AROUND FABRIC.
  6. COMPACT SOIL BACKFILL WITH MECHANICAL EQUIPMENT. DO NOT DAMAGE THE FABRIC DURING COMPACTION (DAMAGED FABRIC SHALL BE REPLACED).
- (L) ONLY SILT FENCE WITH WIRE BACKING FABRIC LISTED ON THE QUALIFIED PRODUCTS LIST MAY BE USED. ANY PRODUCTS LISTED ON THE QUALIFIED PRODUCTS LIST AS AN APPROVED ALTERNATE MAY ALSO BE USED.
- (M) SILT FENCE WITH WIRE BACKING SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBER:
 

209-08.02, TEMPORARY SILT FENCE (WITH BACKING), L.F.

PAYMENT SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR CONSTRUCTION, MAINTENANCE, AND REMOVAL OF THE SILT FENCE WITH WIRE BACKING.
- (N) SEDIMENT SHALL BE REMOVED FROM BEHIND THE SILT FENCE WITH WIRE BACKING WHEN IT HAS ACCUMULATED TO ONE-HALF THE ORIGINAL HEIGHT OF THE STRUCTURE AND PAID FOR UNDER ITEM NUMBER 209-05, SEDIMENT REMOVAL PER C.Y.
- (O) OSHA 1926.701(B) COMPLIANT (IMPALEMENT PREVENTING) POST CAPS SHALL BE REQUIRED FOR ANY METAL POST ABOVE WHICH PEOPLE MAY BE WORKING AND THE RISK OF FALLING DOWN ONTO THE POST IS PRESENT; REGARDLESS OF HOW HIGH THE POST STICKS UP OUT OF THE GROUND. PLASTIC "MUSHROOM-STYLE" POST CAPS SHALL BE REQUIRED FOR ANY METAL POST WITH AN INSTALLED HEIGHT LESS THAN 36" ABOVE THE GROUND AND WHEN THERE ARE NO WORKERS CONDUCTING WORK ABOVE THE POSTS. NO CAPS SHALL BE REQUIRED FOR METAL POSTS WITH AN INSTALLED HEIGHT OF 36" OR GREATER AND WHEN THERE ARE NO WORKERS CONDUCTING WORK ABOVE THE POSTS. ALL CAPS SHALL BE ORANGE OR YELLOW TO ENHANCE VISIBILITY. WHEN REQUIRED, PAYMENT OF POST CAPS SHALL BE INCLUDED IN THE TOTAL COST OF SILT FENCE.

**EROSION CONTROL PLAN LEGEND: \* SFB \* SFB \* SFB \***

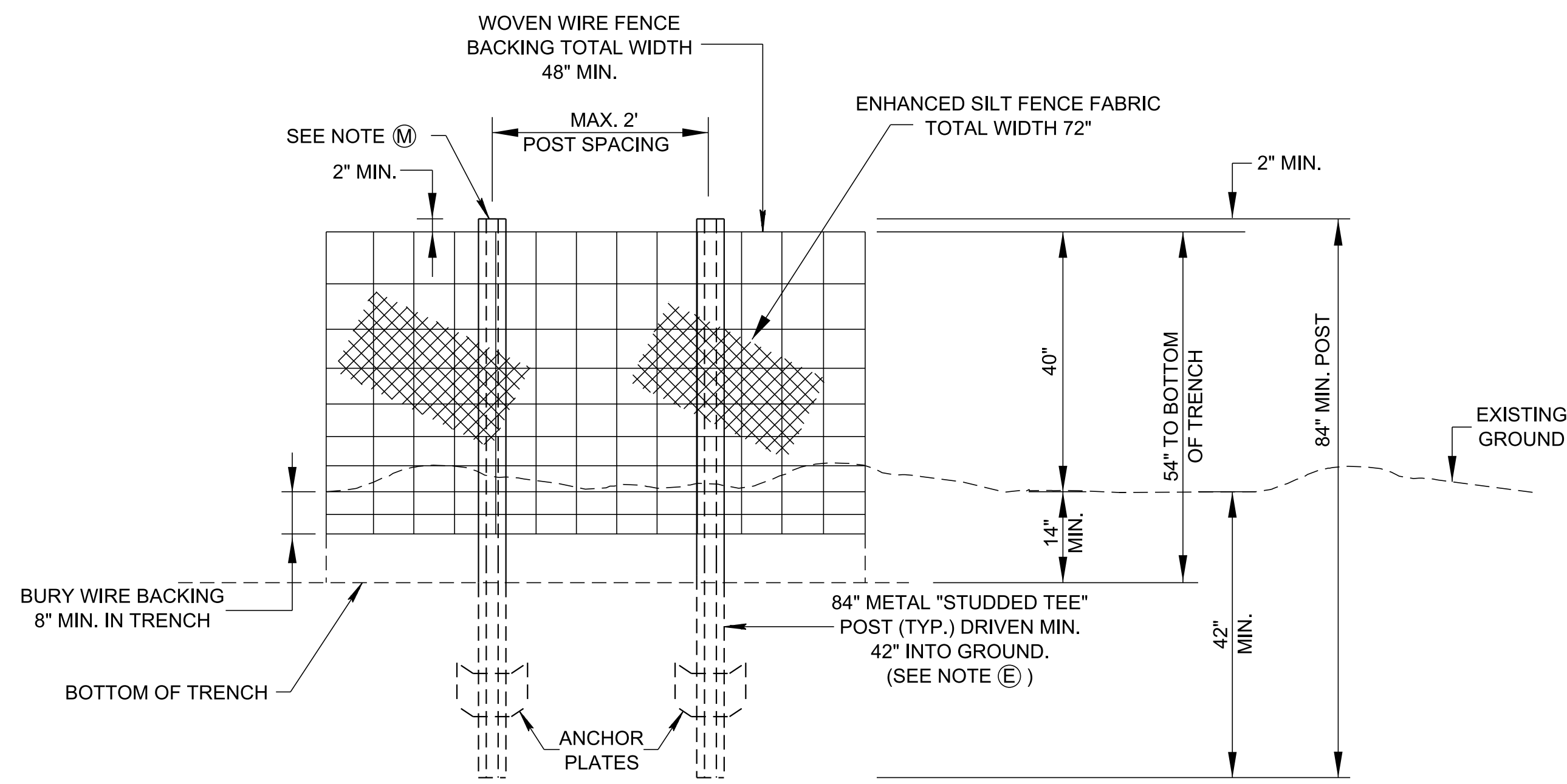
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APPROVED BY FHWA (ALL OTHERS APPROVED BY TDOT)

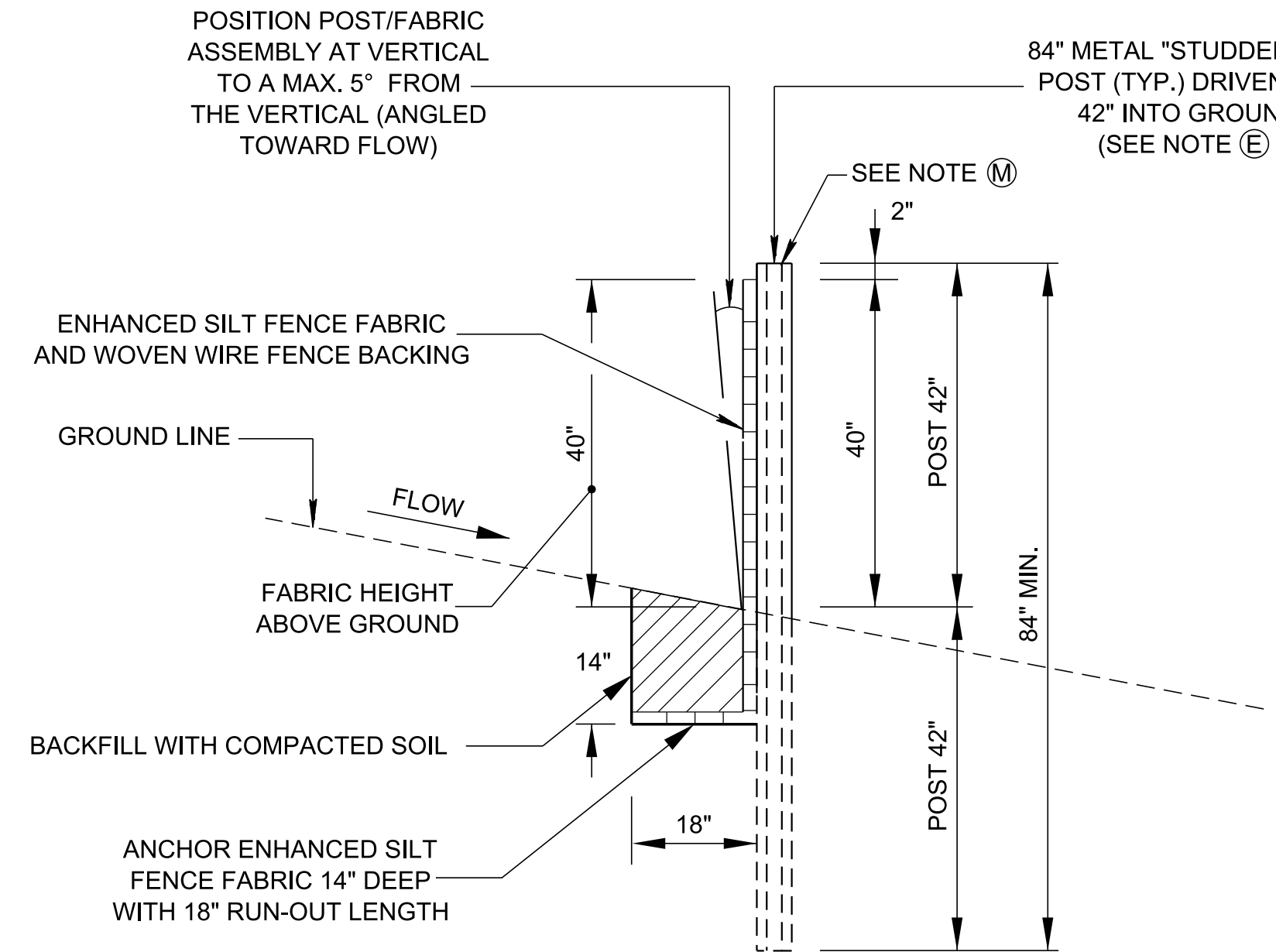
STATE OF TENNESSEE  
STANDARD DRAWING  
DEPARTMENT OF TRANSPORTATION

**SILT FENCE WITH WIRE BACKING**

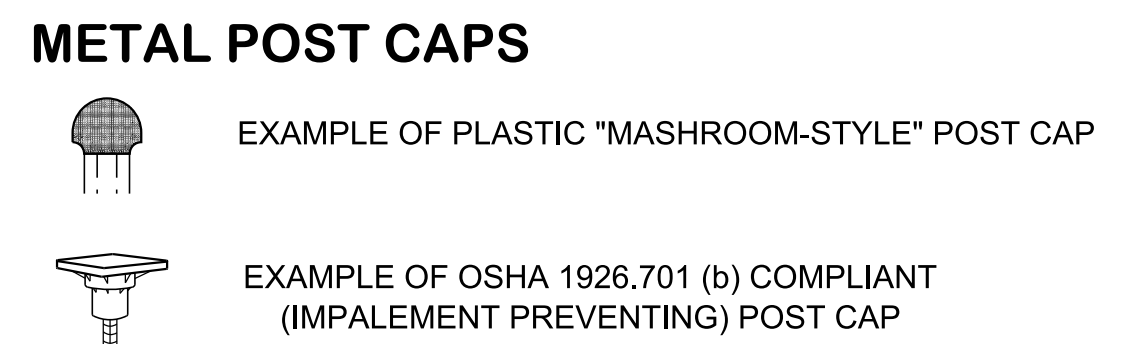
3/17/2023 7:18:25 AM P:\StandDraw\DESIGN STANDARDS\Standards Drawings\Standard Roadway Drawings - CURRENT\In Progress\10-108.00 Erosion Prevention and Sediment Control IP\180.02 Slope Devices IP\ECSTR3D-2



**ELEVATION VIEW**



**SECTIONAL VIEW**



SILT FENCE WITH WIRE BACKING FABRIC SPECIFICATIONS	
FABRIC PROPERTY AND TEST METHODS	REQUIRED PHYSICAL PROPERTIES (MARV VALUES OF TEST DATA)
GEOTEXTILE FABRIC TYPE	WOVEN MONOFILAMENT
APPARENT OPENING SIZE (ASTM D4751)	# 30 TO # 80 STANDARD SIEVE
WATER FLUX (ASTM D4491)	≥ 110 GPM/FT <sup>2</sup>
TENSILE STRENGTH (ASTM D4632)	≥ 370 LB. (WARP DIRECTION) X 230 LB. (FILL DIRECTION)
ULTRAVIOLET STABILITY (AFTER 500 HRS PER ASTM D4355)	≥ 90%
BURST STRENGTH (ASTM D3786)	≥ 470 PSI
PUNCTURE STRENGTH (ASTM D4833)	≥ 110 LB.
TRAPEZOIDAL TEAR (ASTM D4533)	≥ 115 LB. (WARP DIRECTION) X 75 LB. (FILL DIRECTION)
PERMEABILITY (ASTM D4491)	≥ 0.02 INCHES/SEC
THICKNESS (ASTM D5199)	≤ 35 MILS

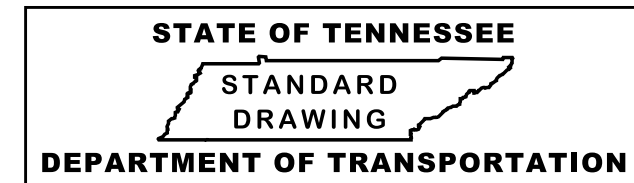
**ENHANCED SILT FENCE GENERAL NOTES**

- (A) ENHANCED SILT FENCE IS TO BE USED WHERE INTERCEPTION OF CONCENTRATED FLOWS (e.g. SWALES, DITCHES, RUTS ALONG SLOPE) ARE ANTICIPATED. LIMITS OF FLOW APPLICATIONS FOR USE OF ENHANCED SILT FENCE ARE GIVEN ON STANDARD DRAWINGS EC-STR-4 AND EC-STR-4A. DO NOT USE ENHANCED SILT FENCE IN OR ADJACENT TO NATURAL WATER RESOURCES (WETLANDS OR STREAMS).
- (B) ENHANCED SILT FENCE SHOULD NOT BE USED TO REPLACE SILT FENCE WITH WIRE BACKING.
- (C) WHEN TWO SECTIONS OF ENHANCED SILT FENCE FABRIC ADJOIN EACH OTHER THEY SHALL BE JOINED ACCORDING TO THE DETAILS ON STANDARD DRAWING EC-STR-3E.
- (D) MAINTENANCE SHALL BE PERFORMED AS NEEDED; CAPTURED SOIL MATERIAL SHALL BE REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE AND/OR WHEN EVIDENCE OF FILTER CLOGGING IS NOTED.
- (E) STEEL POSTS SHALL BE ROLLED FROM HIGH CARBON STEEL AND SHALL HAVE A MINIMUM WEIGHT OF 1.25 LB/FT. POSTS SHALL BE HOT-DIPPED GALVANIZED OR PAINTED WITH HIGH GRADE WEATHER RESISTANT STEEL PAINT. STEEL POSTS SHALL BE EQUIPPED WITH AN ANCHOR PLATE HAVING A MINIMUM AREA OF 14 SQUARE INCHES. POSTS SHALL BE STUDDED, EMBOSSED, OR PUNCHED TO AID IN THE ATTACHMENT OF THE WIRE BACKING. POSTS AND ANCHOR PLATES SHALL CONFORM TO THE REQUIREMENTS OF ASTM A702.
- (F) STEEL POSTS SHALL HAVE A PROJECTION FOR FASTENING WIRE TO THEM. WOVEN WIRE FENCE BACKING TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES. THE WIRE FASTENERS SHOULD BE EVENLY SPACED WITH AT LEAST SIX PER POST.
- (G) WOVEN WIRE FENCE BACKING SHALL MEET THE REQUIREMENTS FOR ASTM A-116 FOR NO. 11 FARM, DESIGN NO. 1047-6-11, CLASS 3 COATING.
- (H) FILTER FABRIC SHALL BE FASTENED SECURELY TO WOVEN WIRE FENCE BACKING WITH TIES SPACED EVERY 24 INCHES ALONG TOP AND MID SECTION.
- (I) FOR TRENCH-BASED INSTALLATIONS, ENHANCED SILT FENCING SHALL BE INSTALLED PER THE FOLLOWING STEPS AND IN THE FOLLOWING ORDER:
  1. EXCAVATE TRENCH A MAXIMUM OF 18 INCHES WIDE 14 INCHES DEEP. THE TRENCH SHALL BE HAND-CLEANED FOLLOWING EXCAVATION TO REMOVE BULKY DEBRIS SUCH AS ROCKS, STICKS, AND SOIL CLOUDS FROM THE TRENCH.
  2. DRIVE AND SET SUPPORT POSTS PER SPACING REQUIREMENTS GIVEN ON THE APPLICABLE FENCE DETAIL.
  3. ATTACH WOVEN WIRE FENCE BACKING TO POSTS AND FABRIC TO THE WIRE BACKING USING WIRE TIES. SPACING AND DENSITY OF TIES SHALL BE INSTALLED ACCORDING TO NOTES (F) AND (H).
  4. INSTALL FABRIC IN TRENCH.
  5. BACKFILL TRENCH (OVER-FILL) WITH SOIL PLACED AROUND FABRIC.
  6. COMPACT SOIL BACKFILL WITH MECHANICAL EQUIPMENT. DO NOT DAMAGE THE FABRIC DURING COMPACTION (DAMAGED FABRIC SHALL BE REPLACED).
- (J) ONLY ENHANCED SILT FENCE FABRIC LISTED ON THE QUALIFIED PRODUCTS LIST MAY BE USED. ANY PRODUCTS LISTED ON THE QUALIFIED PRODUCTS LIST AS AN APPROVED ALTERNATE MAY ALSO BE USED.
- (K) ENHANCED SILT FENCE SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBER:  
 209-08.04, TEMPORARY ENHANCED SILT FENCE, L.F.  
 PAYMENT SHALL INCLUDE ALL MATERIALS AND LABOR NECESSARY FOR CONSTRUCTION, MAINTENANCE, AND REMOVAL OF THE ENHANCED SILT FENCE.
- (L) SEDIMENT SHALL BE REMOVED FROM BEHIND THE ENHANCED SILT FENCE WHEN IT HAS ACCUMULATED TO ONE-HALF THE ORIGINAL HEIGHT OF THE STRUCTURE AND PAID FOR UNDER ITEM NUMBER 209-05, SEDIMENT REMOVAL, PER C.Y.
- (M) OSHA 1926.701(B) COMPLIANT (IMPALEMENT PREVENTING) POST CAPS SHALL BE REQUIRED FOR ANY METAL POST ABOVE WHICH PEOPLE MAY BE WORKING AND THE RISK OF FALLING DOWN ONTO THE POST IS PRESENT; REGARDLESS OF HOW HIGH THE POST STICKS UP OUT OF THE GROUND. PLASTIC "MUSHROOM-STYLE" POST CAPS SHALL BE REQUIRED FOR ANY METAL POST WITH AN INSTALLED HEIGHT LESS THAN 36" ABOVE THE GROUND AND WHEN THERE ARE NO WORKERS CONDUCTING WORK ABOVE THE POSTS. NO CAPS SHALL BE REQUIRED FOR METAL POSTS WITH AN INSTALLED HEIGHT OF 36" OR GREATER AND WHEN THERE ARE NO WORKERS CONDUCTING WORK ABOVE THE POSTS. ALL CAPS SHALL BE ORANGE OR YELLOW TO ENHANCE VISIBILITY. WHEN REQUIRED, PAYMENT OF POST CAPS SHALL BE INCLUDED IN THE TOTAL COST OF SILT FENCE.

EROSION CONTROL PLAN LEGEND: \* ESF \* ESF \* ESF \* ENHANCED SILT FENCE

NOT TO SCALE

REV. 12-18-03: REPLACED TABLE 3 AND MODIFIED GENERAL NOTES (B), (D), AND (I)  
 REV. 7-29-04: CHANGED VALUES IN TABLE 3 FROM MEAN TO MARV VALUES.  
 REV. 4-15-06: MODIFIED NOTE (H) ADDED NOTE (I). REVISED TABLE TITLE. REORDERED GENERAL NOTES. REFORMATTED SHEET. REVISED NOTES. MISC. EDITS TO DRAWING.  
 REV. 4-1-08: REMOVED TEMPORARY REFERENCE, REVISED GENERAL NOTES, AND MISC. EDITS TO DRAWING.  
 REV. 06-28-19: ADDED NOTE (M). REDREW SHEET.  
 REV. 03-01-23: REVISED GENERAL NOTE (M). ADDED METAL POST CAPS LEGEND.



ENHANCED SILT FENCE