



**STATE OF TENNESSEE  
DEPARTMENT OF TRANSPORTATION**

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

**BUTCH ELEY**  
DEPUTY GOVERNOR  
COMMISSIONER OF TRANSPORTATION

**BILL LEE**  
GOVERNOR

**INSTRUCTIONAL BULLETIN NO. 23-11**

**Regarding New, Revised and Voided Standard Drawings**

**Effective December 8, 2023, letting (September 27, 2023, Turn-in),** the following Standard Drawings have been revised, are new or have been voided. In addition, Chapter 10 of the Roadway Design Guidelines - Index of Standard Drawings and the web site have been updated accordingly and are available online.

**New Standard Drawings:**

**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-FLU-2		BRIDGE END DRAIN FLUME DETAILS
---------	--	--------------------------------

D-FLU-2A		BRIDGE END DRAIN FLUME DETAILS
----------	--	--------------------------------

D-PB-4		PIPE COLLAR DETAILS
--------	--	---------------------

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

**10-105.01 CONCRETE PAVEMENT**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
---------------------------	--------------------------	--------------------

RP-CS-3		CONCRETE SHOULDER MILLED RUMBLE STRIP DETAILS
---------	--	--

**10-107.00 SAFETY DESIGN AND GUARDRAILS**

**10-107.01 CLEAR ZONE AND SAFETY PLANS**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
---------------------------	--------------------------	--------------------

S-PL-4A		SAFETY PLAN FOR BRIDGE PIERS IN CLEAR ZONE & OUT
---------	--	--

## OF CLEAR ZONE

**10-108.00 DESIGN - TRAFFIC CONTROL**

**10-108.01 PAVEMENT MARKINGS**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
-----------------------	----------------------	--------------------

T-M-9A		PAVEMENT MARKING AND SIGNING DETAILS FOR RAMP INTERSECTIONS
--------	--	---

T-M-9B		PAVEMENT MARKING AND SIGNING DETAILS FOR RAMP INTERSECTIONS
--------	--	---

**Revised Standard Drawings:**

**10-102.00 PIPE CULVERTS AND ENDWALLS**

**10-102.03 SAFETY SIDE DRAIN ENDWALLS**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
-----------------------	----------------------	--------------------

D-SEW-1A	07-07-23	TYPE "SAFETY" SIDE DRAIN ENDWALL WITH STEEL PIPE GRATE, FOR 15" THRU 48" PIPES, 6:1 SLOPE
----------	----------	---

D-SEW-12D	07-07-23	TYPE "SAFETY" SIDE DRAIN ENDWALL WITH STEEL PIPE GRATE, FOR 18" PIPE, 12:1 SLOPE
-----------	----------	--

**10-103.00 CATCH BASINS AND MANHOLES**

**10-103.01 CATCH BASINS**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
-----------------------	----------------------	--------------------

D-CBB-12D	07-07-23	TYPE "B" CAST IRON FRAME, GRATE & CURB HOOD DETAILS FOR NOS. 12, 14, 16 & 17 TYPE CATCH BASINS
-----------	----------	--

**10-103.06 SLOTTED AND TRENCH DRAINS**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
-----------------------	----------------------	--------------------

D-TD-1	07-07-23	TRENCH DRAIN
--------	----------	--------------

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

**10-105.02 INTERSECTIONS**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
RP-DHO-2	07-07-23	MEDIAN OPENING DETAILS FOR RESTRICTED CROSSING & J-TURN INTERSECTIONS

**10-106.00 MULTIMODAL**

**10-106.04 SIDEWALK**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
-----------------------	----------------------	--------------------

MM-SW-1 07-07-23 DETAILS FOR CONCRETE SIDEWALK

**10-107.00 SAFETY DESIGN AND GUARDRAILS**

**10-107.02 CABLE BARRIER**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
-----------------------	----------------------	--------------------

S-CB-1 07-07-23 CABLE BARRIER PLACEMENT

S-CB-2 07-07-23 HIGH TENSION CABLE BARRIER

**10-107.04 GUARDRAIL DETAILS**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
-----------------------	----------------------	--------------------

S-GR31-1C 07-07-23 GUARDRAIL GENERAL NOTES AND POST DETAILS

**10-107.05 GUARDRAIL CONNECTIONS**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
-----------------------	----------------------	--------------------

S-GRC-4 07-07-23 GUARDRAIL CONNECTION TO BRIDGE RAILING CONCRETE PARAPET

S-GRC-6 07-07-23 GUARDRAIL CONNECTION TO BRIDGE ENDS FOR LOW SPEED ROADWAYS

**10-108.00 DESIGN – TRAFFIC CONTROL**

**10-108.01 PAVEMENT MARKINGS**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
-----------------------	----------------------	--------------------

T-M-3 07-07-23 MARKING STANDARDS FOR TRAFFIC ISLANDS, PAVED SHOULDERS AND MEDIANS FOR CONVENTIONAL ROADS

T-M-9	05-01-23	PAVEMENT MARKING AND SIGNING DETAILS FOR RAMP INTERSECTIONS
T-M-19	07-07-23	PAVEMENT MARKING DETAILS FOR RESTRICTED CROSSING & J-TURN INTERSECTIONS

**10-108.02 WORK ZONES**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
-----------------------	----------------------	--------------------

T-WZ-18	07-07-23	SHOULDER CLOSURE DETAIL FOR FREEWAYS AND DIVIDED HIGHWAYS
---------	----------	---

**10-200.00 SIGNS**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
-----------------------	----------------------	--------------------

T-S-26	07-07-23	SIGNING PLAN FOR RESTRICTED CROSSING & J-TURN INTERSECTIONS
--------	----------	---

**Voided Standard Drawings**

The following standard drawings have been voided:

RD11-SA-1 has been voided and replaced with S-PL-4A.

Cable Barrier Drawings S-CB-3, S-CB-3A, S-CB-4 and S-CB-5

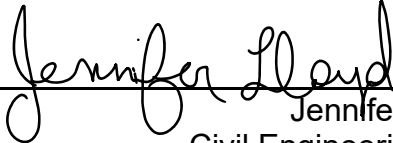
These standard drawings are located on the web site and in Chapter 10 of the Design Guidelines and can be found in the following links.

Standard Drawings:

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

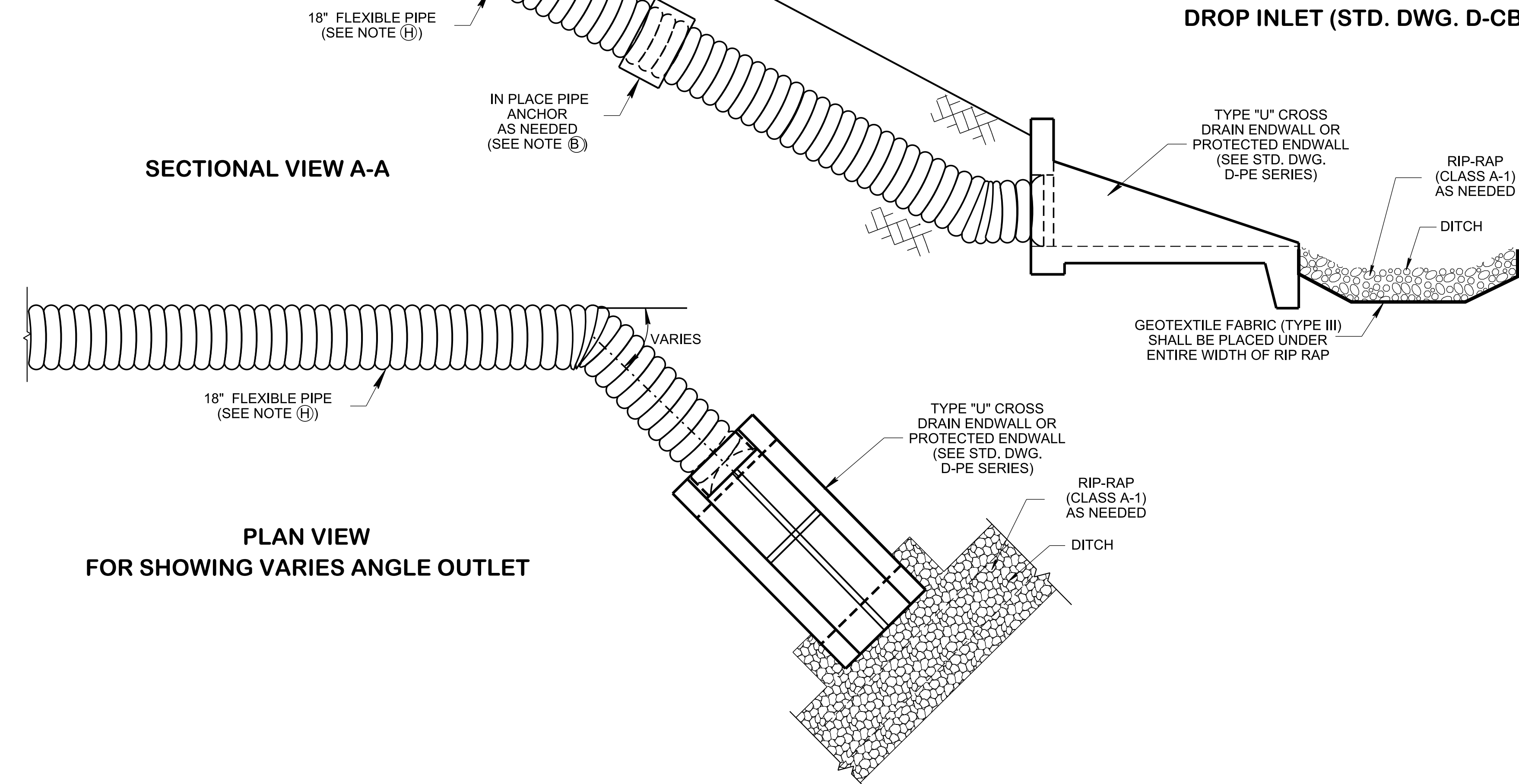
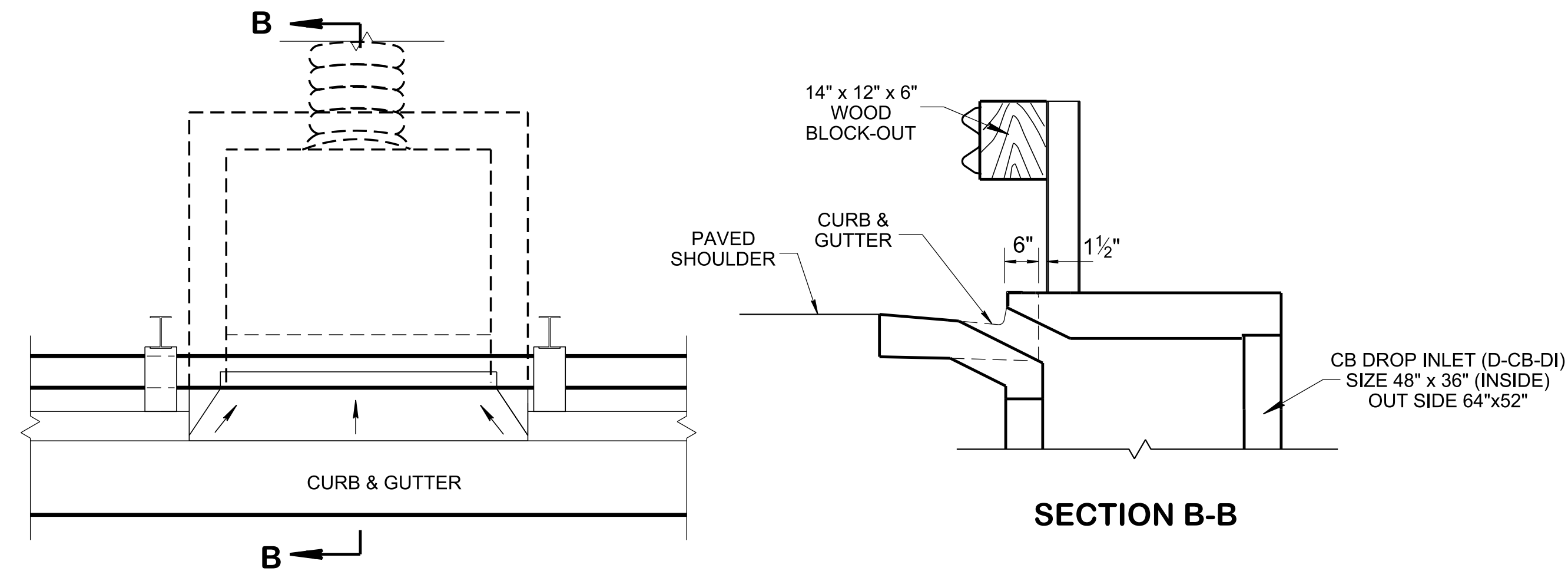
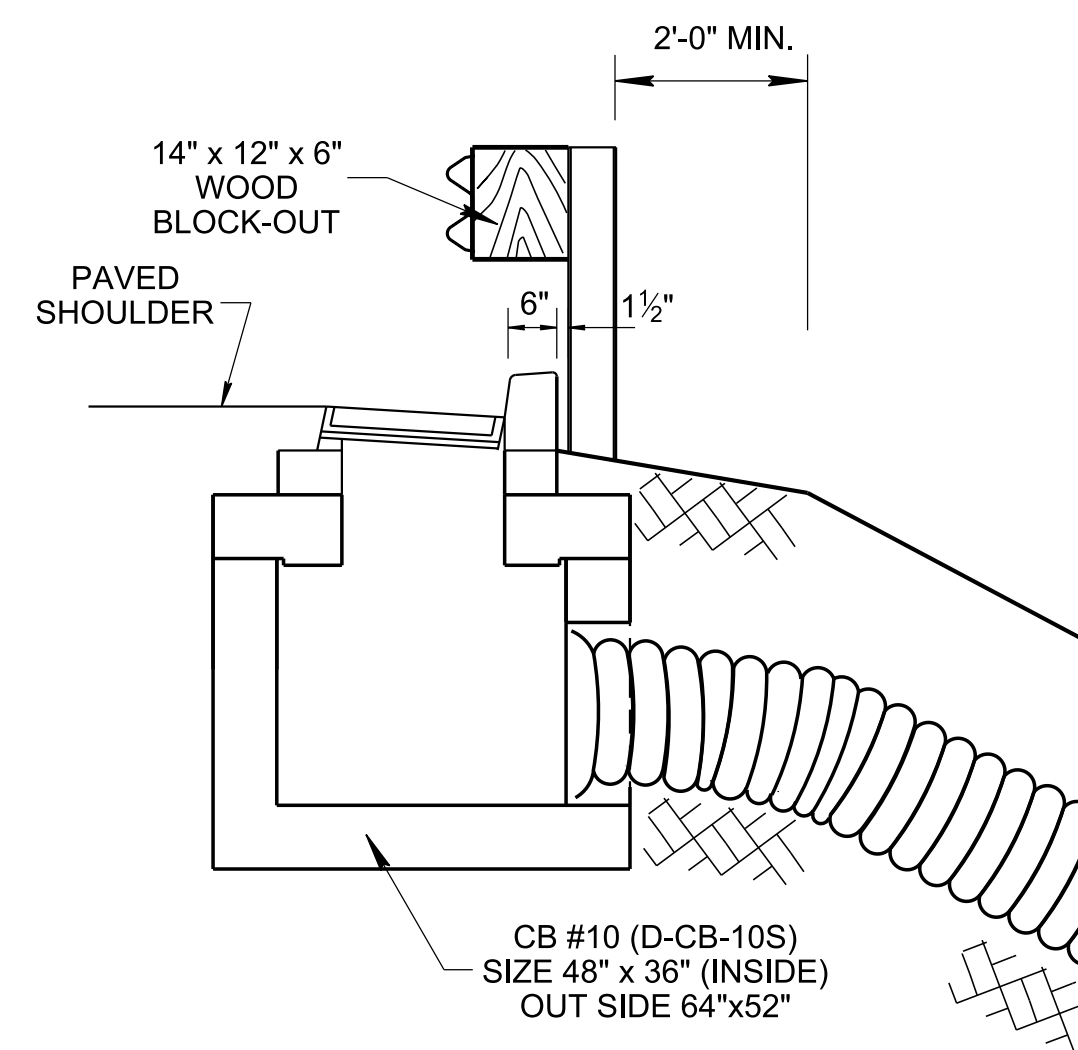
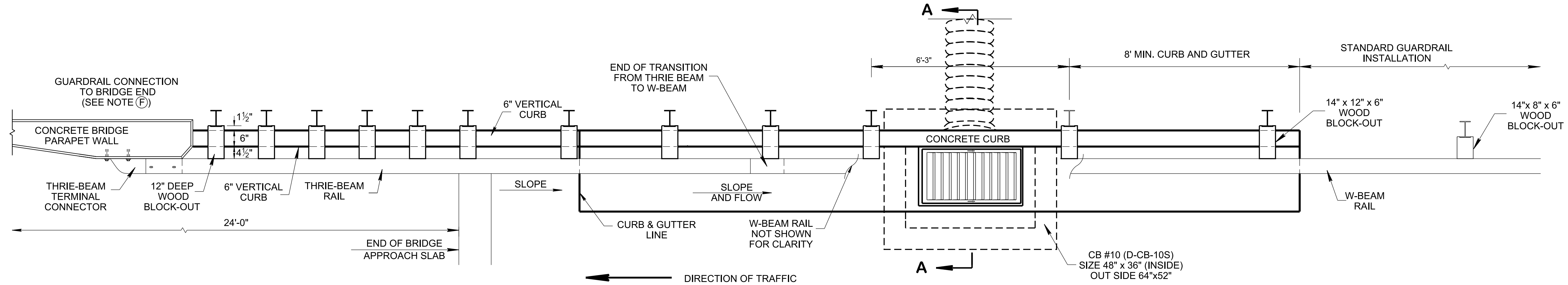
Chapter 10 - Index of Standard Drawings is available online at this location:

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

  
 Jennifer Lloyd, PE  
 Civil Engineering Director  
 Roadway Design Division



7/6/2023 2:36:01 PM P:\StandDraw\DESIGN STANDARDS\Standards Drawings\Standard Roadway Drawings - CURRENT\In Progress\10-101.00 Pipe Culverts and Endwalls IP\101.01 Pipe Culverts and Flumes IP\DFLU2-202301



**NOTE TO DESIGNER**

USE AND PLACEMENT OF FLUMES TO BE COORDINATED WITH HYDRAULIC DESIGN SECTION OF STRUCTURES DIVISION.

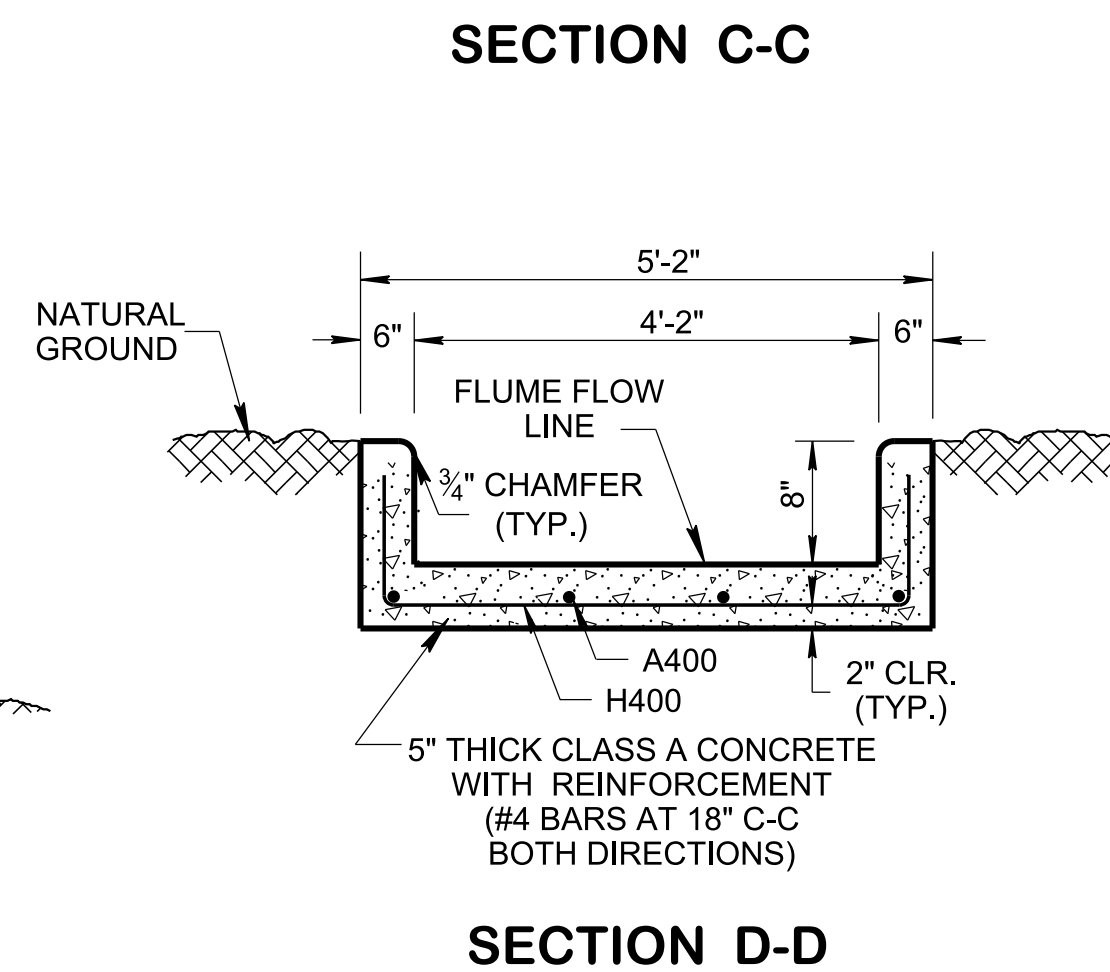
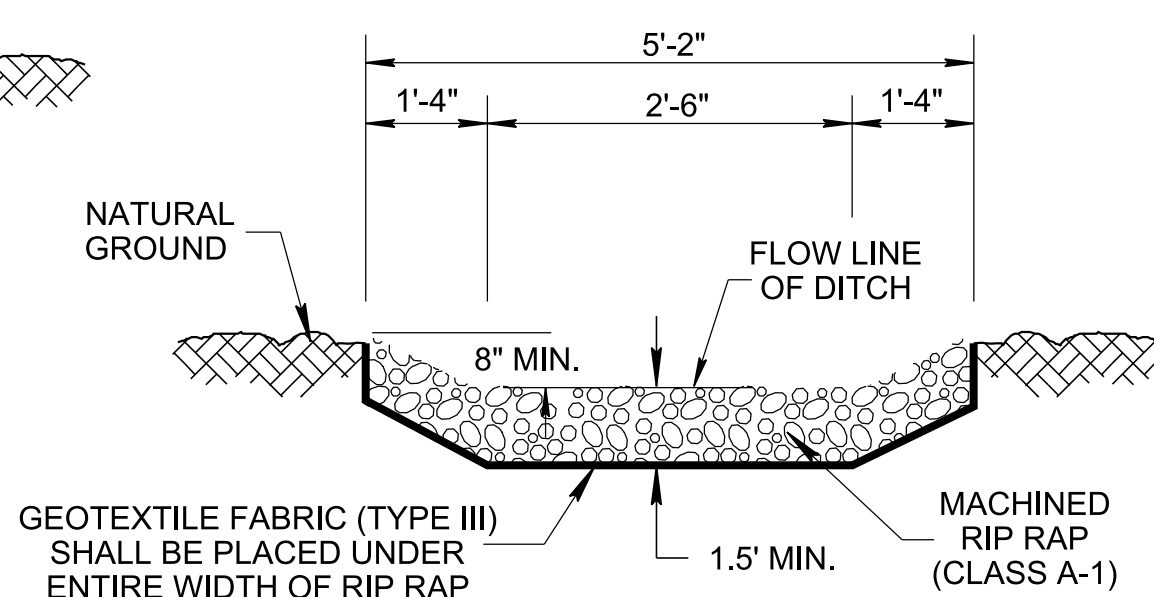
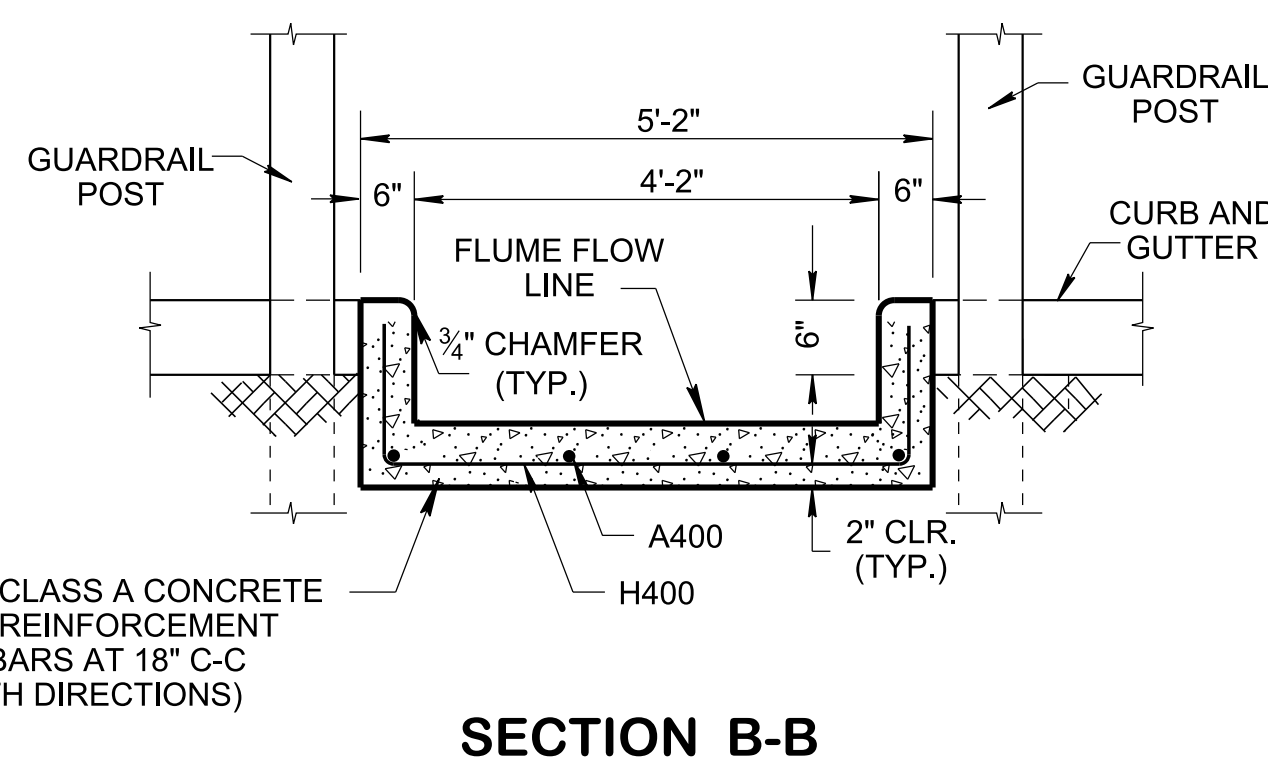
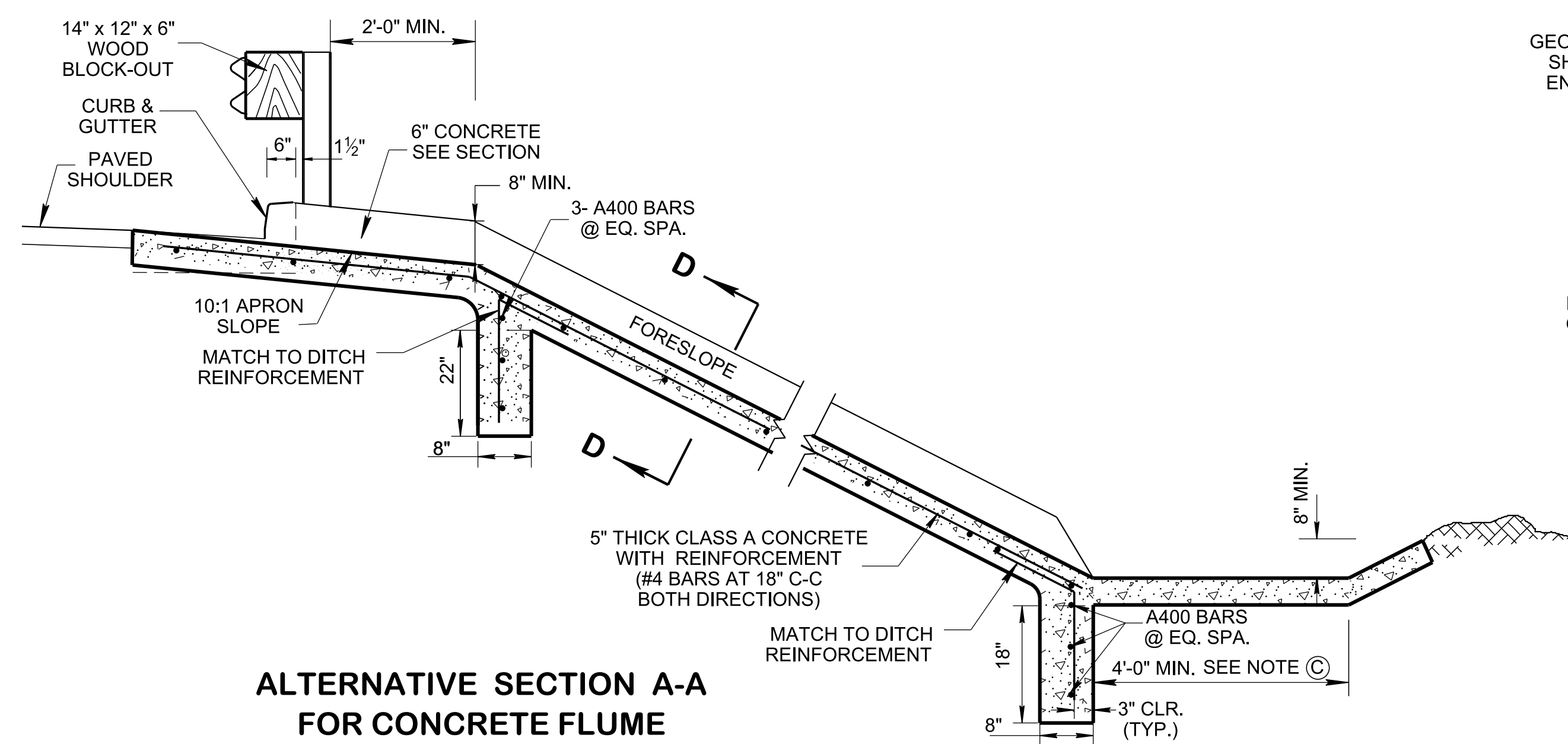
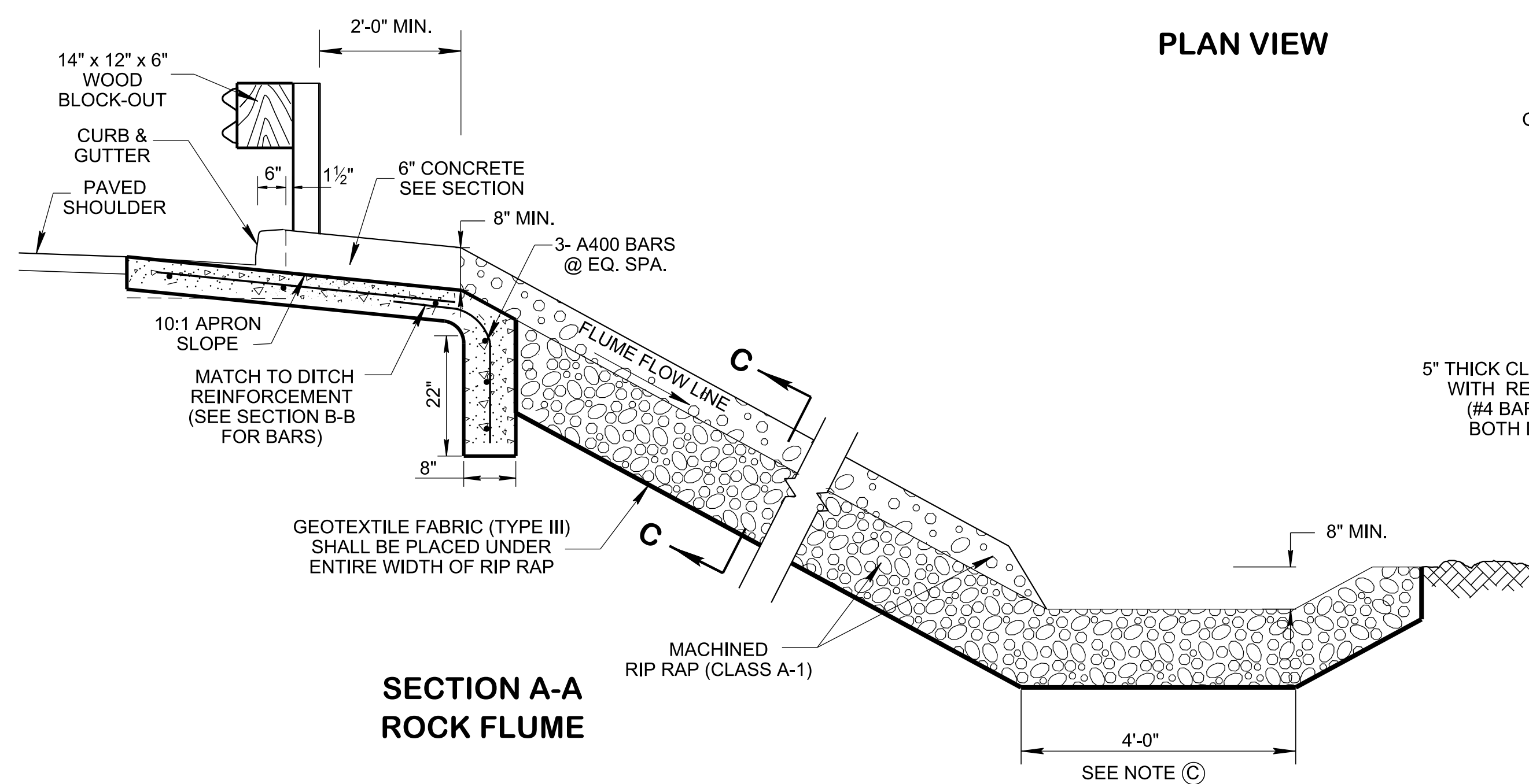
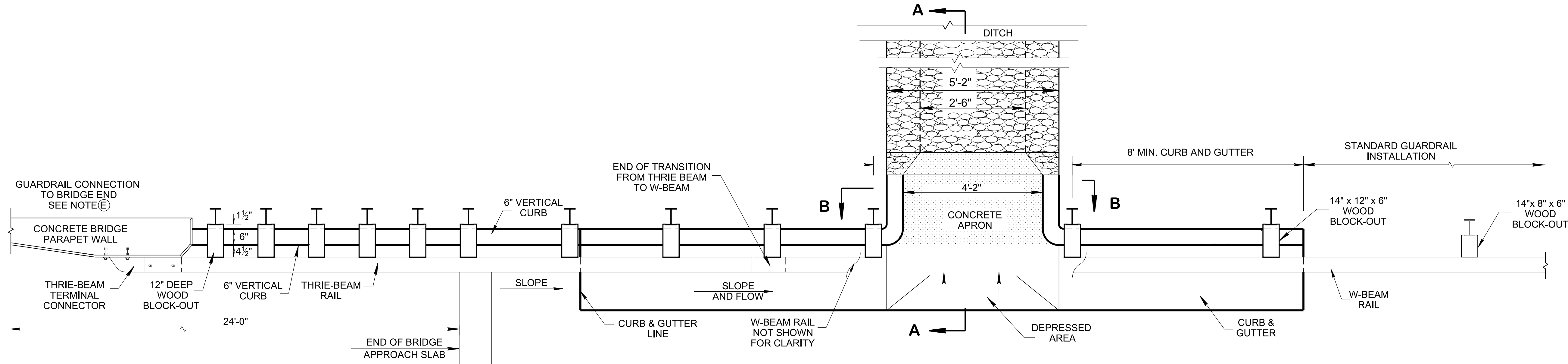
- GENERAL NOTES**
- (A) THIS DRAWING SHALL BE USED FOR BRIDGE ENDS DRAINAGE ONLY. SEE STANDARD DRAWING D-FLU-2A FOR BRIDGE END DRAIN ALTERNATIVE DESIGN. SEE STANDARD DRAWINGS D-CB-10S AND D-CB-DI FOR ADDITIONAL CONSTRUCTION NOTES AND DETAILS. FOR SPECIFICATION SEE "STANDARD SPECIFICATION FOR ROAD AND BRIDGE CONSTRUCTION" OF THE TENNESSEE DEPARTMENT OF TRANSPORTATION.
  - (B) FLEXIBLE PIPES USED FOR BRIDGE END DRAIN ARE TO BE ATTACHED TO THE GROUND WITH CONCRETE COLLARS OR OTHER METHODS AS APPROVED BY THE ENGINEER TO ASSURE PROPER ANCHORAGE AND PREVENT THE PIPE FROM SLIPPING DOWN THE SLOPE.
  - (C) PIPE ELBOWS AND BENDS SHALL BE DETERMINED IN THE FIELD PRIOR TO FABRICATION.
  - (D) PREFABRICATED HEADWALLS MAY BE USED WITH APPROVAL BY THE ENGINEER.
  - (E) REFER TO STANDARD DRAWINGS S-GR31 SERIES FOR POSTS, RAIL, AND HARDWARE STANDARDS FOR CONSTRUCTION.
  - (F) REFER TO STANDARD DRAWINGS S-GRC SERIES FOR CONNECTING TO BRIDGE RAIL OR OTHER CONCRETE BARRIER FOR DETAILS.
  - (G) REFER TO STANDARD DRAWING RP-VC-10 FOR CURB AND CURB AND GUTTER DETAILS.
  - (H) REFER TO STANDARD DRAWINGS D-PB-1 OR D-PB-2 FOR PIPE INSTALLATION STANDARD DETAILS.
  - (I) GEOTEXTILE REINFORCEMENT BETWEEN THE EXCAVATED EMBANKMENT AND RIP-RAP STONE. ONLY GEOTEXTILE FABRIC (TYPE III) LISTED ON THE QUALIFIED PRODUCTS LIST SHALL BE USED.
  - (J) ALL COST OF INSTALLATION BRIDGE END DRAIN INCLUDING ALL COMPONENTS SUCH AS CURB AND GUTTER, 12" DEEP BLOCK-OUT, FLEXIBLE PIPE, PIPE ENDWALL, CATCH BASIN, RIP-RAP AND GEOTEXTILE SHALL BE INCLUDED IN THE COST OF BRIDGE.

STATE OF TENNESSEE  
STANDARD DRAWING  
DEPARTMENT OF TRANSPORTATION

**BRIDGE END DRAIN  
FLUME  
DETAILS**

07-07-2023 D-FLU-2

7/6/2023 2:35:12 PM P:\StandDraw\DESIGN STANDARDS\Standards Drawings\Standard Roadway Drawings - CURRENT\In Progress\10-101.00 Pipe Culverts and Endwalls\10101.01 Pipe Culverts and Flumes\PIDFLU2A-2023



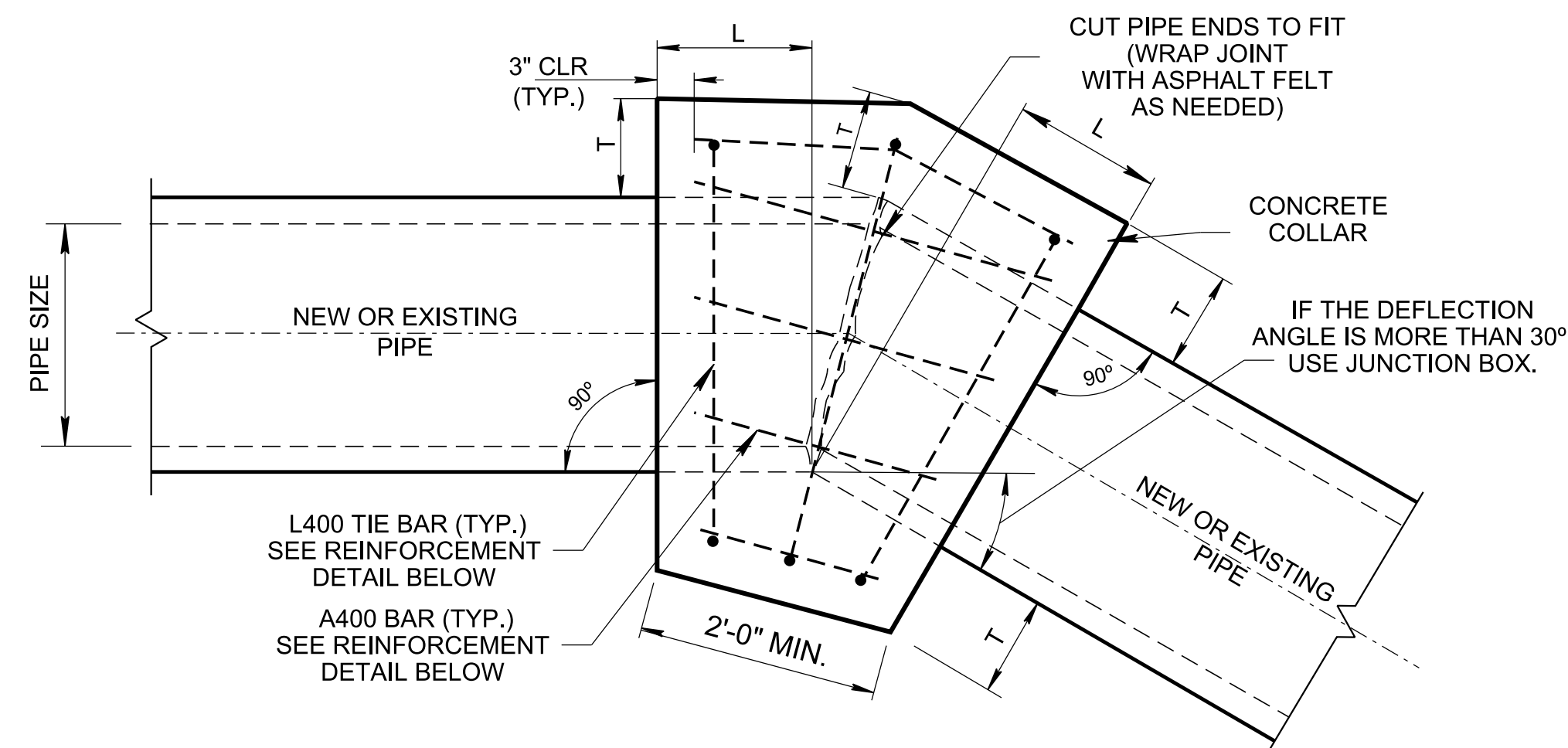
**NOTE TO DESIGNER**  
USE AND PLACEMENT OF FLUMES TO BE COORDINATED WITH HYDRAULIC DESIGN SECTION OF STRUCTURES DIVISION.

- GENERAL NOTES**
- (A) THIS DRAWING SHALL BE USED FOR BRIDGE ENDS DRAINAGE ONLY. SEE STANDARD DRAWING D-FLU-2 FOR BRIDGE END DRAIN ALTERNATIVE DESIGN. FOR SPECIFICATION SEE "STANDARD SPECIFICATION FOR ROAD AND BRIDGE CONSTRUCTION" OF THE TENNESSEE DEPARTMENT OF TRANSPORTATION.
  - (B) ALL CONCRETE TO BE CLASS "A"  $F_c = 3,000$  POUNDS PER SQUARE INCH AT 28 DAYS. ALL REINFORCING STEEL TO MEET ASTM A615 SPECIFICATION,  $F_y = 60,000$  POUNDS PER SQUARE INCH.
  - (C) EXTEND FLUME TO TOE OF BACKSLOPE. IF NO BACKSLOPE EXISTS, EXTEND FLUME A MINIMUM OF 4 FEET BEYOND THE TOE OF FORESLOPE.
  - (D) REFER TO STANDARD DRAWINGS S-GR31 SERIES FOR POSTS, RAIL, AND HARDWARE STANDARDS FOR CONSTRUCTION.
  - (E) REFER TO STANDARD DRAWINGS S-GRC SERIES FOR CONNECTING TO BRIDGE RAIL OR OTHER CONCRETE BARRIER FOR DETAILS.
  - (F) REFER TO STANDARD DRAWING RP-VC-10 FOR CURB AND CURB AND GUTTER DETAILS.
  - (G) GEOTEXTILE REINFORCEMENT BETWEEN THE EXCAVATED EMBANKMENT AND RIP-RAP STONE. ONLY GEOTEXTILE FABRIC (TYPE III) FROM TDOT QPL SHALL BE USED.
  - (H) FORM DEPRESSION INTO CONCRETE OR ASPHALT PAVEMENT SHOULDER.
  - (J) ALL COST OF INSTALLATION BRIDGE END DRAIN INCLUDING ALL COMPONENTS SUCH AS CURB AND GUTTER, 12" DEEP BLOCK-OUT, ROCK FLUME OR CONCRETE FLUME, RIP-RAP AND GEOTEXTILE SHALL BE INCLUDED IN THE COST OF BRIDGE.

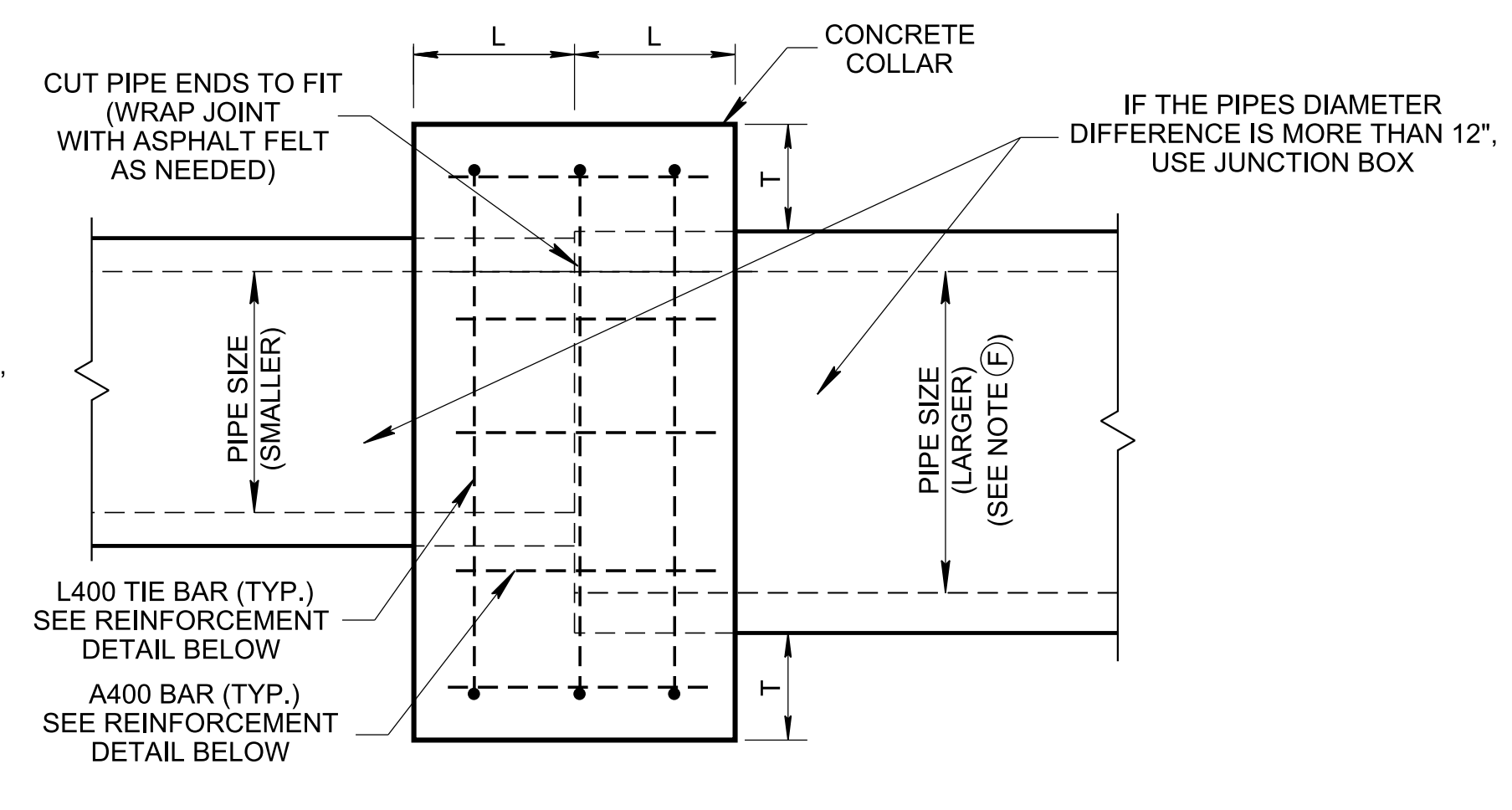
STATE OF TENNESSEE  
STANDARD DRAWING  
DEPARTMENT OF TRANSPORTATION

BRIDGE END DRAIN  
FLUME  
DETAILS

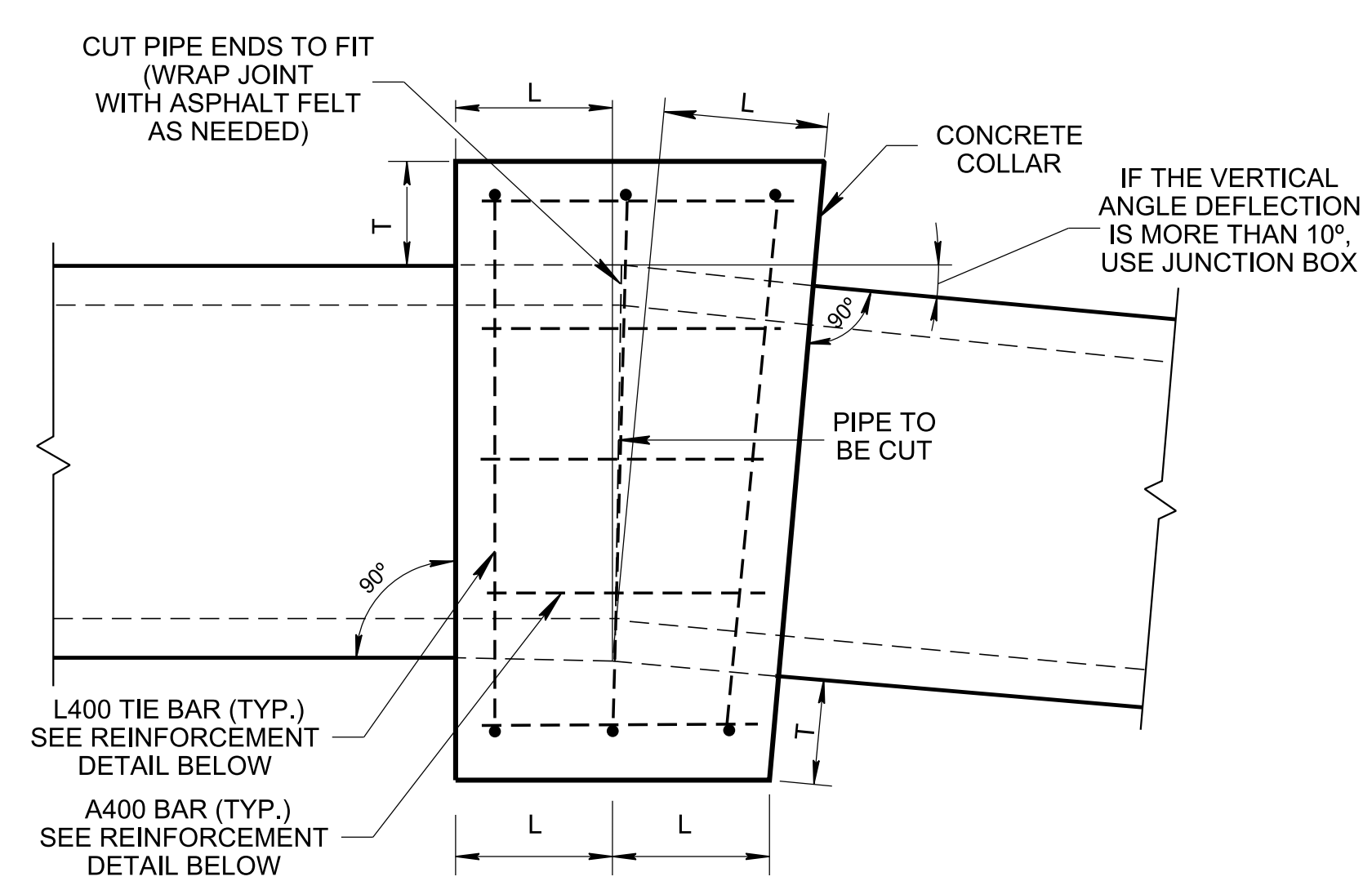
7/5/2023 2:49:00 PM P:\StandDraw\DESIGN STANDARDS\Standards Drawings\Standard Roadway Drawings - CURRENT\In Progress\10-101.00 Pipe Culverts and Endwalls\101.01 Pipe Culverts and Flumes\IPDPB4-202307



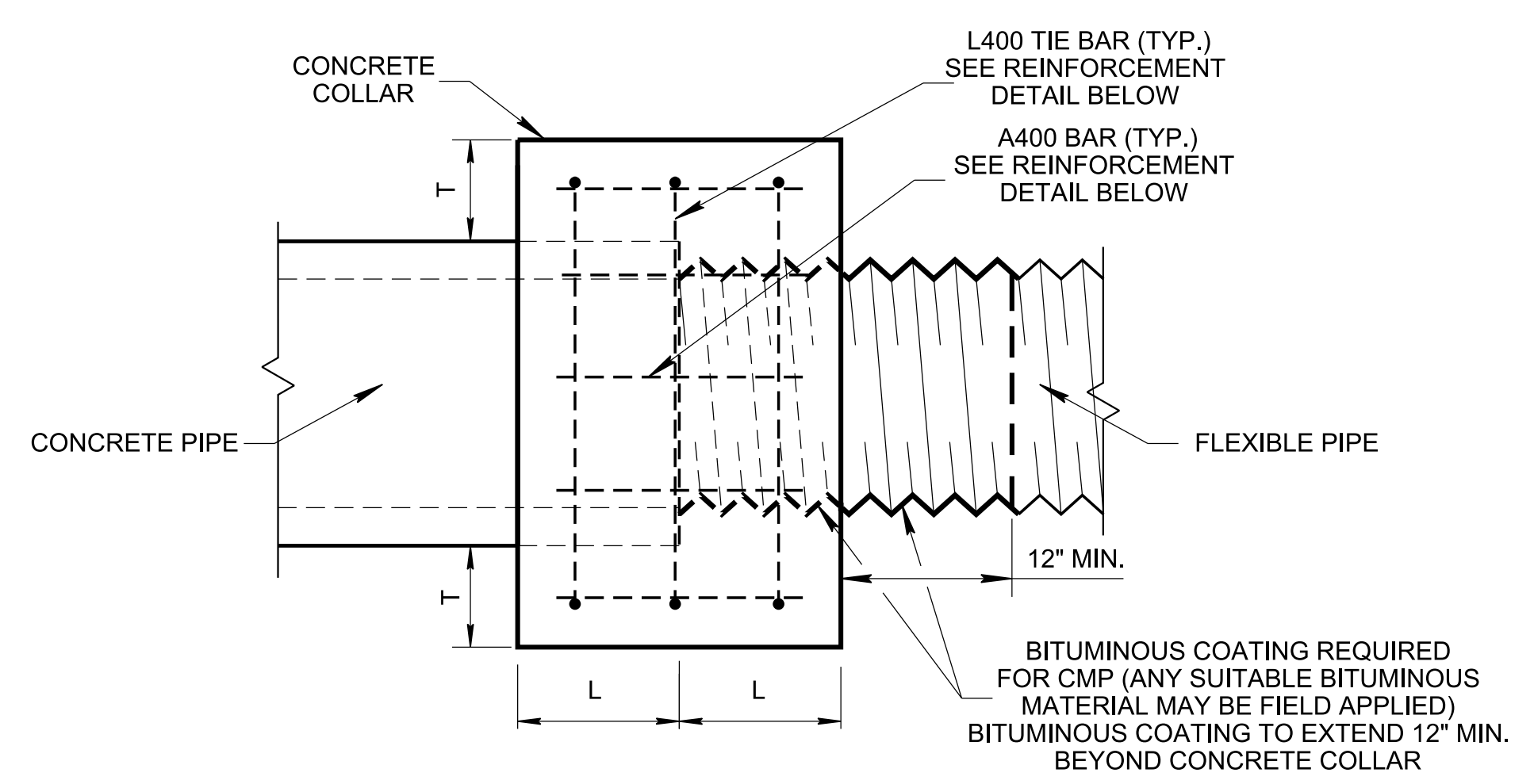
**PLAN VIEW  
FOR HORIZONTAL ALIGNMENT  
CONCRETE COLLAR DETAIL**



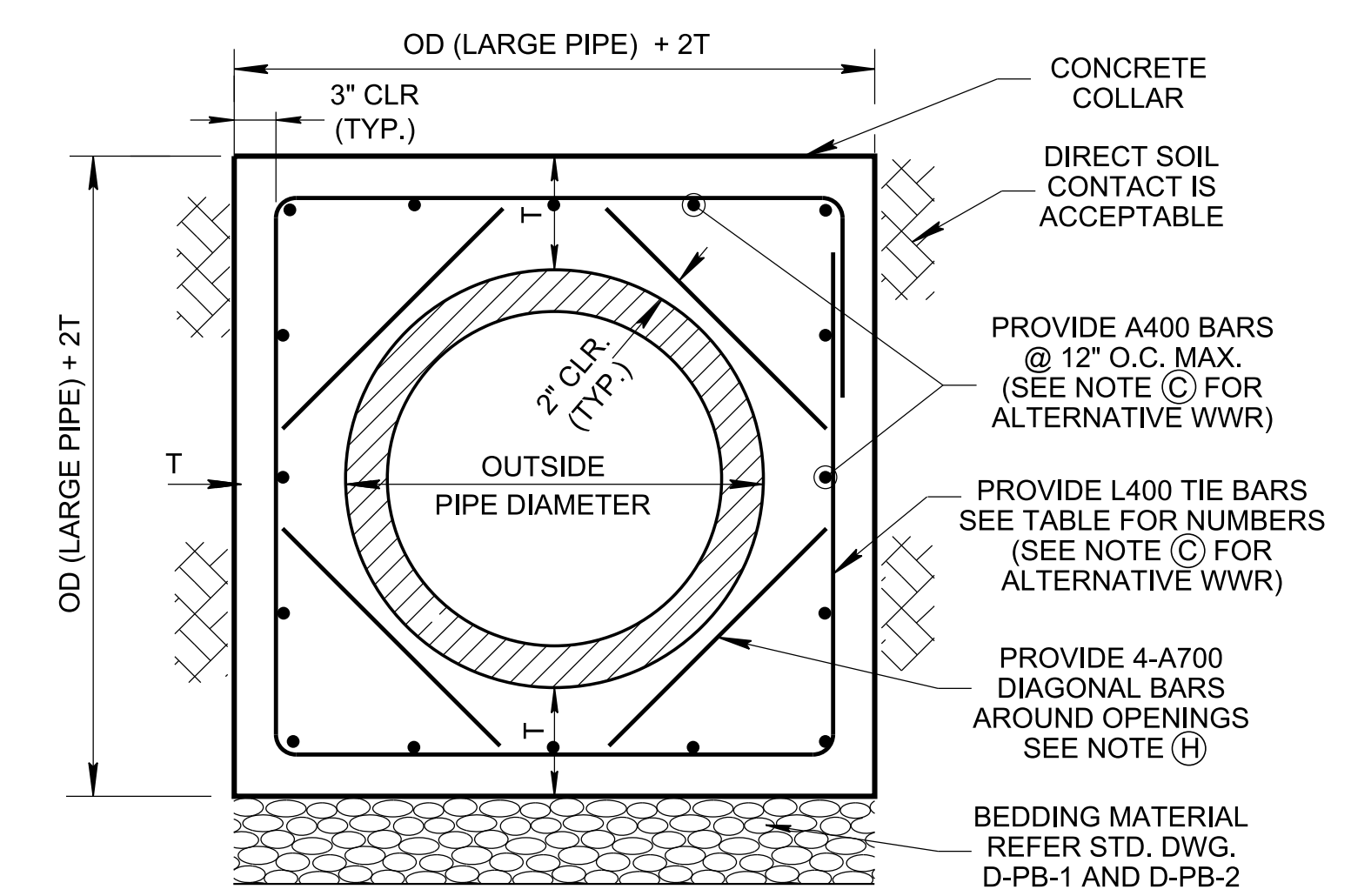
**ELEVATION VIEW  
CONCRETE COLLAR DETAIL FOR  
CONNECTING DIFFERENT PIPES DIAMETER**



**ELEVATION VIEW  
FOR VERTICAL ALIGNMENT  
CONCRETE COLLAR DETAIL**



**ELEVATION VIEW  
CONCRETE COLLAR DETAIL FOR  
CONNECTING CONCRETE PIPE AND FLEXIBLE PIPE**



**ELEVATION VIEW  
CONCRETE COLLAR REINFORCEMENT DETAIL**

PIPE COLLAR TABLE			
PIPE SIZE (IN)	LENGTH (L) MIN.	THICKNESS (T) MIN.	L400 TIE BARS (MIN.)
18"	1'-0"	8"	3
24"	1'-0"	8"	3
30"	1'-6"	8"	3
36"	1'-6"	8"	3
42"	2'-0"	10"	4
48"	2'-0"	10"	4
52"	2'-0"	10"	4
60"	2'-0"	12"	4
66"	2'-0"	12"	5
72"	2'-0"	14"	5
78"	2'-0"	14"	5

REINFORCING STEEL LEGEND	
VARIABLE A400	 12" MIN. LAP L400 (VARIABLE SIZE)
VARIABLE A700	
APPLY STANDARD C.R.S.I. FOR HOOK AND TIE DETAILS.	

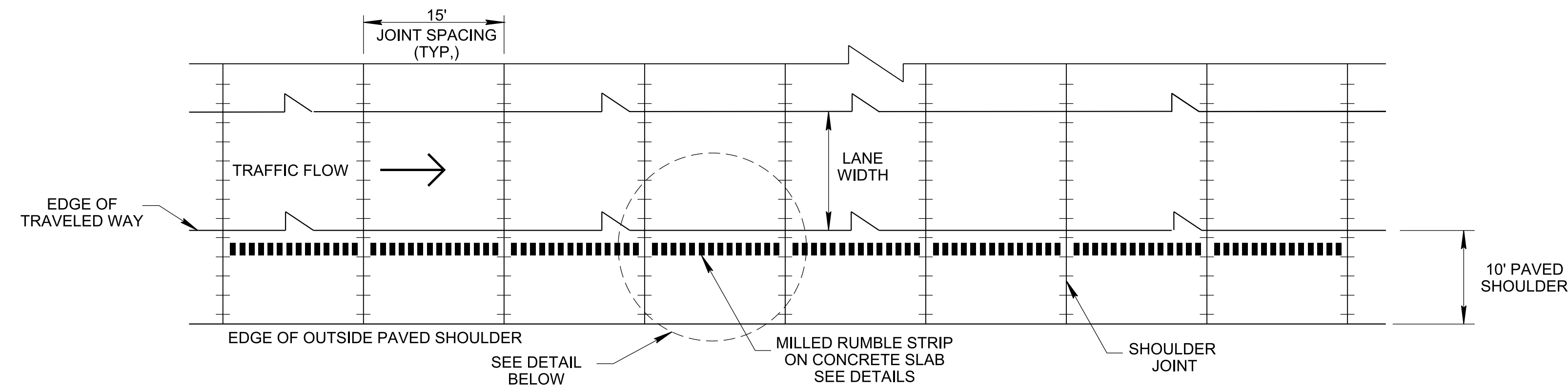
- GENERAL NOTES**
- (A) A CONCRETE COLLAR MAY BE USED WHERE PIPES OF DIFFERENT DIAMETERS OR MATERIALS ARE JOINED OR WHERE THE DESIGN CHANGE IN ALIGNMENT OR GRADE EXCEEDS THAT ALLOWED FOR A STANDARD JOINT.
  - (B) THE FOLLOWING MATERIAL PROPERTIES ARE REQUIRED FOR BOTH CAST-IN-PLACE AND PRECAST PIPE COLLAR:  
 CONCRETE:  $f'_c = 4,000$  POUNDS PER SQUARE INCH AT 28 DAYS  
 REINFORCING STEEL: ASTM A615,  $F_y = 60,000$  PSI.  
 ALL REINFORCING STEEL TO BE INSTALLED AS DETAILED ON THIS DRAWING.
  - (C) AS ALTERNATIVE REINFORCEMENT, EQUIVALENT AREA OF WELDED WIRE REINFORCEMENT CAN BE USED. WELDED WIRE REINFORCEMENT SHALL MEET ASTM A1064, WITH A MINIMUM YIELD STRENGTH OF 70,000 PSI.
  - (D) REFER TO STANDARD DRAWINGS D-PB-1 OR D-PB-2 FOR PIPE INSTALLATION STANDARD DETAILS.
  - (E) REFER TO STANDARD DRAWINGS D-JBS SERIES FOR JUNCTION BOXES.
  - (F) WHEN PIPES OF DIFFERENT DIAMETERS ARE JOINED WITH A CONCRETE COLLAR, "L" AND "T" SHALL BE THOSE OF THE LARGER DIAMETER.
  - (G) PIPE ENDS TO BE TRIMMED SUCH THAT THE MAXIMUM DISTANCE BETWEEN PIPES AT PIPES AT ANY POINT IS 2".
  - (H) WHEN THE PIPE IS 30 INCH OR LARGER, PROVIDE DIAGONAL BARS AROUND THE PIPE OPENING.
  - (I) BENDING OF PROPOSED PIPE SEWER OR REINFORCED CONCRETE PIPE IN A VERTICAL AND OR HORIZONTAL PLANE SHALL BE ACCOMPLISHED BY THE USE OF A PIPE COLLAR OR A PRECAST ELBOW, AS APPROVED BY THE ENGINEER.
  - (J) PAYMENT FOR PIPE COLLAR SHALL BE INCLUDED IN THE UNIT PRICE OF THE PIPE.

STATE OF TENNESSEE  
STANDARD DRAWING  
DEPARTMENT OF TRANSPORTATION

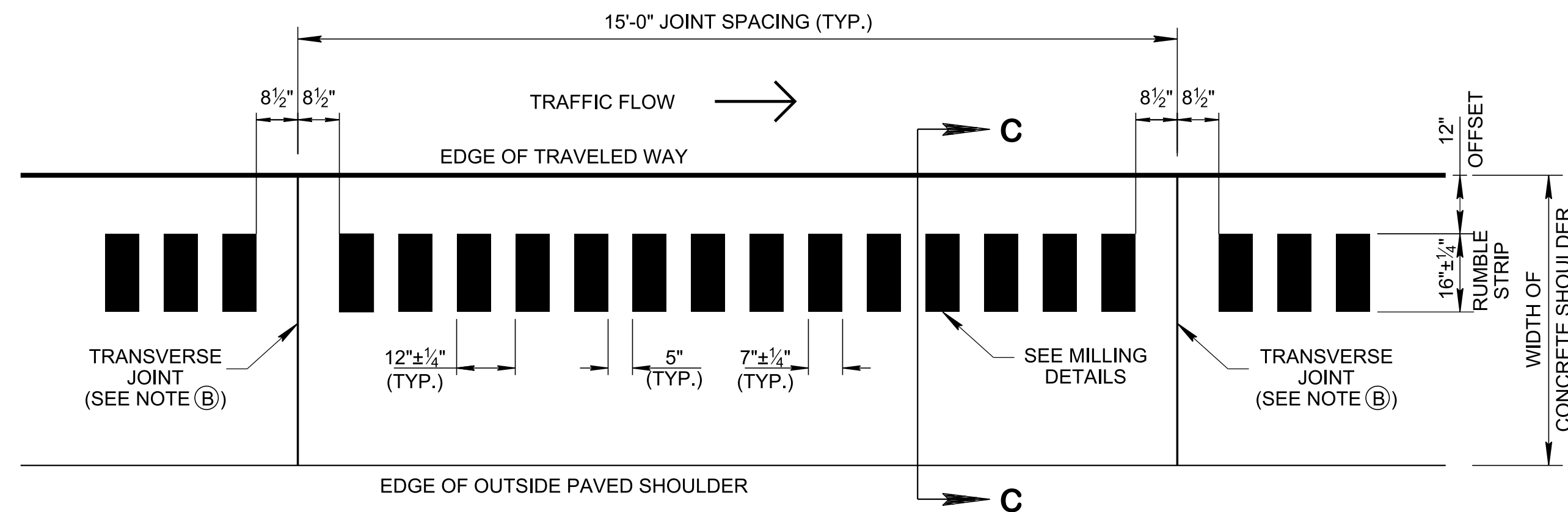
**PIPE COLLAR  
DETAILS**

07-07-2023      D-PB-4

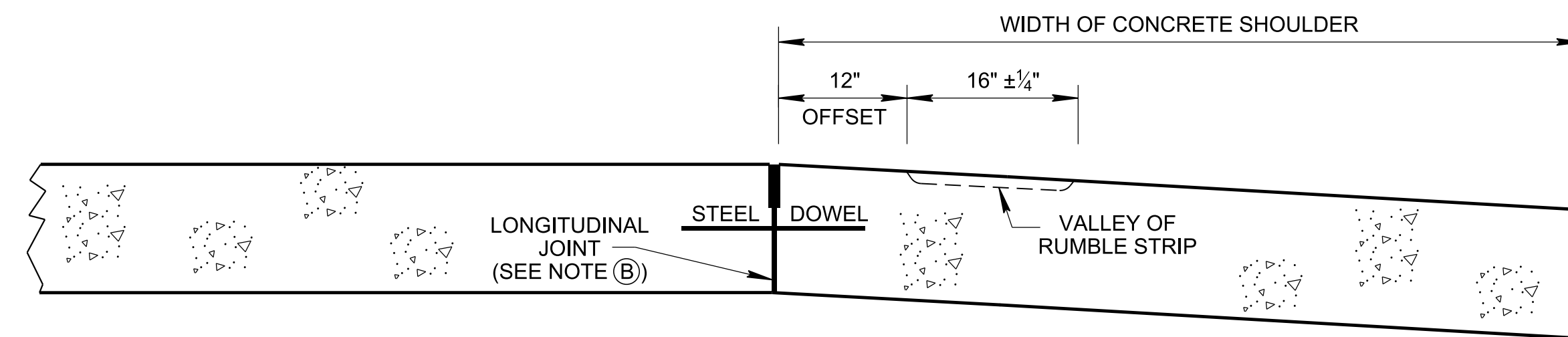
7/5/2023 2:46:33 PM P:\StandDraw\DESIGN STANDARDS\Standards Drawings\Standard Roadway Drawings - CURRENT\In Progress\10-104.00 Roadway, Pavement Appurtenances and Fence IP\104.01 Concrete Pavement IP\RP



**PLAN VIEW  
MILLED RUMBLE STRIP ON CONCRETE SHOULDER**

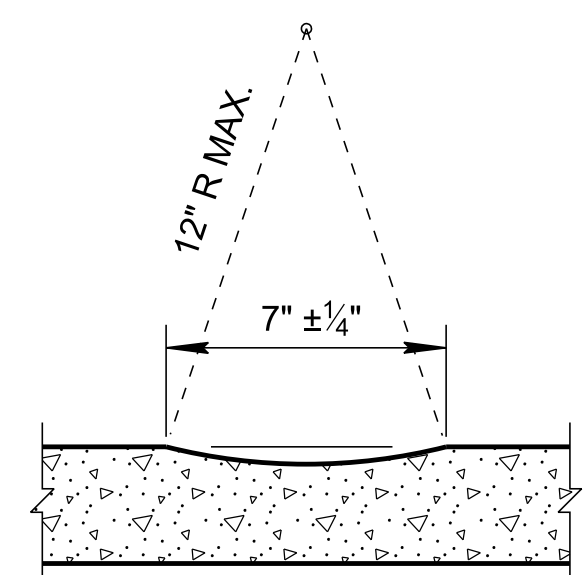


**DETAIL FOR  
MILLED RUMBLE STRIP ON CONCRETE SHOULDER**

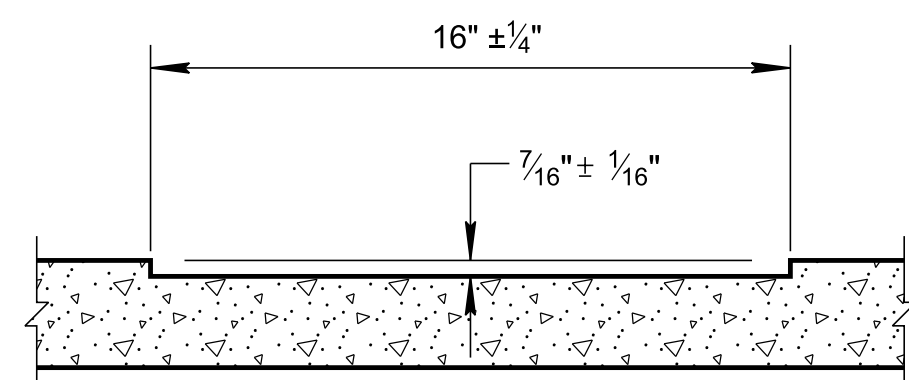


**SECTION C-C**

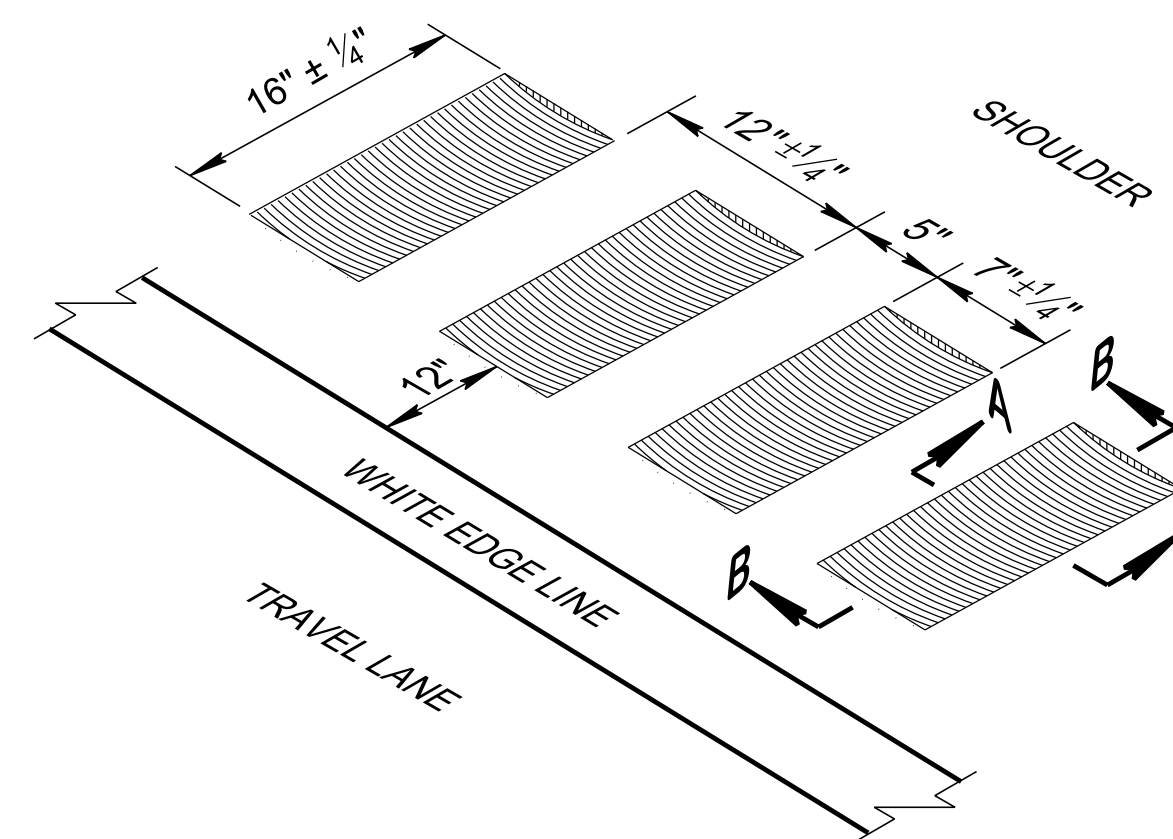
JOINT SYMBOLS	
	TRANSVERSE CONTRACTION
	LONGITUDINAL CONTRACTION OR LONGITUDINAL CONSTRUCTION



**SECTION A-A**



**SECTION B-B**



**ISOMETRIC VIEW**

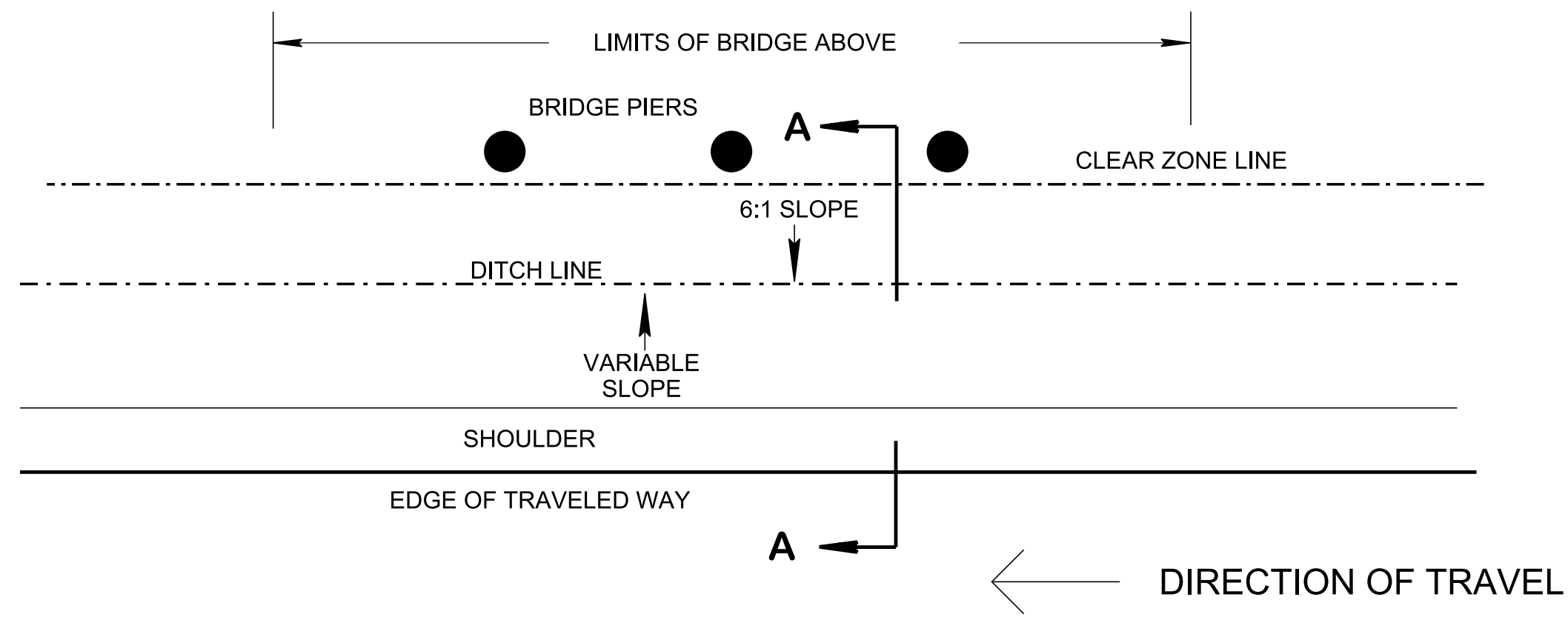
RUMBLE STRIP GENERAL NOTES		
(A)	MILLED-IN RUMBLE STRIP WITH 7" ± 1/4" GROOVES, 7/16" ± 1/16" DEEP, ON 12" ± 1/4" SPACING.	
(B)	REFER TO STANDARD DRAWINGS RP-J SERIES FOR CONCRETE PAVEMENT JOINT TYPES AND SPACING.	
(C)	MILLED RUMBLE STRIP ON CONCRETE SHOULDER, ALL COST OF INSTALLATION SHALL BE INCLUDED IN ITEM NUMBER.	
501-03.15	CONCRETE SHOULDER MILLED RUMBLE STRIPS,	L.M.

STATE OF TENNESSEE  
STANDARD DRAWING  
DEPARTMENT OF TRANSPORTATION

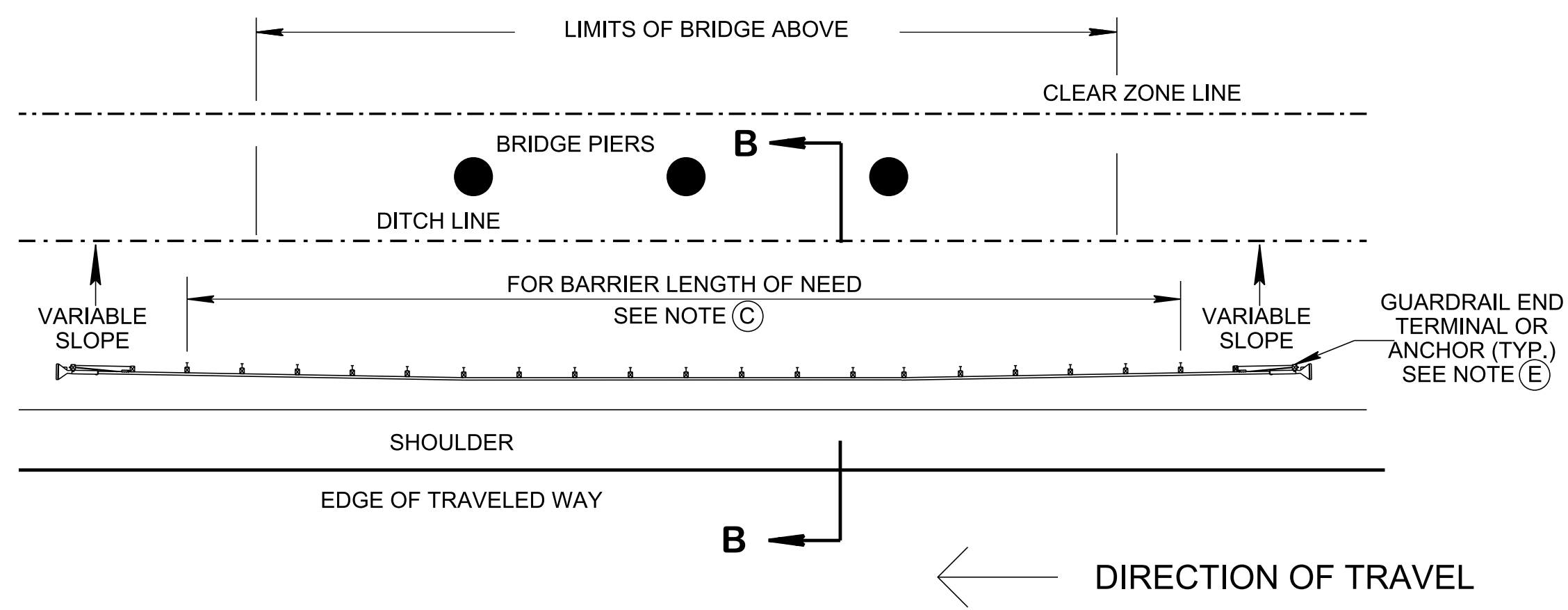
CONCRETE SHOULDER  
MILLED RUMBLE STRIP DETAILS



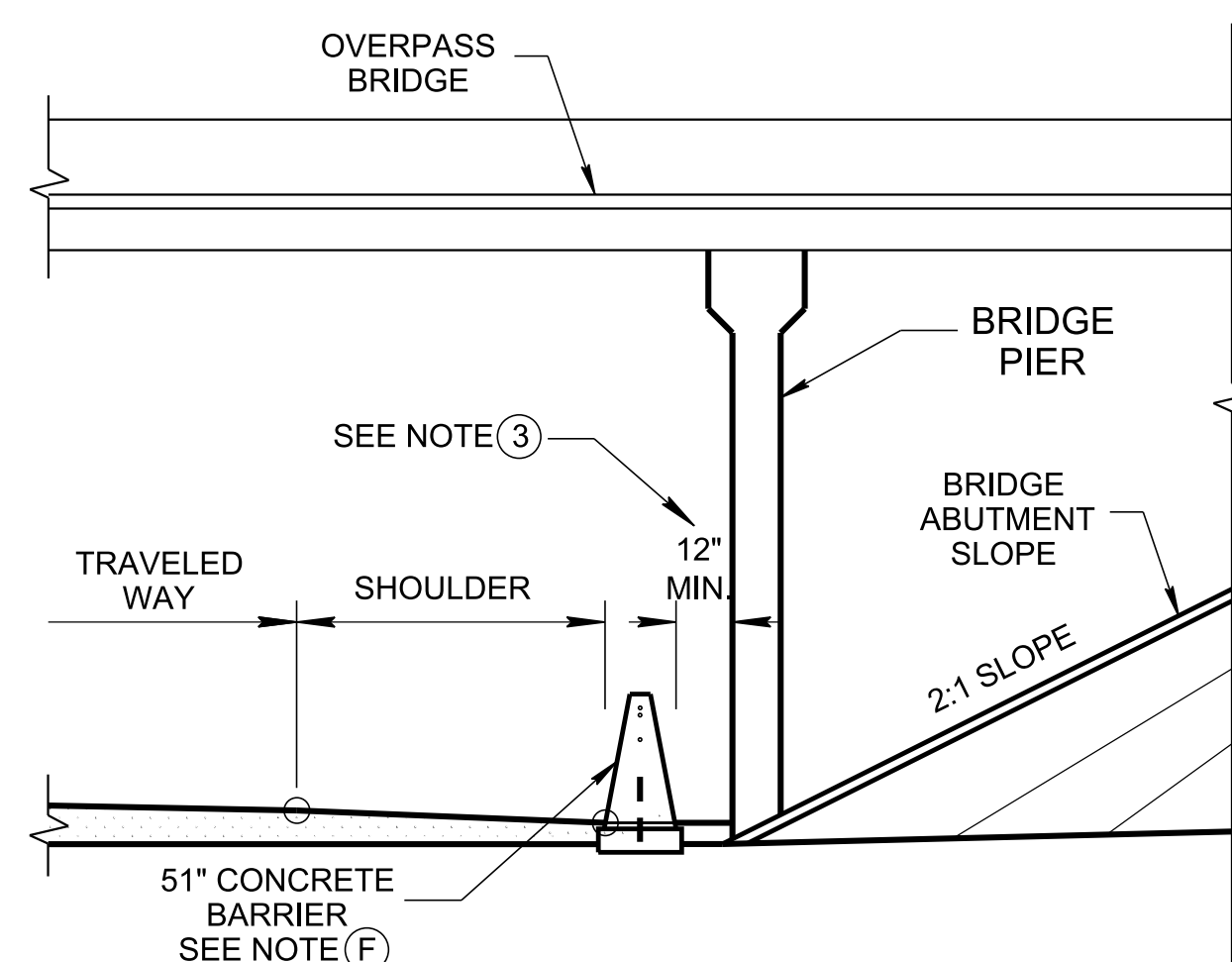
7/5/2023 2:44:30 PM P:\StandDraw\DESIGN STANDARDS\Standards Drawings Library\Standard Roadway Drawings - CURRENT\In Progress\10-106.00 Safety Design and Guardrails IP\SP-4A-2023



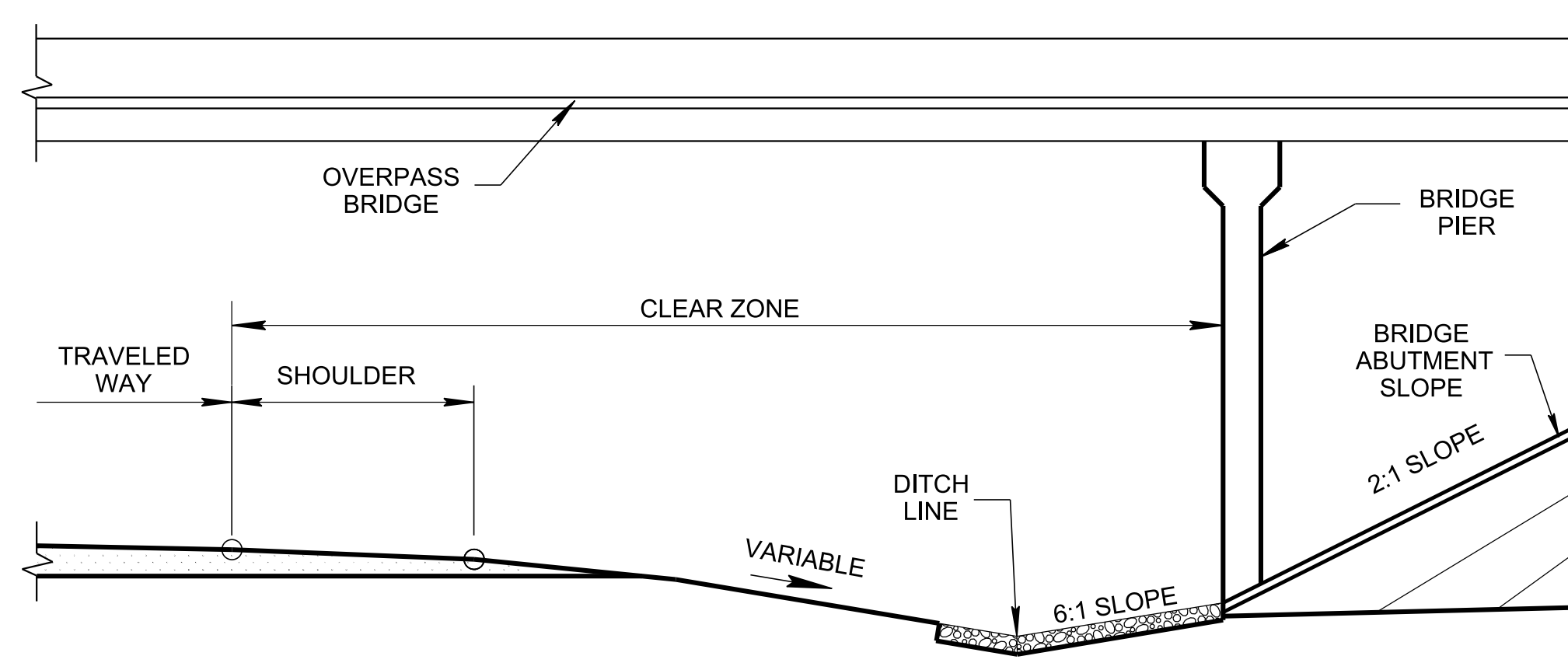
**PLAN VIEW**  
**WHEN BRIDGE PIERS OUTSIDE CLEAR ZONE**



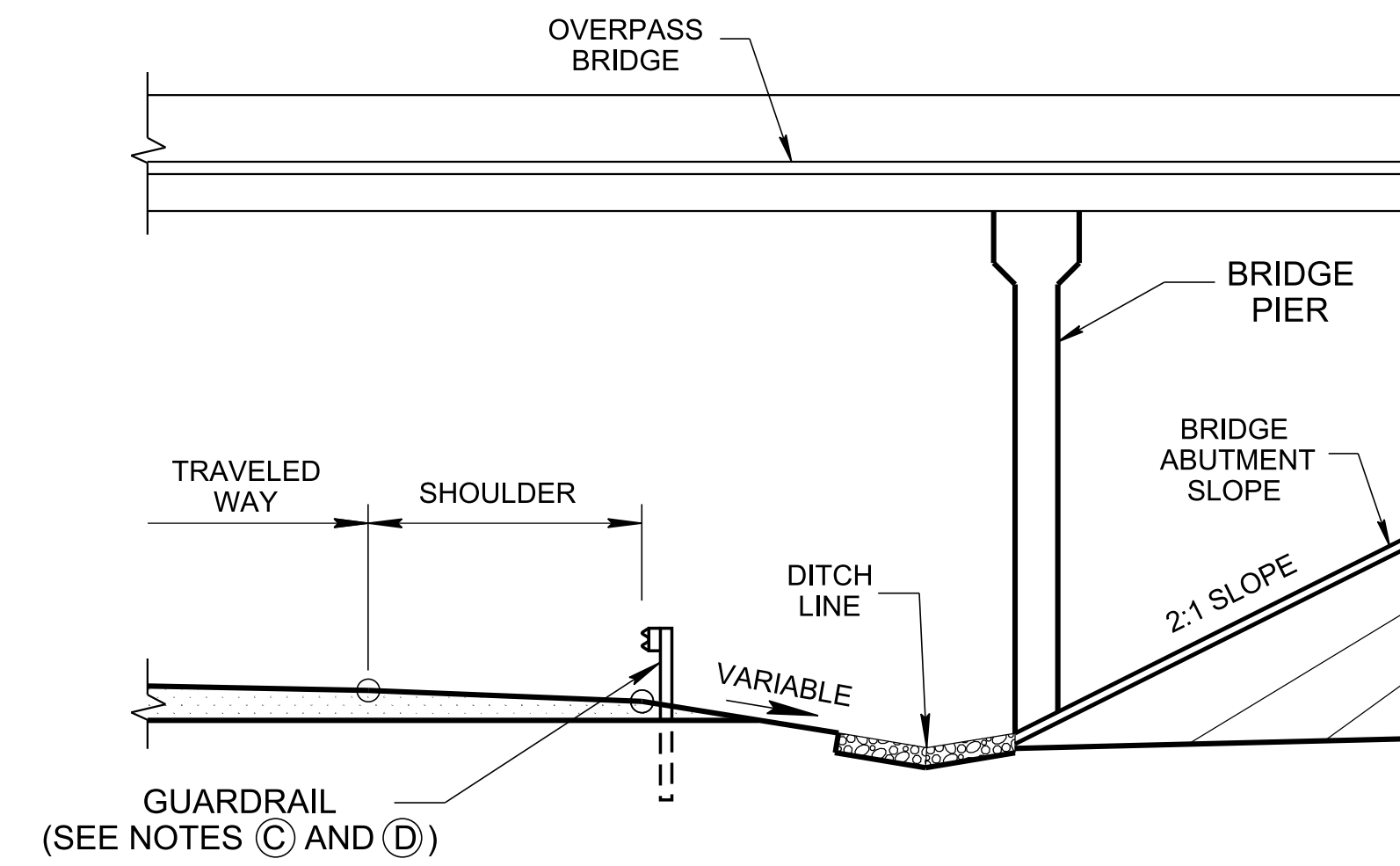
**PLAN VIEW**  
**WHEN BRIDGE PIERS OR ABUTMENT SLOPE INSIDE CLEAR ZONE**



**ELEVATION VIEW**  
**WHEN BRIDGE PIERS OR ABUTMENT SLOPE PROTECTED BY CONCRETE BARRIER WALL**



**SECTION A-A**



**SECTION B-B**

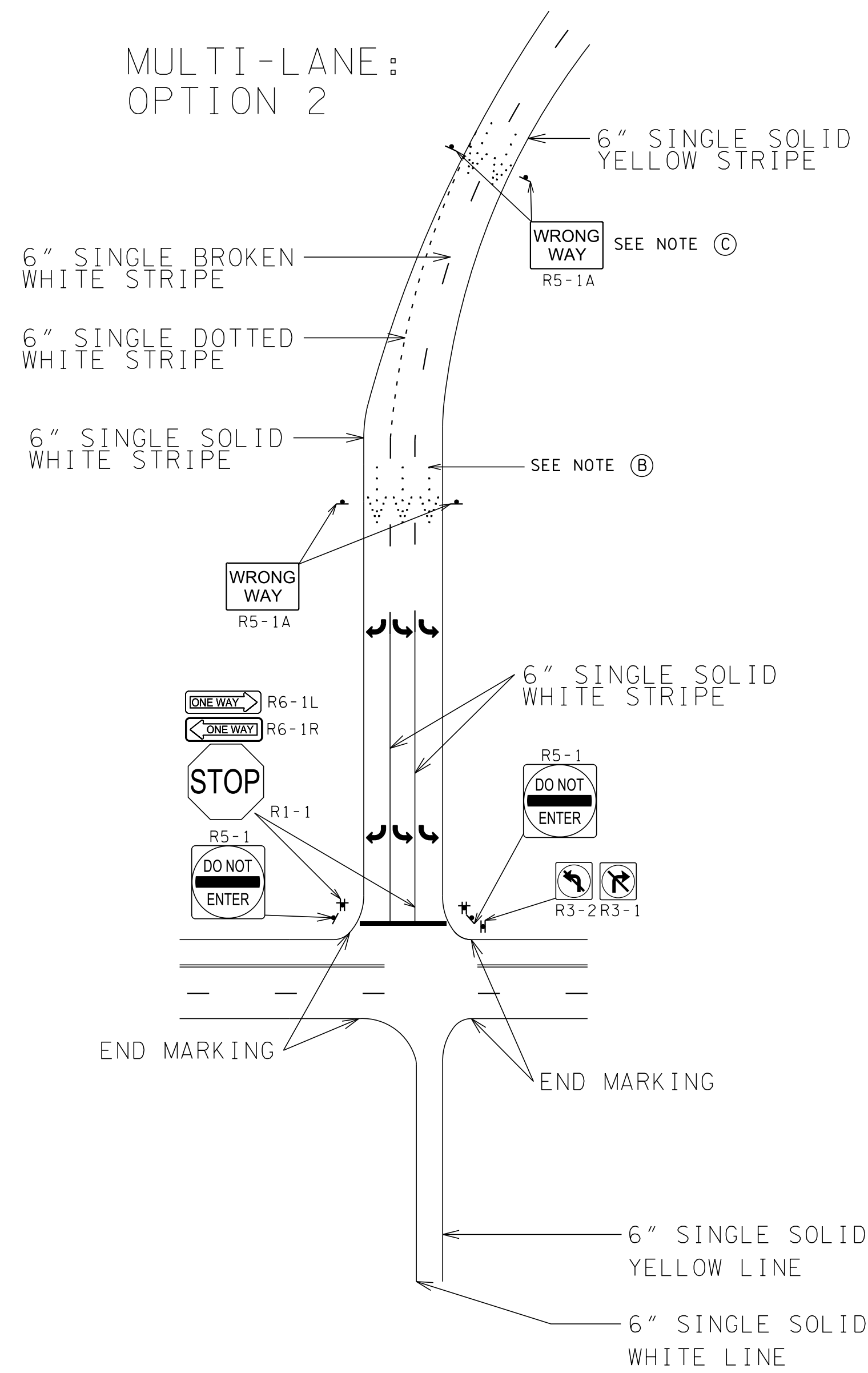
**NOTE TO DESIGNER**

- ① WHEN EXISTING PHYSICAL CONDITIONS OF THE APPROACH AND TRANSITION ZONE ARE SO UNIQUE AS TO WARRANT INDIVIDUAL DESIGN, A CONTOUR PLAN SHALL BE PREPARED TO PROVIDE THE CONSTRUCTION ENGINEER WITH DATA FOR CONSTRUCTION TO THE INTENDED LINES AND GRADES.
- ② IN RARE CASES WHEN A STEEP (GREATER THAN 3:1) FILL SLOPE IS UNAVOIDABLE WITHIN THE SAFETY APPROACH ZONE, A BARRIER WILL BE INDICATED ON PLANS IN ACCORDANCE WITH DESIGN POLICY SET OUT IN THE "S-GR-" SERIES OF STANDARD DRAWINGS.
- ③ DUE TO EXTREME SITE LIMITATIONS WHEN 1 FOOT OFFSET CANNOT BE PROVIDED, DESIGNER SHALL COORDINATE WITH THE STRUCTURES ENGINEER TO ASSURE THE PIER IS DESIGNED TO WITHSTAND IMPACT FORCE MEETING LRFD REQUIREMENTS.

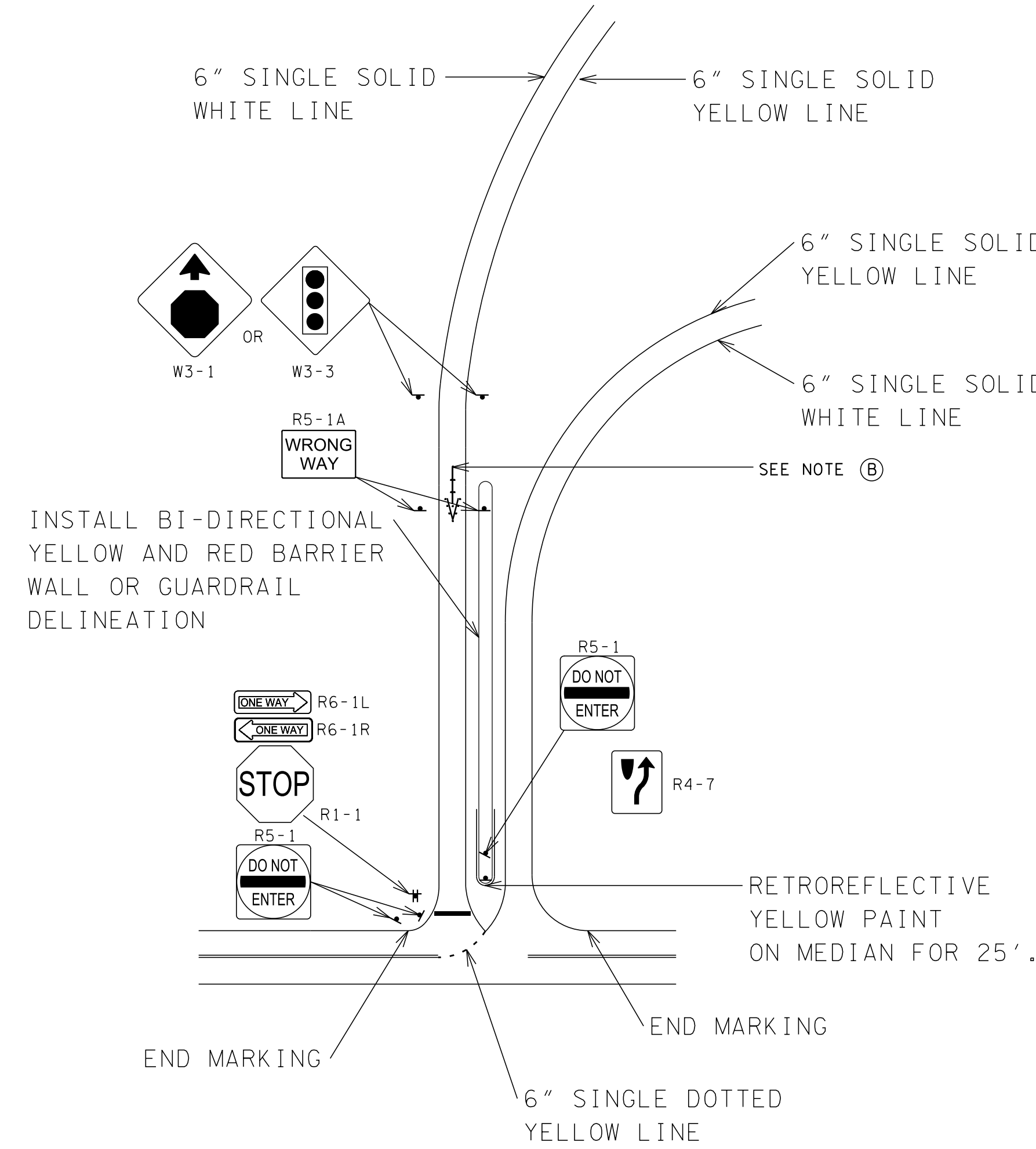
**GENERAL NOTES**

- (A) THIS STANDARD MAY BE USED ON ROADWAYS WITH POSTED SPEED LIMITS OF 45 MPH OR LESS, AND THE DRAWING SHOULD REFER GRADE SEPARATED CROSSING DRAINAGE LAYOUT WITH DITCH. ALL WORK INDICATED ON THIS DRAWING SHALL BE PERFORMED IN ACCORDANCE WITH THE CURRENT TDOT STANDARD SPECIFICATIONS AND/OR CURRENT SPECIAL PROVISION(S).
- (B) THE INTENT OF THIS LAYOUT IS TO DESIGN UNDERPASS CLEAR ZONE GRADING SO THAT TRAVERSABLE FILL/CUT SLOPES APPROACHING TO THE GRADE CROSSING CAN BE MAINTAINED. IT IS IMPORTANT TO KEEP BRIDGE ABUTMENT SLOPE AND/OR BRIDGE PIER OUTSIDE THE CLEAR-ZONE FOR ROADWAY BELOW.
- (C) REFER TO STANDARD DRAWINGS S-PL-1 FOR SAFETY PLAN FOR BARRIER LENGTH OF NEED AND S-PL-6 FOR SAFETY HARDWARE PLACEMENT ON OUTSIDE EDGE.
- (D) REFER TO STANDARD DRAWINGS S-GR31 SERIES FOR GUARDRAIL POST, RAIL, AND HARDWARE STANDARDS FOR CONSTRUCTION.
- (E) REFER TO STANDARD DRAWINGS S-GRT SERIES FOR GUARDRAIL TERMINALS.
- (F) REFER TO STANDARD DRAWING S-SSMB-2 FOR SINGLE SLOPE CONCRETE BARRIER WALL.
- (G) PAYMENT FOR ALL ITEMS DIRECTLY INDICATED OR IMPLIED ON THIS DRAWING WILL BE MADE UNDER APPROPRIATE ITEM NUMBER(S) AND DESCRIPTION(S) RECORDED ELSEWHERE IN THE PLANS.

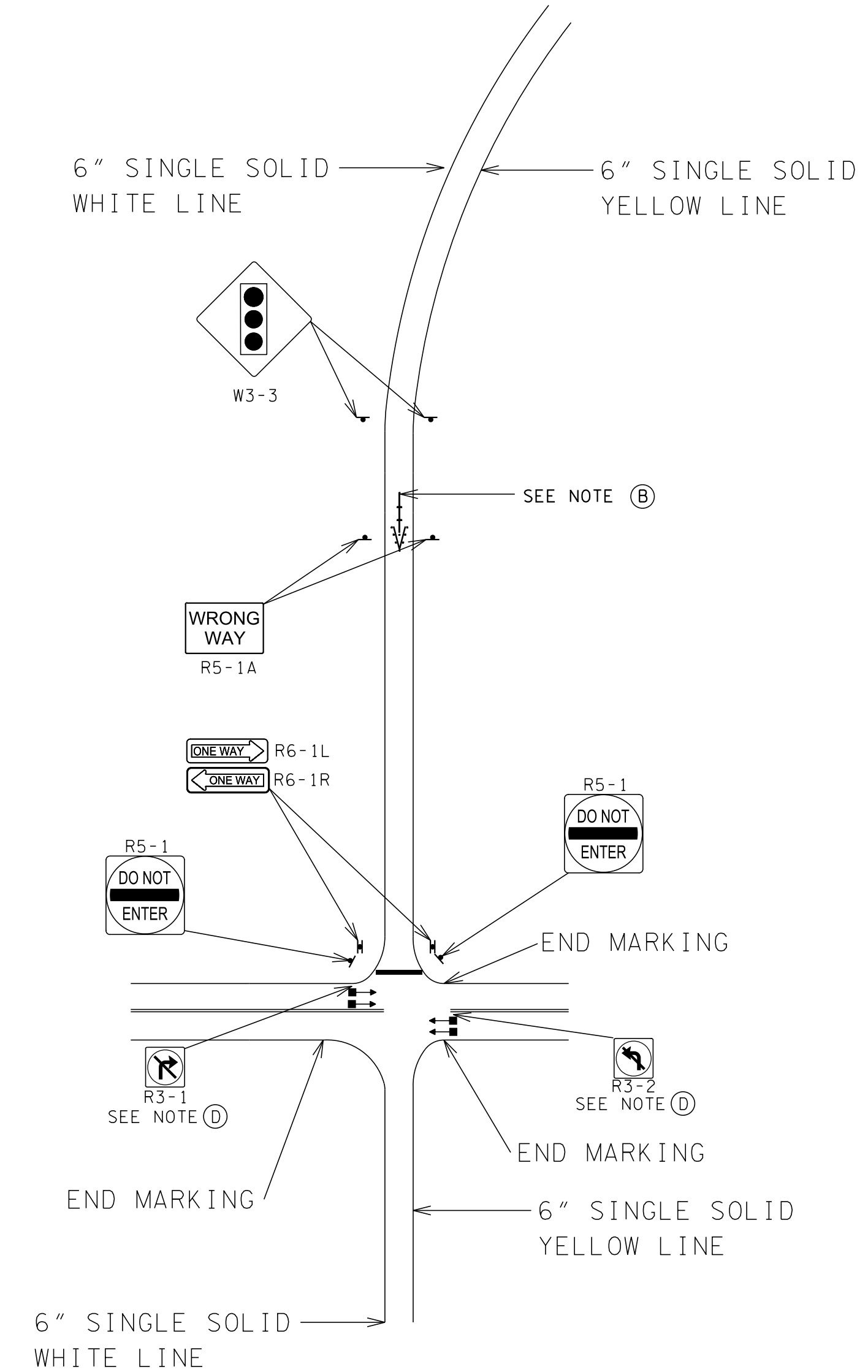
MULTI-LANE :  
OPTION 2



PARTIAL CLOVERLEAF SIGNING



SIGNAL SIGNING



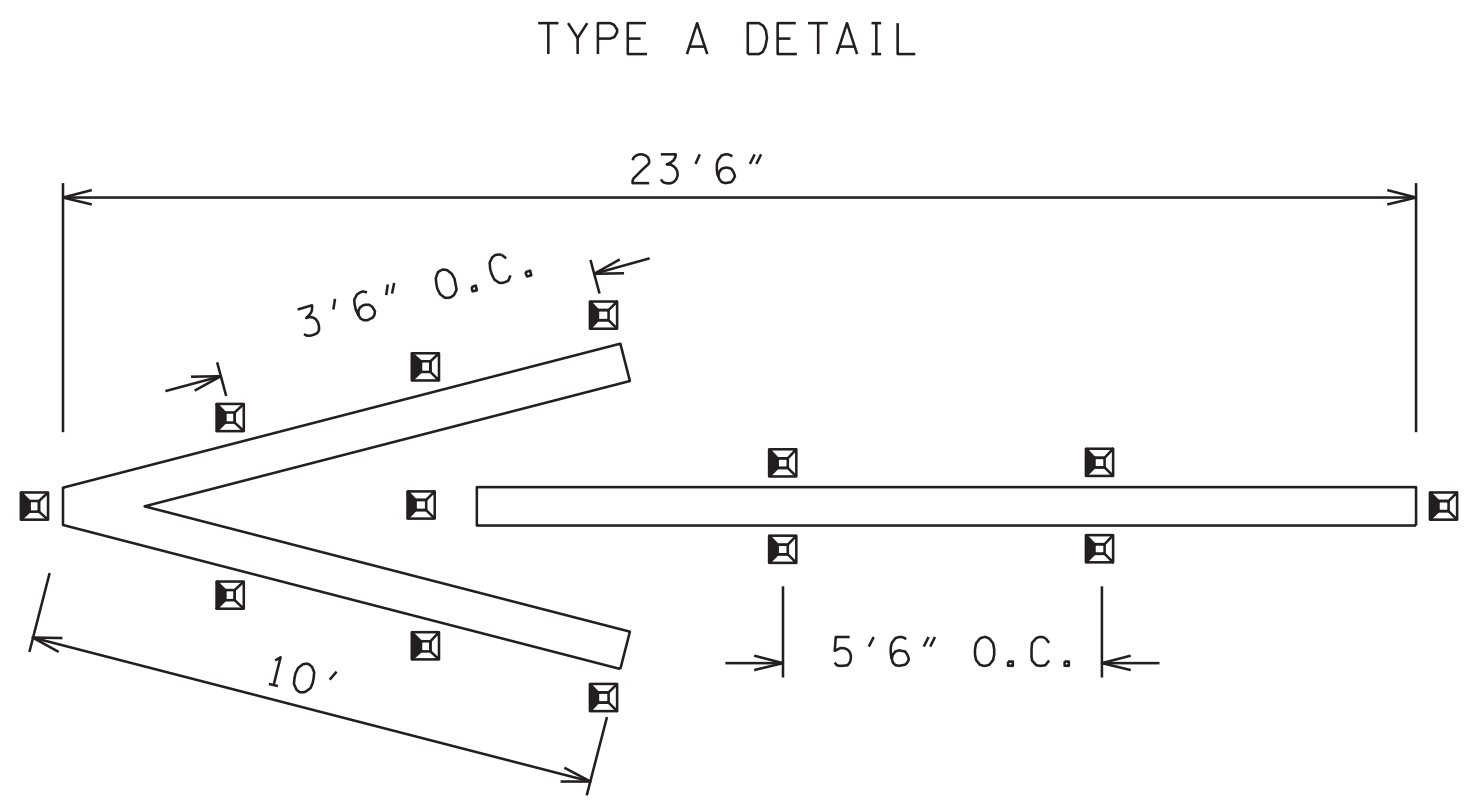
GENERAL NOTES

- (A) SEE STANDARD DRAWING NO. T-M-9 AND T-M-9B FOR ADDITIONAL DETAILS FOR RAMP SIGNING, STRIPING, AND PAVEMENT MARKERS.
- (B) THE WRONG WAY PAVEMENT ARROWS SHOULD BE APPROXIMATELY 200' FROM STOP LINE EVEN WITH THE WRONG WAY SIGNS. FOR MULTI-LANE RAMPS, THERE SHOULD BE ONE ARROW PLACED IN EACH LANE. SEE TYPE A DETAIL FOR SPECIFICATIONS FOR ONE LANE RAMPS AND TYPE B DETAIL FOR MULTI-LANE RAMPS.
- (C) ANOTHER SET OF WRONG WAY SIGNS MAY BE ADDED 200' BEYOND THE FIRST SET. A WRONG WAY ARROW MAY BE INCLUDED ON TWO (2) LANE RAMPS. THE ADDITIONAL SIGNS AND ARROW ARE REQUIRED FOR THREE (3) LANE RAMPS.
- (D) TO BE MOUNTED ON SPAN WIRE OR MAST ARM.
- (E) INSTALL RED RETROREFLECTIVE STRIPS ALONG THE SIGNS POSTS OF DO NOT ENTER AND WRONG WAY SIGNS. STRIPS SHALL BE TWO (2) INCHES WIDE AND SIX (6) FEET LONG.

P:\2022\220072\220072\Infrastructure\Reports\Standard Drawing\New Standard Drawing.dgn

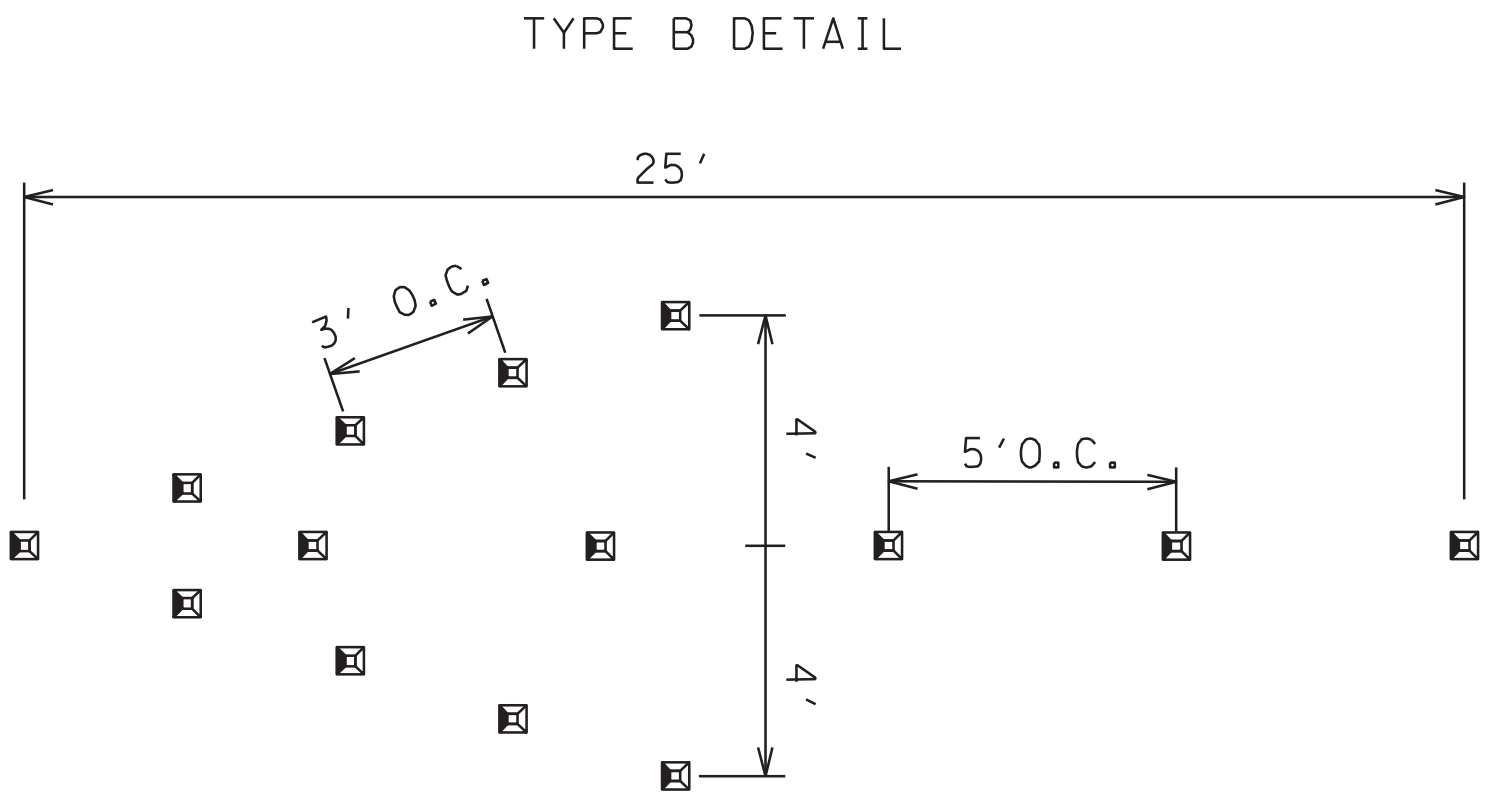
5/1/2023 12:56:19 PM

NOT TO SCALE



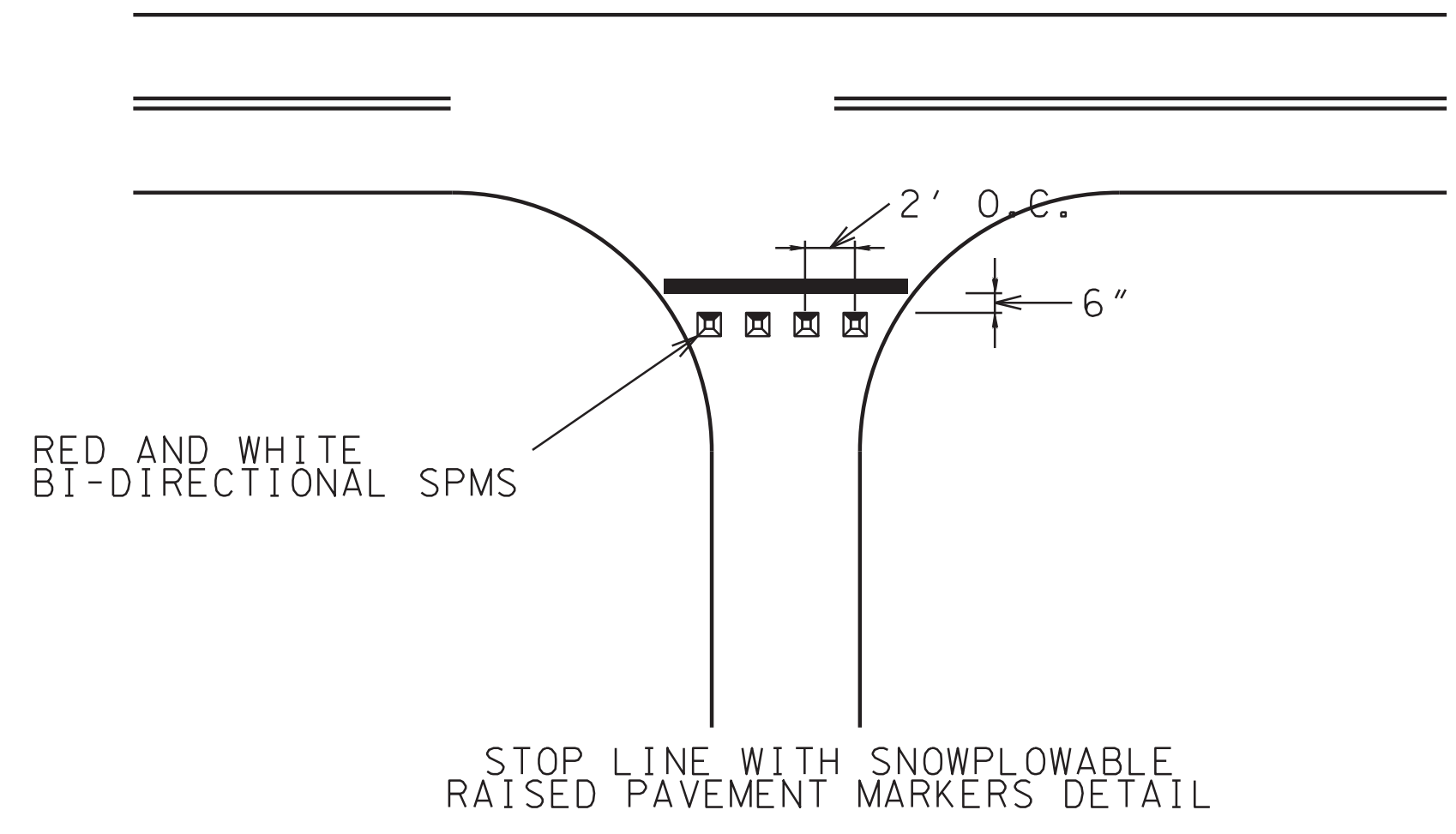
13 BI-DIRECTIONAL RED AND WHITE SPMS

WRONG WAY PAVEMENT ARROW WITH SNOWPLOWABLE PAVEMENT MARKERS TO BE USED ON SINGLE-LANE RAMPS ONLY

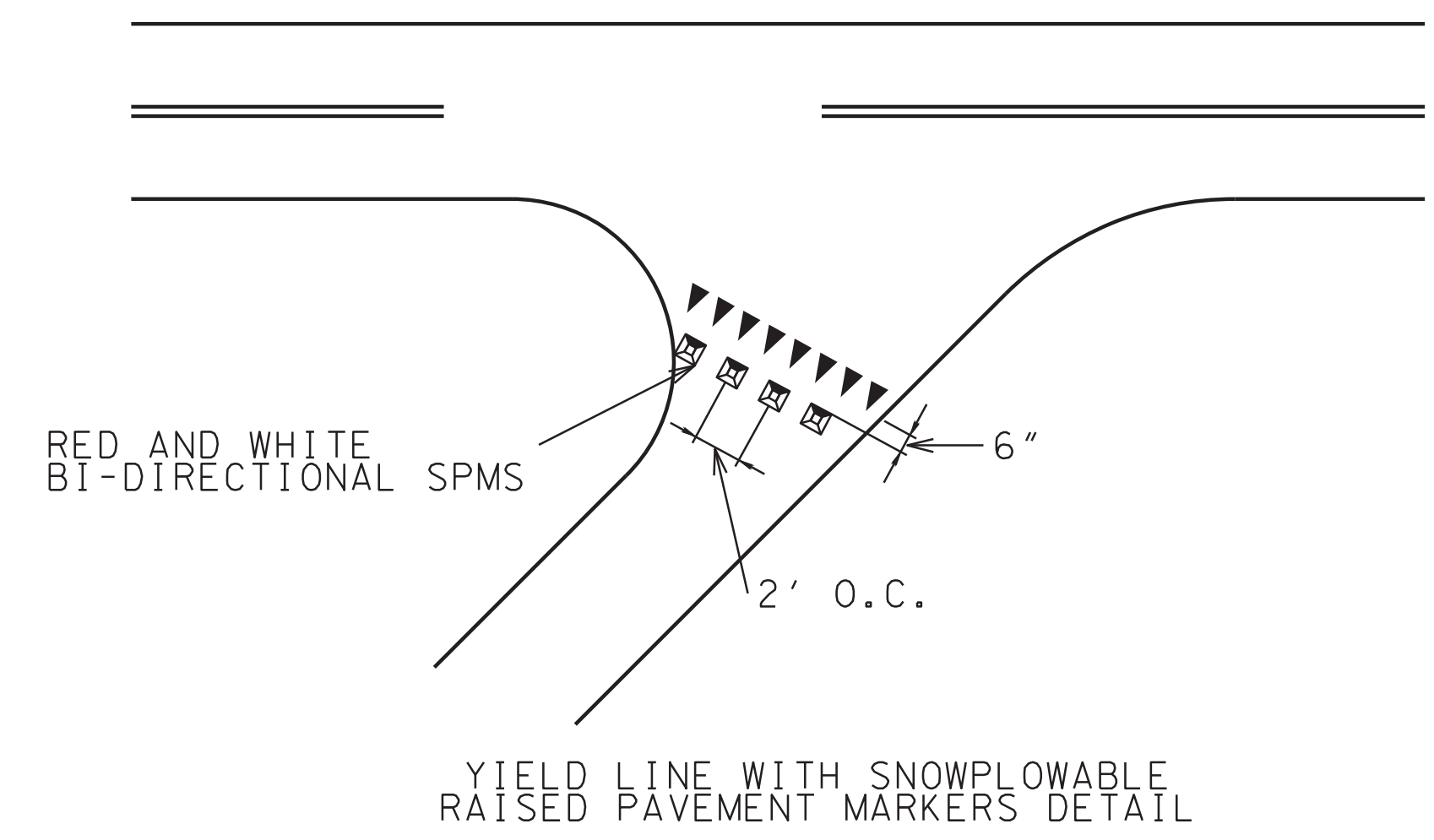


14 MONO-DIRECTIONAL RED ONE-DIRECTIONAL SPMS

WRONG WAY ARROW USING SNOWPLOWABLE PAVEMENT MARKERS TO BE USED ON MULTI-LANE RAMPS ONLY



STOP LINE WITH SNOWPLOWABLE RAISED PAVEMENT MARKERS DETAIL



YIELD LINE WITH SNOWPLOWABLE RAISED PAVEMENT MARKERS DETAIL

**GENERAL NOTES**

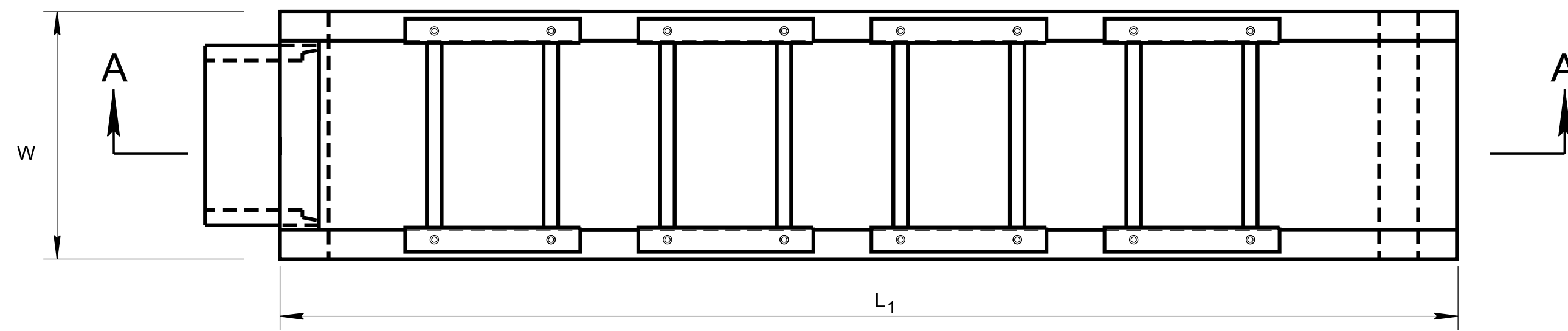
(A) SEE STANDARD DRAWING NO. T-M-9 AND T-M-9A FOR ADDITIONAL DETAILS FOR RAMP SIGNING, STRIPING, AND PAVEMENT MARKERS.

STATE OF TENNESSEE  
 STANDARD DRAWING  
 DEPARTMENT OF TRANSPORTATION

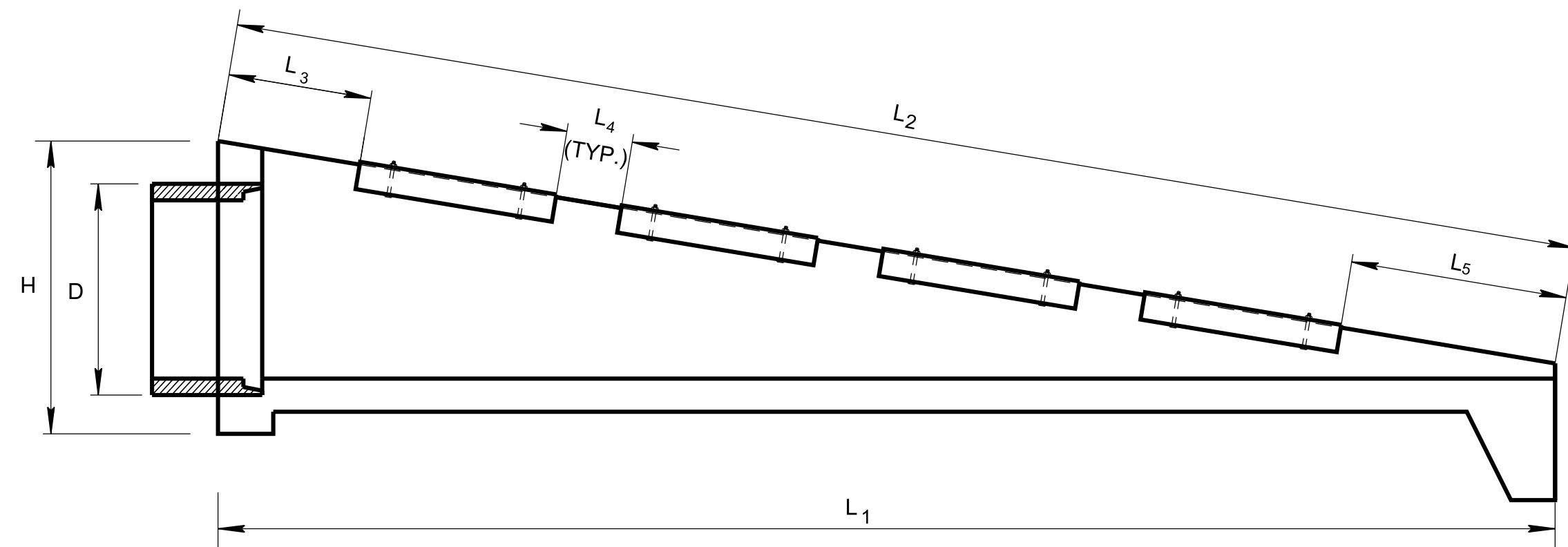
PAVEMENT MARKING AND SIGNING DETAILS FOR RAMP INTERSECTIONS

T-M-9B

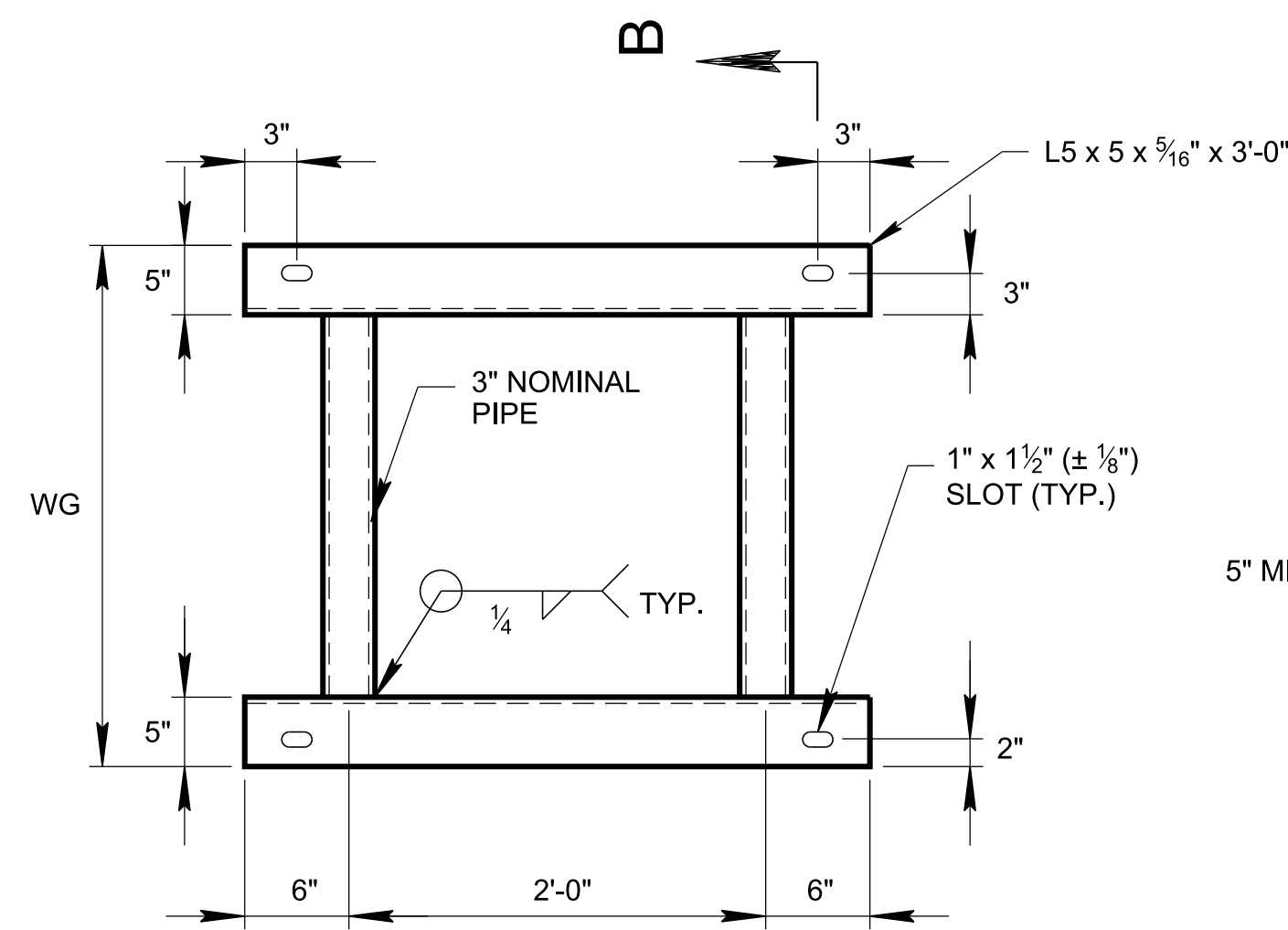
7/5/2023 2:37:39 PM P:\StandDraw\DESIGN STANDARDS\Standards Drawings Library\Standard Roadway Drawings - CURRENT\In Progress\10-101.00 Pipe Culverts and Endwalls IP\101.03 Safety Side Drain Endwalls IP\DSEW\1A-20



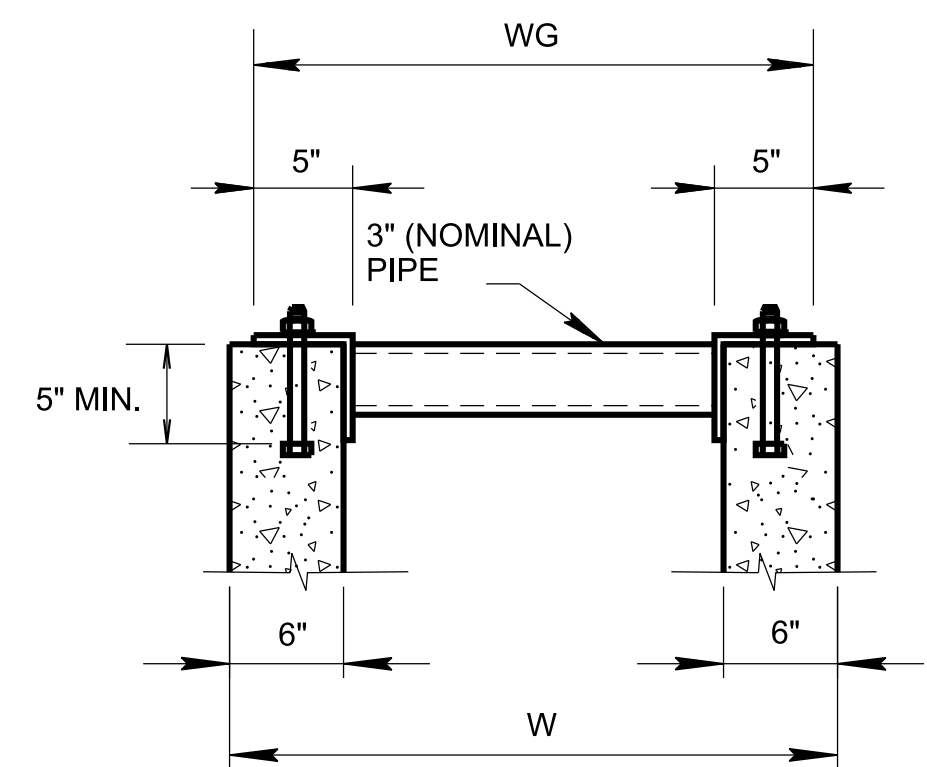
PLAN



SECTION A-A



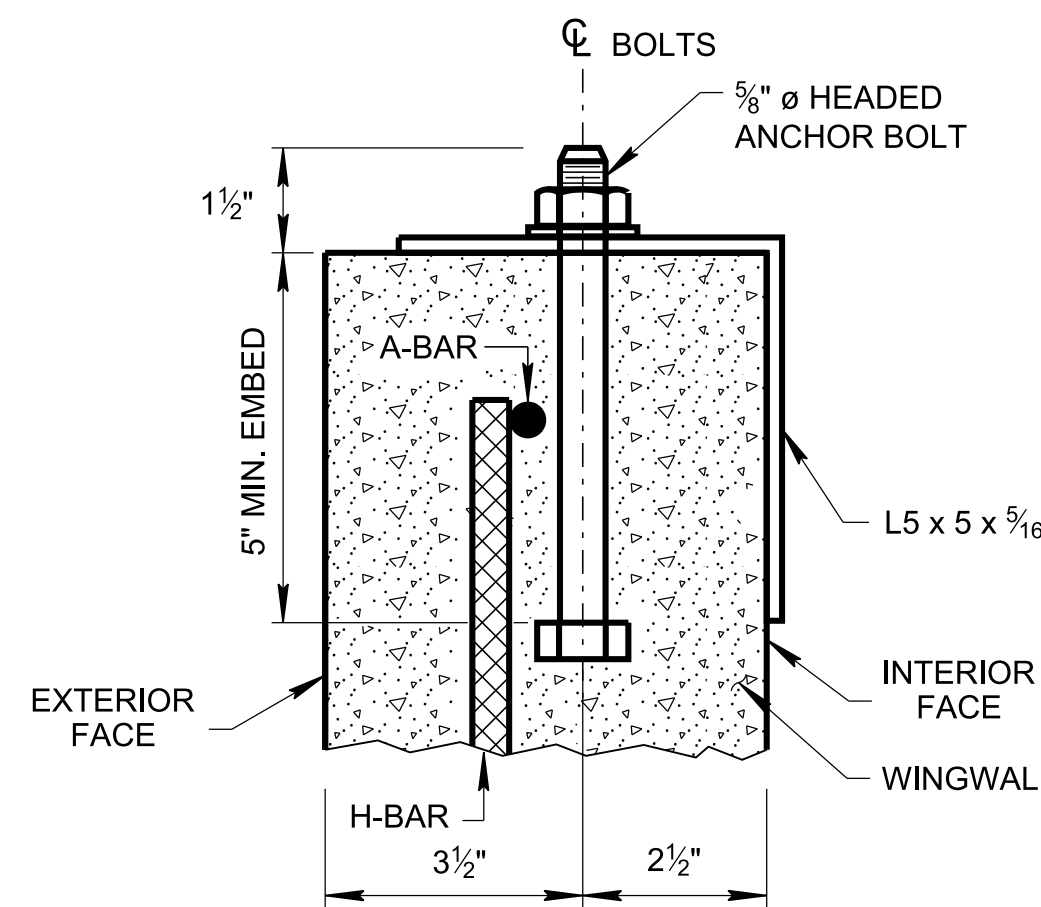
PLAN



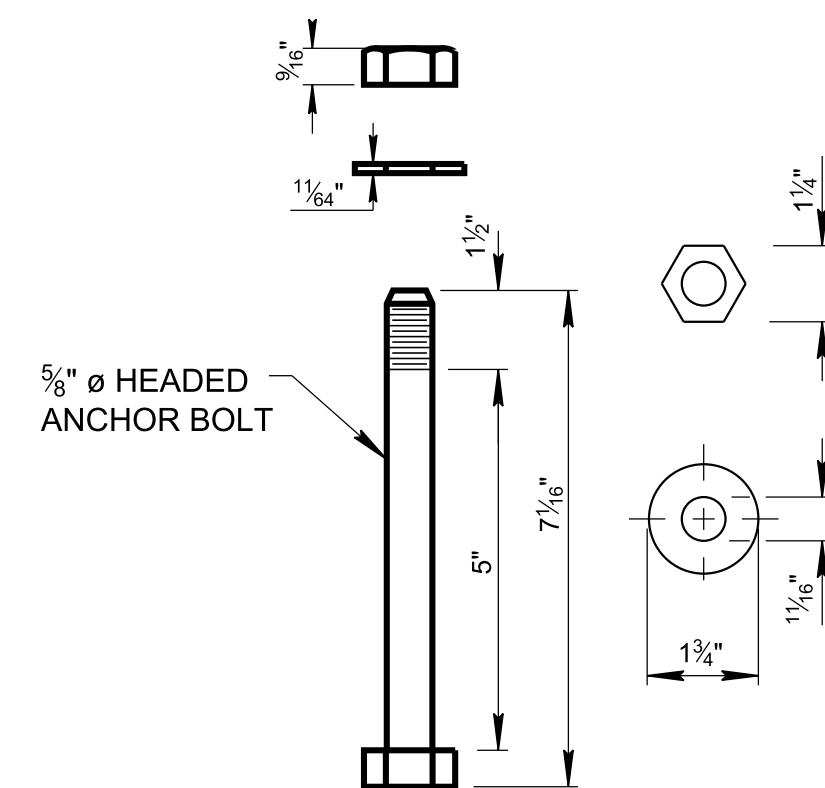
SECTION B-B  
SHOWING ANCHOR BOLTS AND PARTIAL WINGWALLS

**STEEL PIPE GRATE**

NOTE:  
BOLTS SHALL NOT EXTEND MORE THAN 1/2" ABOVE TOP OF NUTS.



ANCHOR BOLT ASSEMBLY



ANCHOR BOLT DETAIL

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

**GENERAL NOTES**

- (A) DRAWING TO BE USED FOR ALL 15" THRU 48" SIDE DRAIN CONCRETE ENDWALLS. REFER THE FOLLOWING STANDARD DRAWINGS FOR CONSTRUCTION DIMENSIONS.
  - 15" ENDWALL - SEE D-PE-15A & D-PE-15B WITH 6:1 WINGWALL SLOPE
  - 18" ENDWALL - SEE D-PE-18A & D-PE-18B WITH 6:1 WINGWALL SLOPE
  - 24" ENDWALL - SEE D-PE-24A & D-PE-24B WITH 6:1 WINGWALL SLOPE
  - 30" ENDWALL - SEE D-PE-30A & D-PE-30B WITH 6:1 WINGWALL SLOPE
  - 36" ENDWALL - SEE D-PE-36A & D-PE-36B WITH 6:1 WINGWALL SLOPE
  - 42" ENDWALL - SEE D-PE-42A & D-PE-42B WITH 6:1 WINGWALL SLOPE
  - 48" ENDWALL - SEE D-PE-48A & D-PE-48B WITH 6:1 WINGWALL SLOPE
- (B) SIDE DRAIN CONCRETE ENDWALL REQUIRES STEEL PIPE GRATES SHOWN ON THIS DRAWING. THE CONTRACTOR SHALL OMIT THE CONCRETE BLOCKOUTS (4" x 7") AS SHOWN ON STANDARD DRAWING D-PE-99 SECTION D-D THRU WINGWALL AND SUBSTITUTE THE FOLLOWING REINFORCING BARS:
  - 30" ENDWALL - SUBSTITUTE A465 & A466 BY EXTENDING A464 TO 19'-5"
  - 36" ENDWALL - SUBSTITUTE A464 & A465 BY EXTENDING A463 TO 23'-0"
  - 42" ENDWALL - SUBSTITUTE A465 (2 BARS), A466 & A467 BY EXTENDING A464 TO 26'-0"
  - 48" ENDWALL - SUBSTITUTE A465 (2 BARS), A466 & A467 BY EXTENDING A464 TO 29'-7"
- (C) THE MATERIALS, WELDING AND PAINTING FOR STRUCTURAL STEEL GRATE SHALL CONFORM TO THE FOLLOWING SPECIFICATIONS:
  - ① ANGLES: ASTM A36
  - ② STEEL PIPE: ASTM A53 GRADE B, STANDARD WEIGHT (SW) OR ASTM A500 GRADE B AND SHALL BE GALVANIZED FOR 15" THRU 24" DIAMETER PIPE CULVERT. ASTM A53 GRADE B, DOUBLE EXTRA STRONG WEIGHT (XXS) - FOR 30" THRU 48" DIAMETER PIPE CULVERT.
  - ③ WELDING: AASHTO/AWS D1.5M/D1.5 BRIDGE WELDING CODE (LATEST EDITION)
  - ④ ALL STEEL GRATES SHALL BE GALVANIZED.
  - ⑤ PIPES ARE TO BE VENTED PER GALVANIZATION REQUIREMENTS. HOLE SIZE AND LOCATIONS WILL BE DETERMINED BY GALVANIZER DURING THE APPLICATION.

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

  - ① BOLTS, NUTS AND WASHERS: ASTM F1554 GRADE 36
  - ② GALVANIZING: ASTM A153
- (D) THE INCIDENTAL ITEMS NECESSARY TO COMPLETE THE INSTALLATION AND FURNISHING OF THE STEEL PIPE GRATE, INCLUDING ALL MATERIALS, LABOR, AND HARDWARE, SHALL BE INCLUDED IN THE BID PRICE FOR THE SIDE DRAIN ENDWALL.
- (E) PAYMENT WILL BE MADE UNDER ITEM NUMBERS:
 

611-07.30	15IN ENDWALL (SIDE DRAIN)	EACH
611-07.31	18IN ENDWALL (SIDE DRAIN)	EACH
611-07.32	24IN ENDWALL (SIDE DRAIN)	EACH
611-07.33	30IN ENDWALL (SIDE DRAIN)	EACH
611-07.34	36IN ENDWALL (SIDE DRAIN)	EACH
611-07.35	42IN ENDWALL (SIDE DRAIN)	EACH
611-07.36	48IN ENDWALL (SIDE DRAIN)	EACH
- (F) THE CONTRACTOR MAY ELECT TO SUBSTITUTE AN APPROVED ALTERNATIVE DESIGN
- (G) DIMENSIONAL AND REINFORCING TOLERANCES WILL BE AS SHOWN IN STANDARD OPERATING PROCEDURE (SOP) 5-3.

- REV. 7-10-12: REVISED ALTERNATE ANCHORS FOR STRUCTURAL STEEL GRATES NOTE.
- REV. 1-10-13: CHANGED REQUIREMENT FOR GRATE ON ALL ENDWALLS.
- REV. 6-14-13: REVISED NOTE (E), ADDED NOTES (F) AND (G).
- REV. 3-16-17: REVISED GENERAL NOTES. ADDED FOOTNOTE TO TABLE.
- REV. 06-28-19: RENAMED AND REDREW SHEET.
- REV. 10-16-20: REVISED SLOT DIMENSION, ADDED ANCHOR BOLT DETAIL AND REVISED 18" PIPE GRATE PLACEMENT DIMENSIONS.
- REV. 03-04-21: REVISED GENERAL NOTES (A), (B) AND (C).
- REV. 10-29-21: ADDED GENERAL NOTE (E).
- REV. 07-07-23: REVISED GENERAL NOTE (D).

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED

STATE OF TENNESSEE  
STANDARD DRAWING  
DEPARTMENT OF TRANSPORTATION

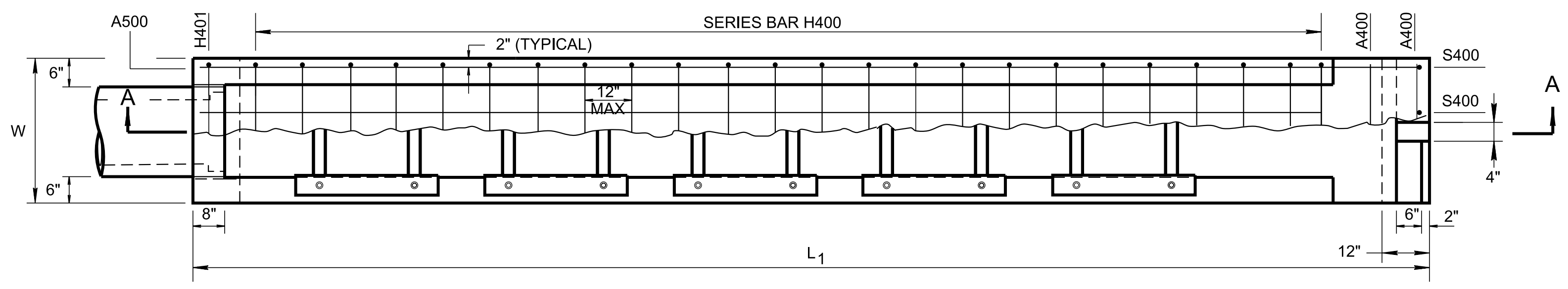
TYPE "SAFETY"  
SIDE DRAIN ENDWALL  
WITH  
STEEL PIPE GRATE,  
FOR 15" THRU 48" PIPES,  
6:1 SLOPE

**ALTERNATE ANCHORS FOR STRUCTURAL STEEL GRATES**

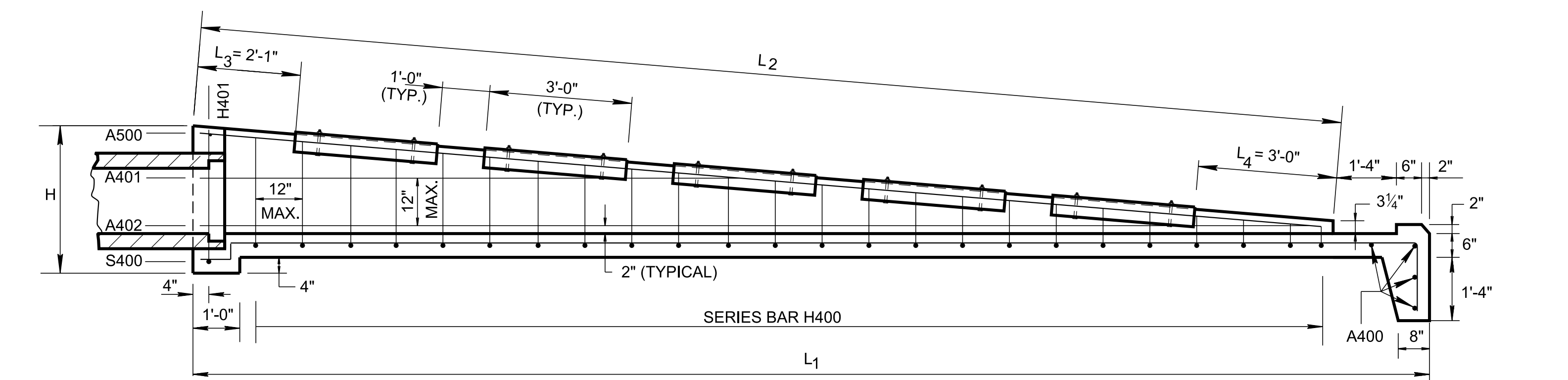
CERTIFICATION:  
DRILLED-IN EPOXY ANCHORS OR CAST-IN THREADED INSERTS MAY BE UTILIZED IN LIEU OF CAST-IN HEADED ANCHOR BOLTS PROVIDED THAT THE CONTRACTOR FURNISHES CERTIFIED ANCHOR PULL OUT DATA FROM AN INDEPENDENT TESTING LABORATORY USING CLASS "A" CONCRETE AS PRESCRIBED BY TENNESSEE HIGHWAY SPECIFICATIONS. THE REQUIRED ULTIMATE LOAD FOR 5/8" DIAMETER ANCHORS IS 10,000 POUNDS.



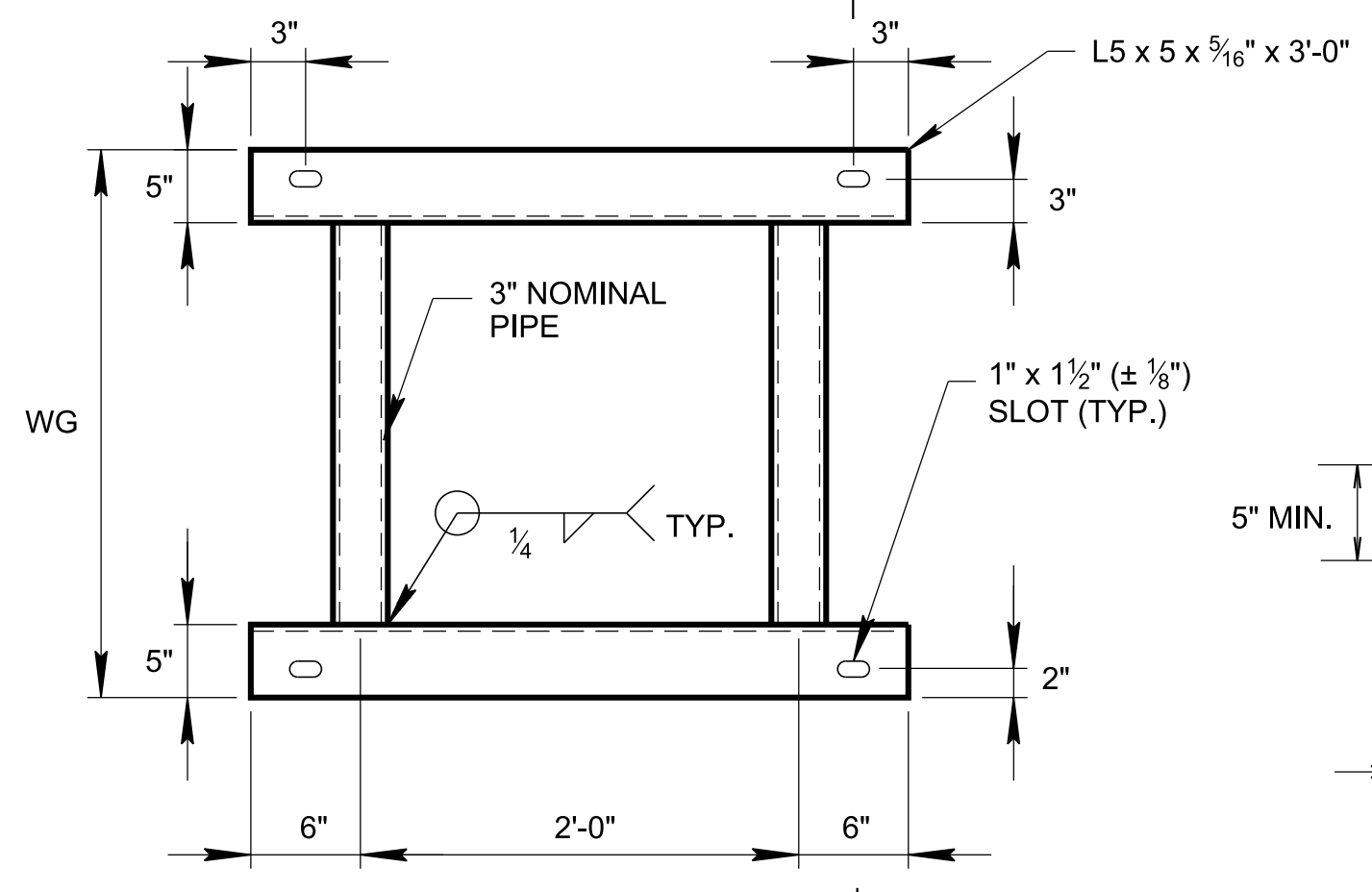
7/5/2023 2:36:48 PM P:\StandDraw\DESIGN STANDARDS\Standards Drawings\Standard Roadway Drawings - CURRENT\In Progress\10-101.00 Pipe Culverts and Endwalls IP\101.03 Safety Side Drain Endwalls IP\DSEW12D-2-



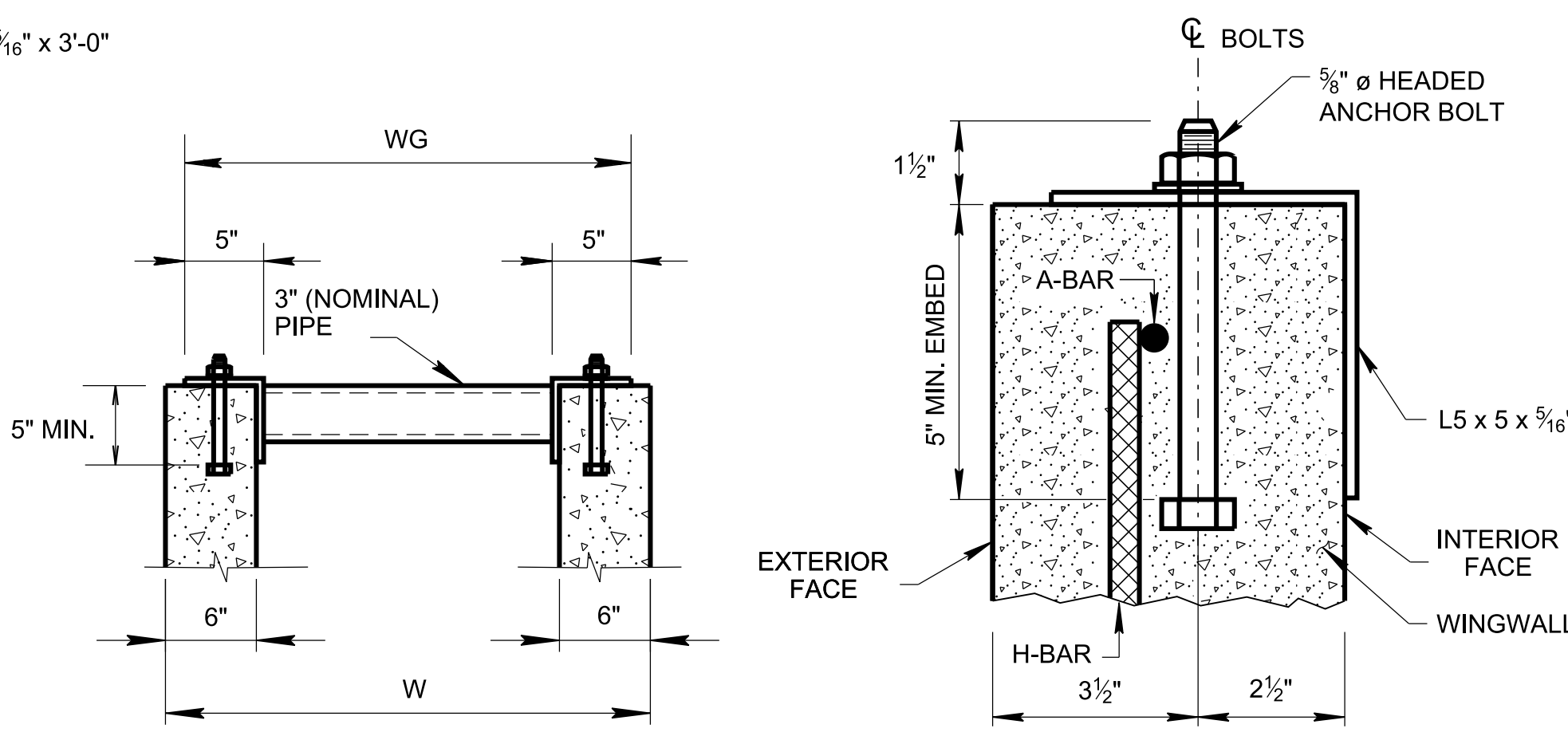
PLAN



SECTION A-A

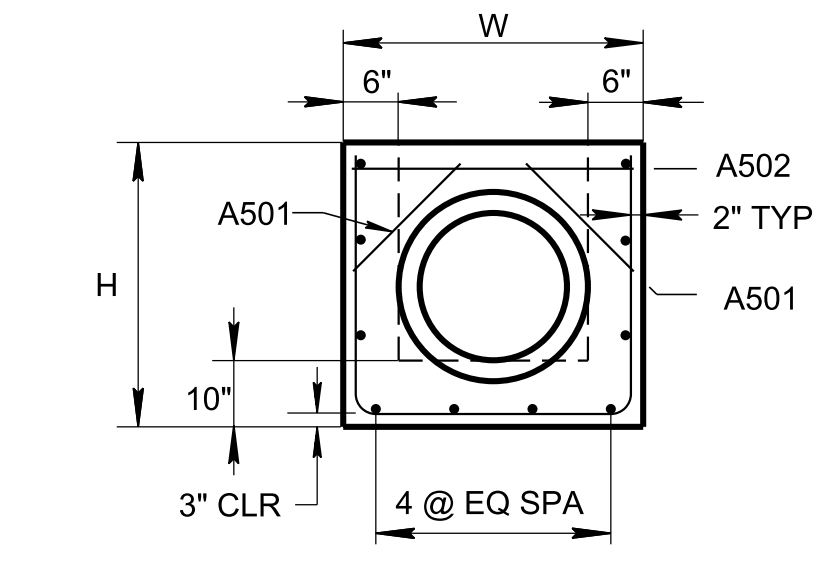


PLAN

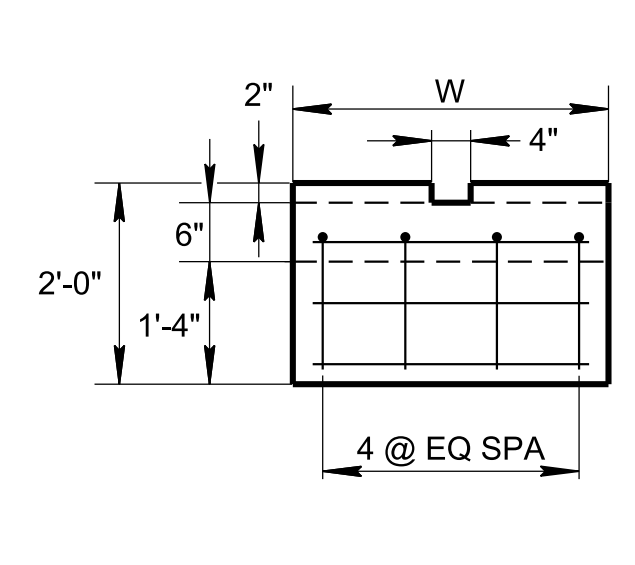


SECTION B-B SHOWING ANCHOR BOLTS AND PARTIAL WINGWALLS

ANCHOR BOLT ASSEMBLY



HEADWALL ELEVATION



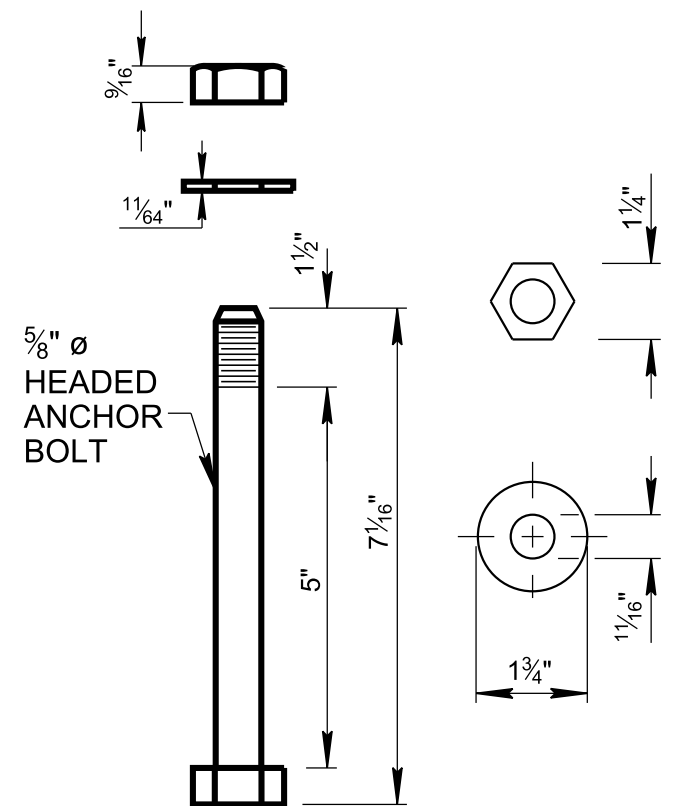
TOEWALL ELEVATION

PIPE CULV. DIA.	CONCRETE ENDWALL DIMENSIONS						STRUCTURAL STEEL GRATE DIMENSION AND QUANTITY		ESTIMATED QUANTITIES		
	H	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	W	WG	NO. REQ'D	CLASS "A" CONCRETE CU. YD.	STEEL BAR REINF. LB.	STRUCT. STEEL LB.
18"	3'-1 1/4"	26'-0"	24'-1"	2'-1"	3'-0"	3'-1"	2'-10"	5	2.84	256	480

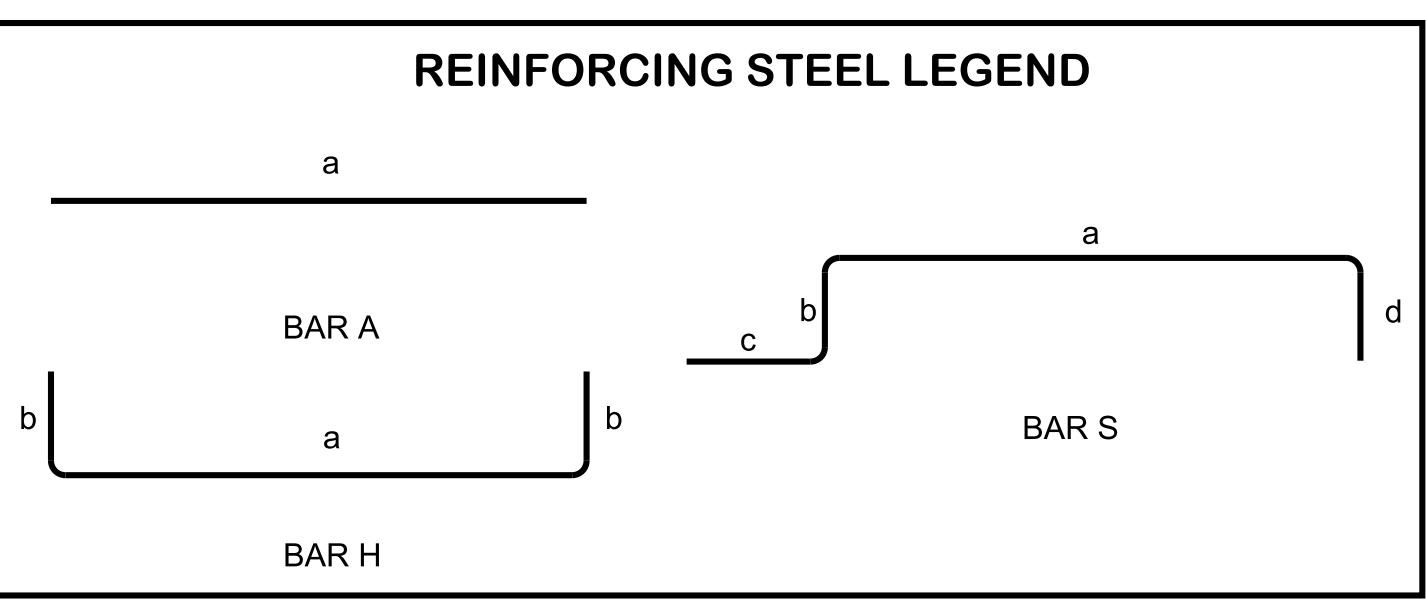
**ALTERNATE ANCHORS FOR STRUCTURAL STEEL GRATES**

CERTIFICATION: DRILLED-IN EPOXY ANCHORS OR CAST-IN THREADED INSERTS MAY BE UTILIZED IN LIEU OF CAST-IN HEADED ANCHOR BOLTS PROVIDED THAT THE CONTRACTOR FURNISHES CERTIFIED ANCHOR PULL OUT DATA FROM AN INDEPENDENT TESTING LABORATORY USING CLASS "A" CONCRETE AS PRESCRIBED BY TENNESSEE HIGHWAY SPECIFICATIONS. THE REQUIRED ULTIMATE LOAD FOR 5/8" DIAMETER ANCHORS IS 10,000 POUNDS.

NOTE: BOLTS SHALL NOT EXTEND MORE THAN 1/2" ABOVE TOP OF NUTS.



ANCHOR BOLT DETAIL



REINFORCING STEEL CODE

TYPE	SIZE	SERIES
A	5	06

DIMENSIONS SHOWN ON THIS SHEET ARE OUTSIDE TO OUTSIDE OF BAR.  
STANDARD C.R.S.I. HOOK DETAILS SHALL APPLY, EXCEPT AS NOTED.

BILL OF STEEL						
BAR TYPE	LOCATION	18" PIPE				LENGTH
		BENDING DIMENSIONS				
		a	b	c	d	
A400	TOEWALL	2'-9"				4 2'-9"
A401	WINGWALLS	10'-0 1/2"				2 10'-0 1/2"
A402	WINGWALLS	23'-6"				2 23'-6"
A500	WINGWALLS	23'-8"				2 23'-8"
A501	HEADWALL	1'-8 5/8"				2 1'-8 5/8"
A502	HEADWALL	2'-9"				1 2'-9"
H400	BOTTOM SLAB AND WINGWALL	2'-9"	*			1 102'-11"
		* DIMENSION "b" VARIES FROM 2'-2 1/8" TO 0'-4 7/8" IN INCREMENTS OF 0'-1" (23 BARS)				
H401	BOTTOM SLAB AND HEADWALL	2'-9"	2'-7 7/8"			1 8'-0 3/4"
S400	BOTTOM SLAB AND TOEWALL	25'-2"	0'-4 1/2"	0'-6"	1'-4"	4 27'-4 1/2"

**GENERAL NOTES**

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

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

- ANGLES ASTM A36
- STEEL PIPE ASTM A53 GRADE B, STANDARD WEIGHT (SW) OR ASTM A500 GRADE B.
- WELDING AASHTO/AWS D1.5M/D1.5 BRIDGE WELDING CODE (LATEST EDITION)
- ALL STEEL GRATES SHALL BE GALVANIZED.
- PIPES ARE TO BE VENTED PER GALVANIZATION REQUIREMENTS. HOLE SIZE AND LOCATIONS WILL BE DETERMINED BY GALVANIZER DURING THE APPLICATION.

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

- BOLTS, NUTS AND WASHERS ASTM F1554 GRADE 36
- GALVANIZING ASTM A153

(D) THE INCIDENTAL ITEMS NECESSARY TO COMPLETE THE INSTALLATION AND FURNISHING OF THE STEEL PIPE GRATE, INCLUDING ALL MATERIALS, LABOR, AND HARDWARE, SHALL BE INCLUDED IN THE BID PRICE FOR THE SIDE DRAIN ENDWALL.

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

(F) PAYMENT WILL BE MADE UNDER:

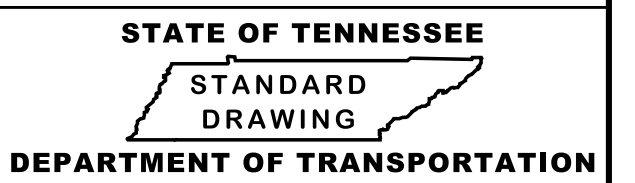
611-07.73 18IN ENDWALL (MEDIAN DRAIN) EACH.

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

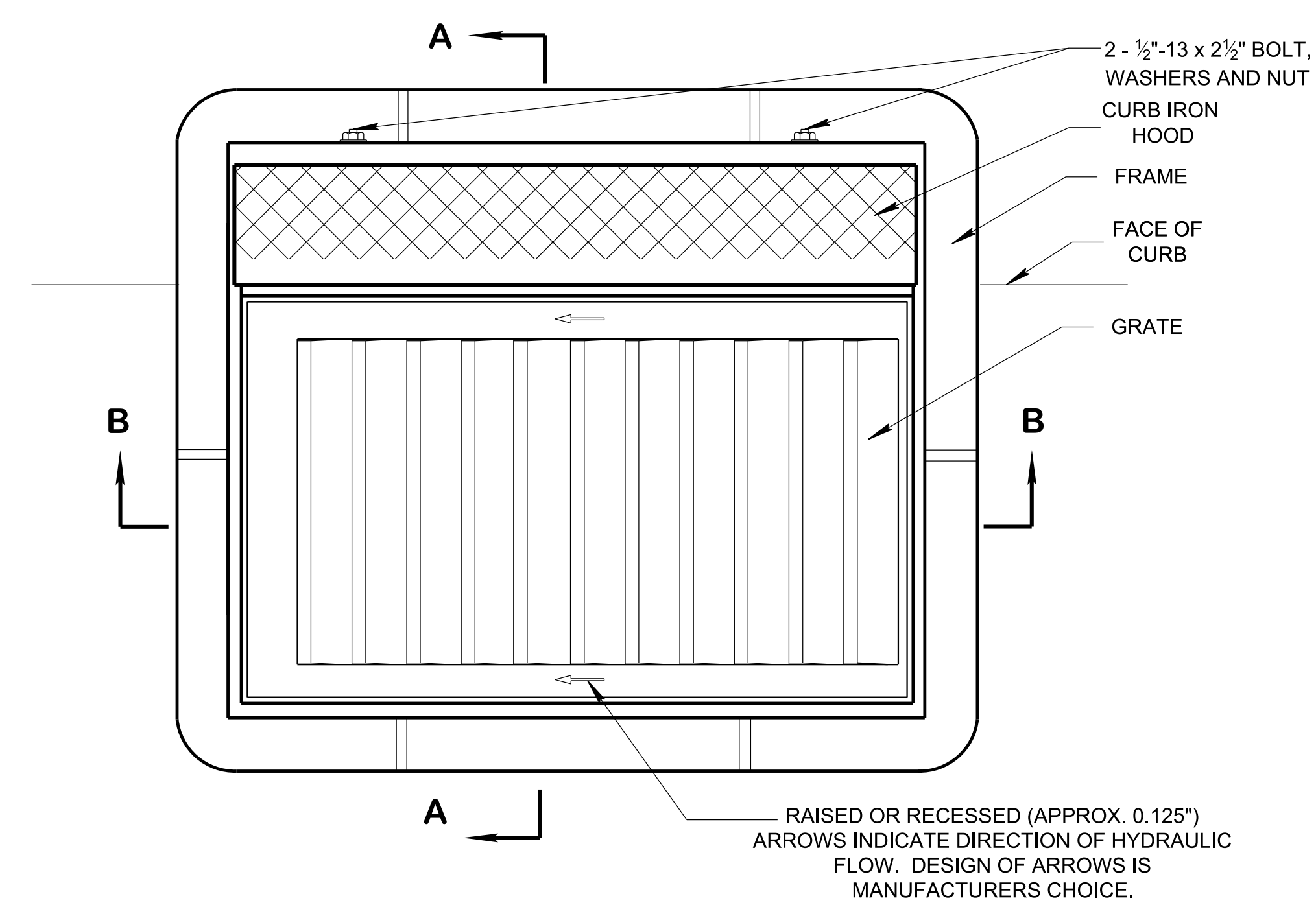
(H) DIMENSIONAL AND REINFORCING TOLERANCES WILL BE AS SHOWN IN STANDARD OPERATING PROCEDURE (SOP) 5-3.

- REV. 7-29-92: REDREW, RENAMED AND REORGANIZED SHEET. CHANGED SHEET NUMBER FROM D-PE-12 TO D-SEW-12D. CHANGED ENDWALL FROM TYPE "U" TO TYPE "SD". UPDATED SPECIFICATIONS IN THE GENERAL NOTES. CORRECTED DIMENSIONS AND ESTIMATED QUANTITIES IN THE DIMENSION AND QUANTITY BLOCK. CORRECTED DIMENSIONS IN BILL OF STEEL.
- REV. 10-26-95: IN GENERAL NOTE (B) CHANGED MINIMUM WALL THICKNESS FROM 0.25" TO 0.216".
- REV. 1-19-97: CHANGED WEIGHT OF STRUCTURAL STEEL GRATES.
- REV. 5-27-99: CHANGED PAINT SPECIFICATION TO TT-E-489J.
- REV. 4-15-00: MODIFIED TOE WALL AND CLASS "A" CONCRETE QUANTITIES.
- REV. 5-27-01: CHANGED DESCRIPTION FOR ITEM NO. 611-07.03.
- REV. 6-1-09: ADDED GENERAL NOTE (F).
- REV. 7-19-10: DELETED GENERAL NOTE (F).
- REV. 3-1-12: REVISED REINFORCING STEEL, BILL OF STEEL, REINFORCING STEEL LEGEND, STEEL GRATE, ANCHOR BOLT DETAIL, ESTIMATED QUANTITIES FOR CLASS "A" CONCRETE, STEEL BAR REINF. & STRUCTURAL STEEL. REVISED GENERAL NOTES AND NOTE FOR ALTERNATE DRILLED IN ANCHORS.
- REV. 6-14-13: REVISED GENERAL NOTE (F) ADDED NOTES (G) AND (H).
- REV. 06-28-19: RENAMED AND REDREW SHEET.
- REV. 10-16-20: REMOVED 15" PIPE INFORMATION, REVISED SLOT DIMENSION, ADJUSTED (L4) AND (L3) DIMENSIONS, CHANGED NUMBER OF GRATES ON PLAN AND ADDED ANCHOR BOLT DETAIL.
- REV. 03-04-21: REVISED GENERAL NOTE (B).
- REV. 10-29-21: ADDED GENERAL NOTE (B).
- REV. 07-07-23: REVISED GENERAL NOTE (D).

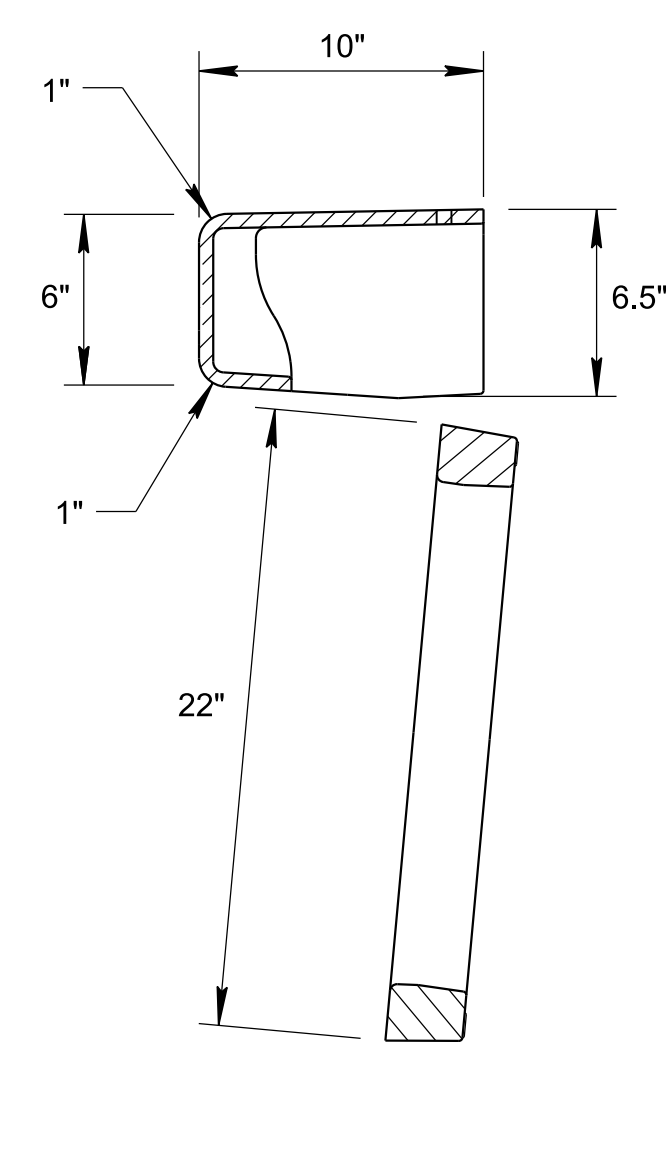
MINOR REVISION -- FHWA APPROVAL NOT REQUIRED



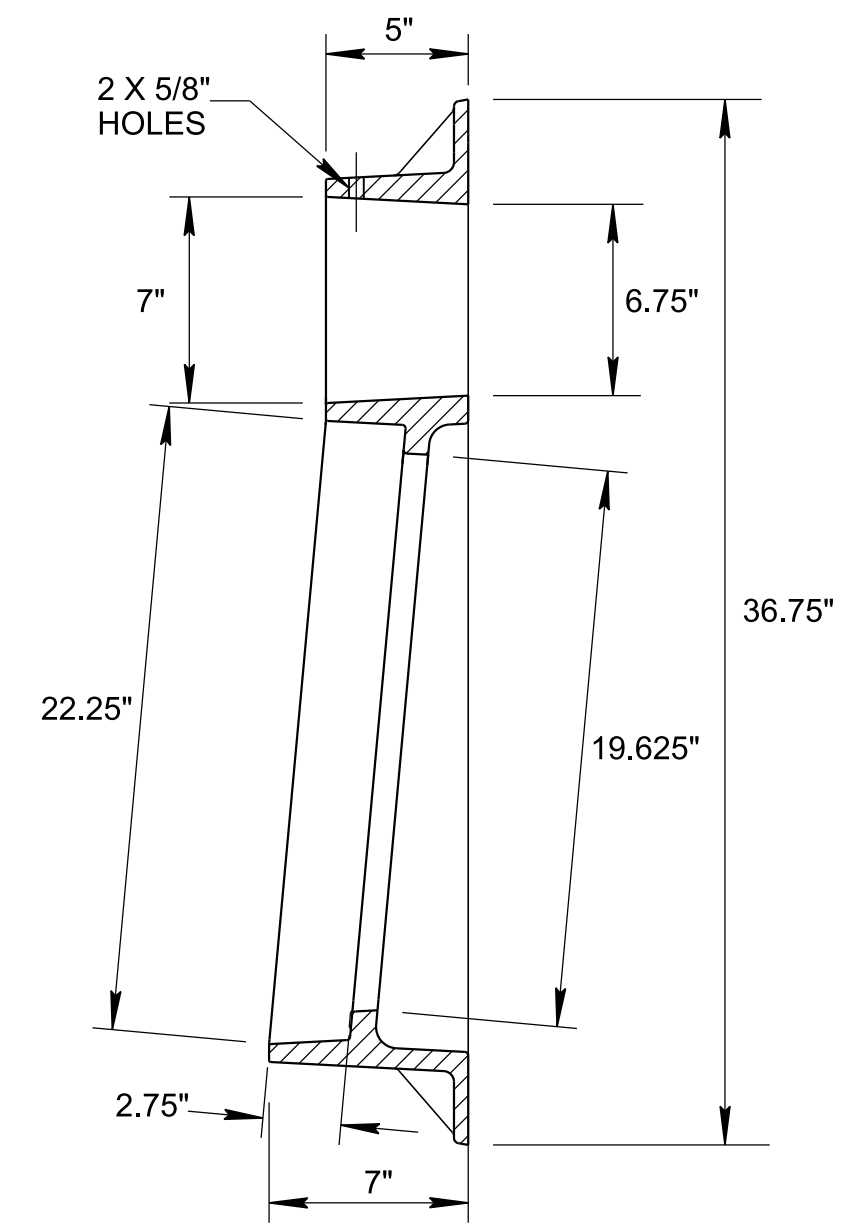
TYPE "SAFETY" SIDE DRAIN ENDWALL WITH STEEL PIPE GRATE, FOR 18" PIPE, 12:1 SLOPE



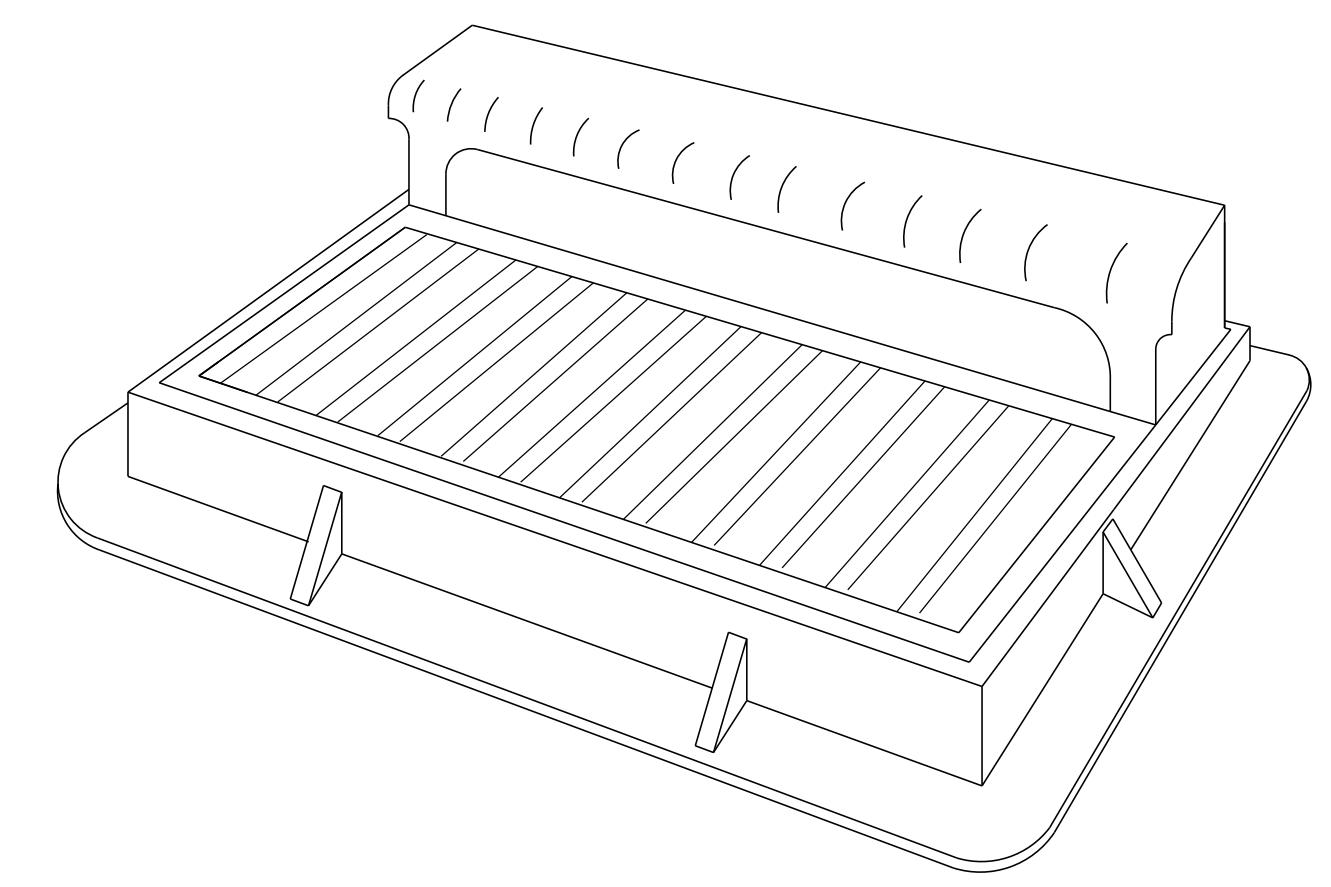
**TOP VIEW**



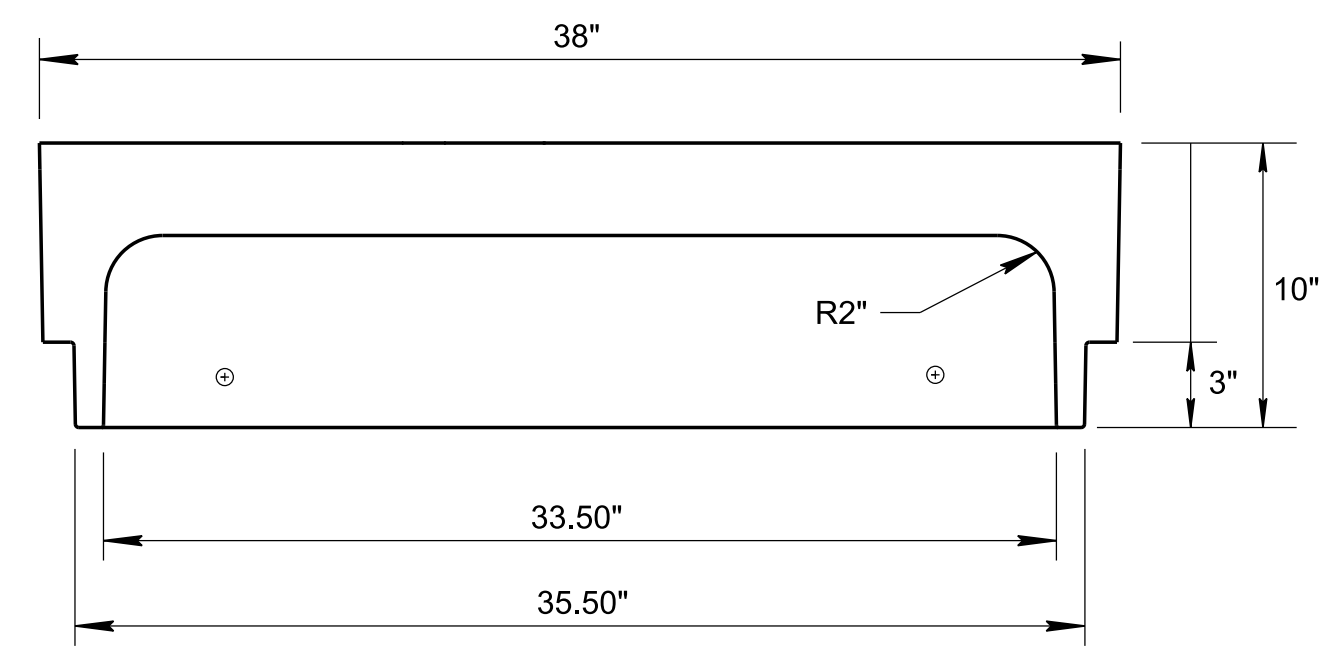
**CURB HOOD AND GRATE DIMENSIONS**



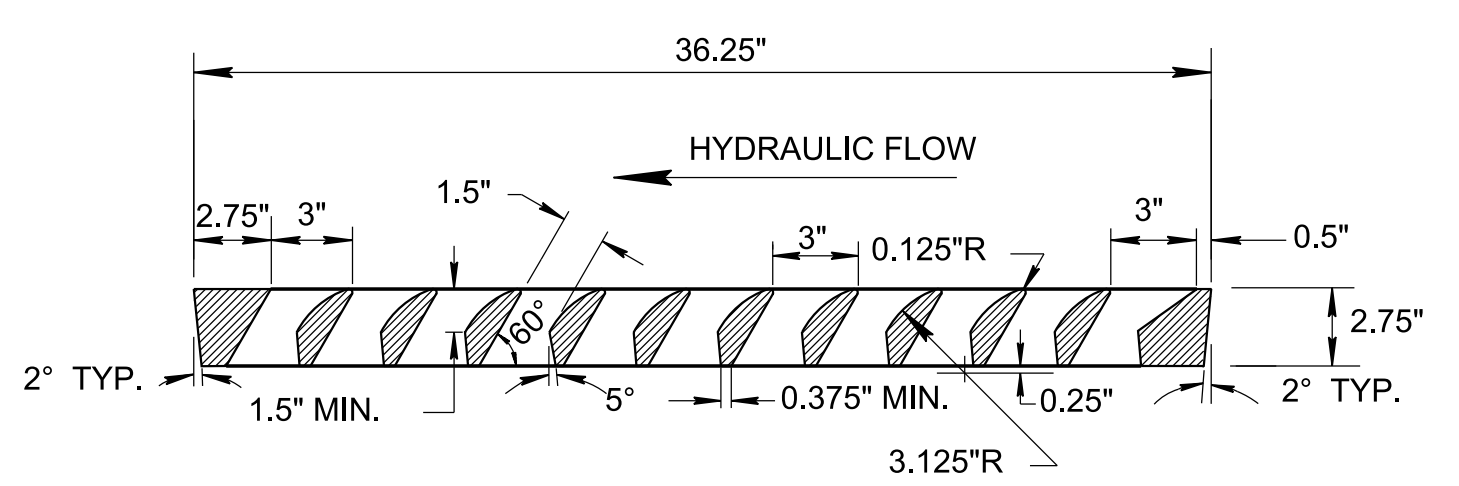
**FRAME DIMENSION**



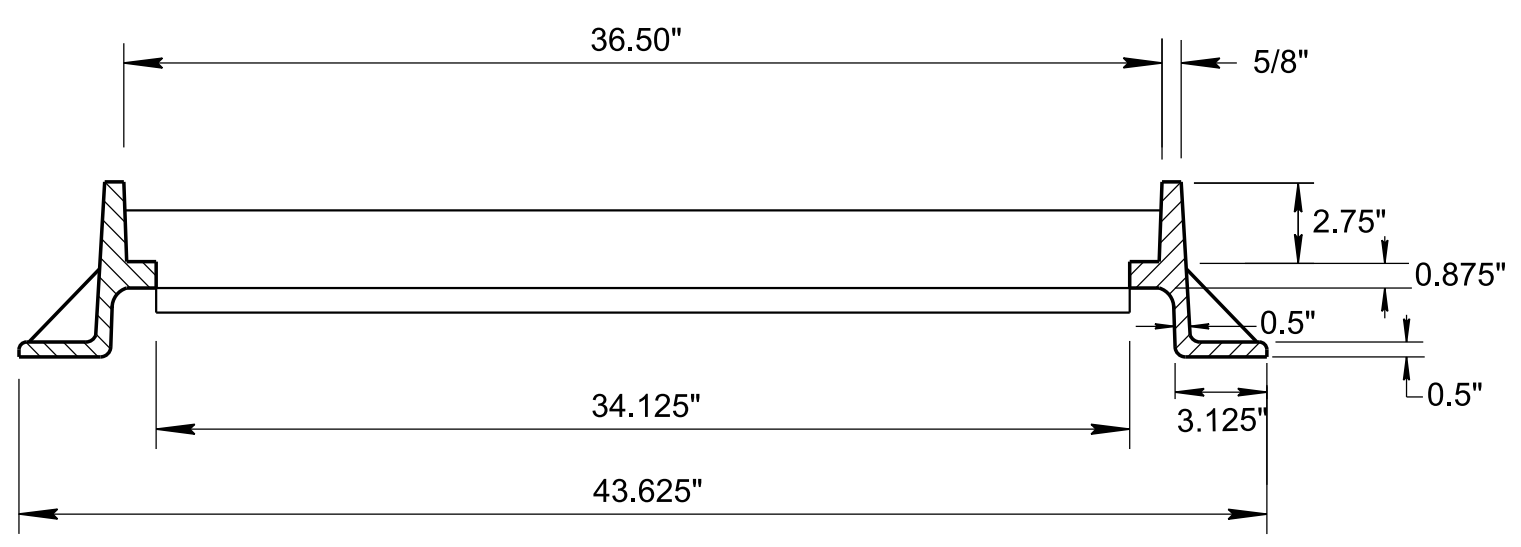
**ISOMETRIC VIEW**



**CURB HOOD DIMENSION**

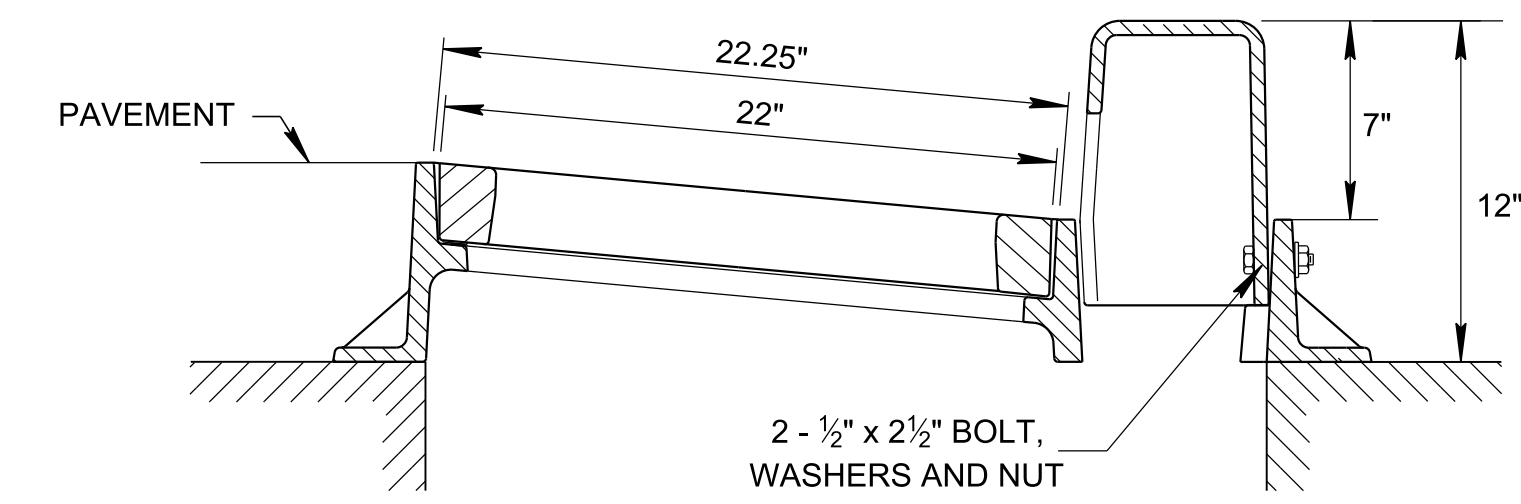


**GRATE DIMENSION**

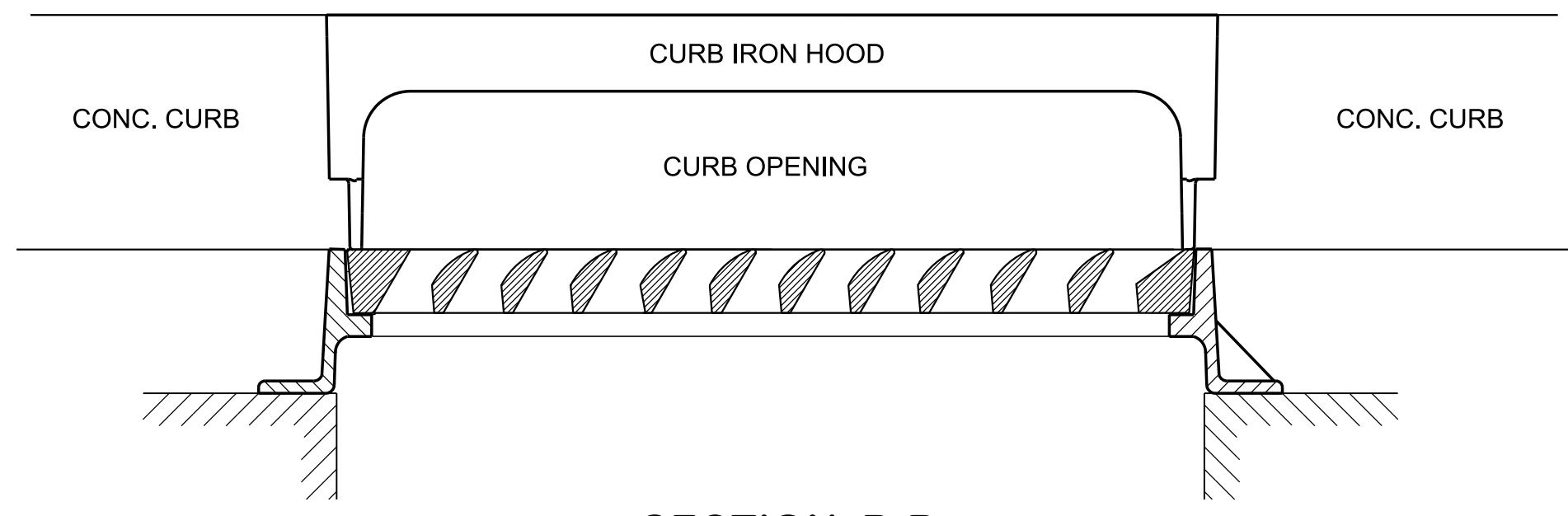


**FRAME DIMENSION**

**FRONT VIEWS**



**SECTION A-A**



**SECTION B-B**

WEIGHTS FOR SINGLE GRATE CATCH BASIN	
FRAME -----	APPROX. 272 LBS.
GRATE -----	APPROX. 245 LBS.
CURB BOX -----	APPROX. 144 LBS.
TOTAL ----- APPROX. 661 LBS.	
CAST GRAY IRON ASTM-48 CLASS 35B H-20/HS-20 LOAD RATING	

**GENERAL NOTES**

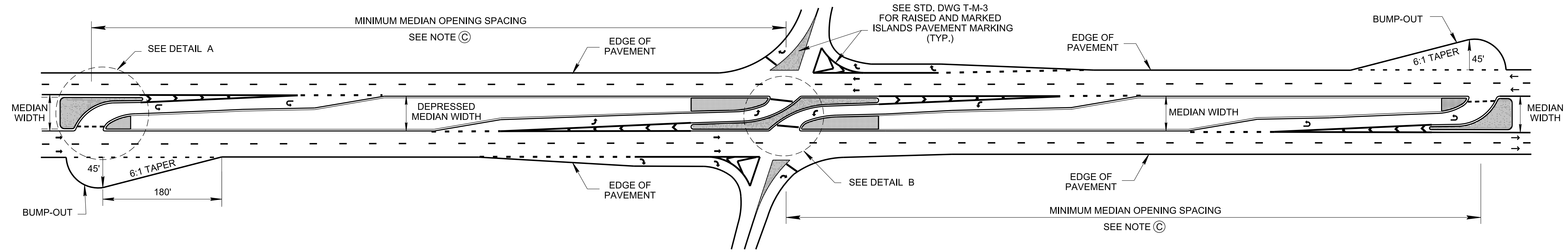
- (A) WHEN A SIX (6) INCH VERTICAL CURB IS REQUIRED USE THIS DRAWING ON ALL VARIATIONS OF NUMBER 12, 14, 16, AND 17 CATCH BASINS CONTAINED IN THIS SECTION OF THE STANDARD DRAWINGS.
- (B) FOR CLEARNESS, ALL CORNERS ARE SHOWN ON THIS DRAWING BY STRAIGHT LINES WITH THE EXCEPTION OF THE 1" RADIUS AT THE TOP OF FACE OF CURB. ALL INSIDE CORNERS SHOULD BE MADE WITH 1/2" x 1/2" FILLETS OR 3/4" RADIUS FILLETS FOR EASE IN MOLDING.
- (C) IF CATCH BASIN IS PAID FOR UNDER EACH, THEN COST OF CAST IRON USED IN CASTINGS IS TO BE PAID FOR UNDER THE SPECIFIC ITEM BID FOR THAT CATCH BASIN. SEE STANDARD DRAWINGS FOR TYPE 12, 14, 16, AND 17 CATCH BASINS FOR APPLICABLE PAY ITEMS FOR EACH TYPE OF CATCH BASIN.
- (D) INLET FRAME, GRATE, AND CURB BOX GRAY IRON CASTINGS SHALL BE MANUFACTURED CONFIRMING TO ASTM A-48 CLASS 35B MEETING 35 KSI, AND AASHTO M306 FOR H-20/HS-20 LOAD RATING. NEENAH FOUNDRY COMPANY HAS DESIGNED THIS OTHER ALTERNATE TYPE "B" CASTINGS.
- (E) IF PAID FOR SEPARATELY, CAST IRON USED IN CASTINGS IS TO BE PAID FOR UNDER ITEM NO.

611-03.04 GRAY IRON CASTINGS (CATCHBASIN) LB.

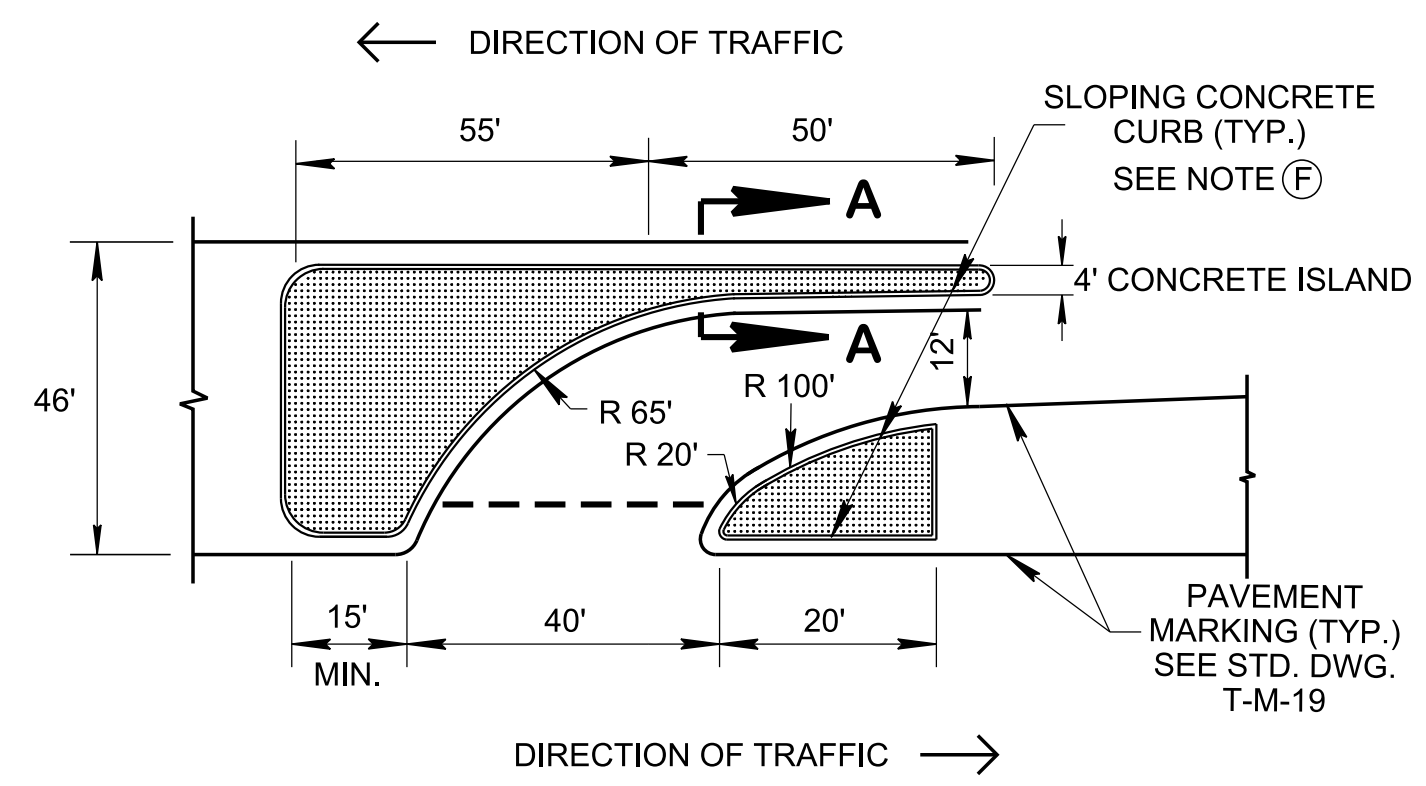
7/6/2023 2:48:58 PM P:\StandDraw\DESIGN STANDARDS\Standards Drawings Library\Standard Roadway Drawings - CURRENT\In Progress\10-102.00 Catch Basins and Manholes IP\102.01 Catch Basins IP\DCBB12D-20230707.dgn

NOT TO SCALE

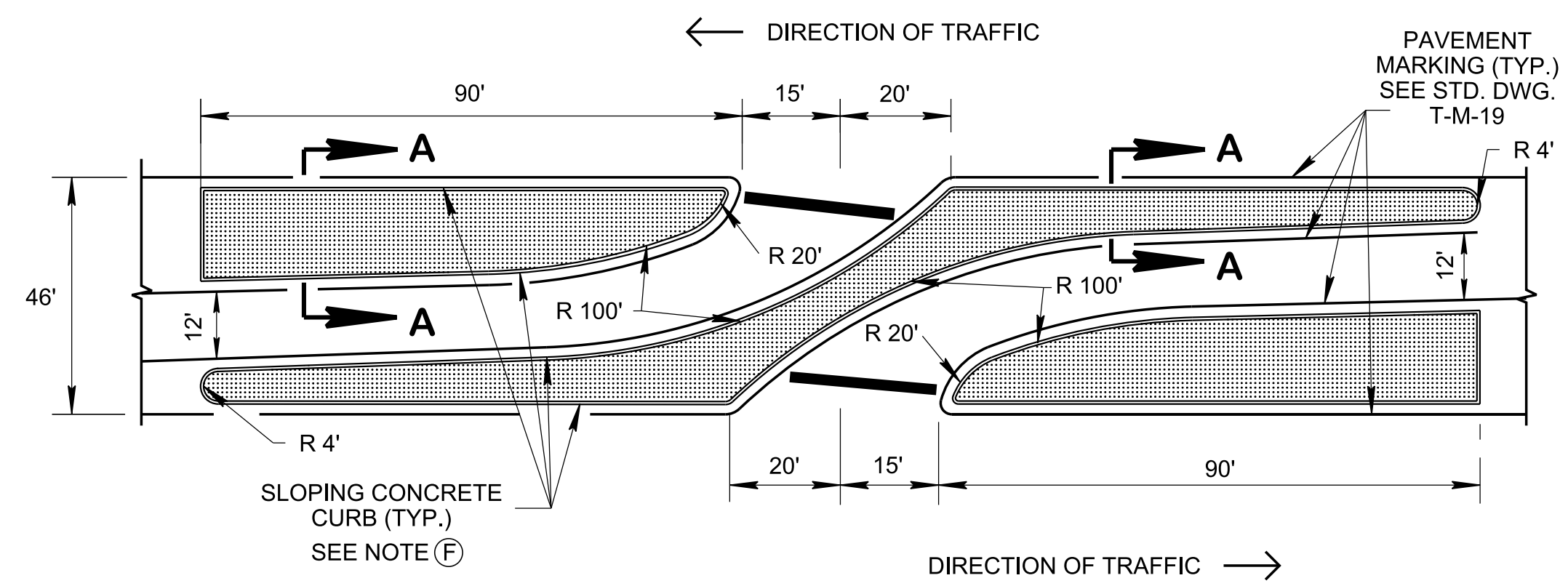




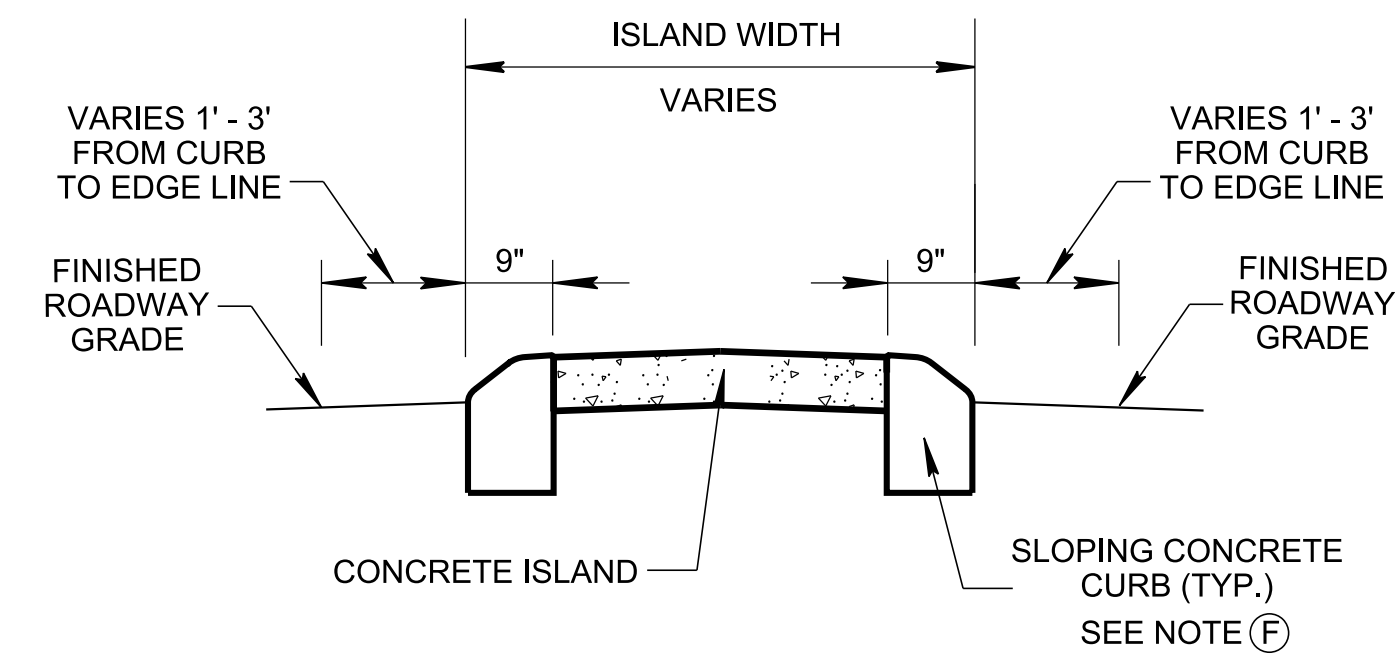
**PLAN VIEW FOR J-TURN AND RESTRICTED CROSSING INTERSECTIONS**



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



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



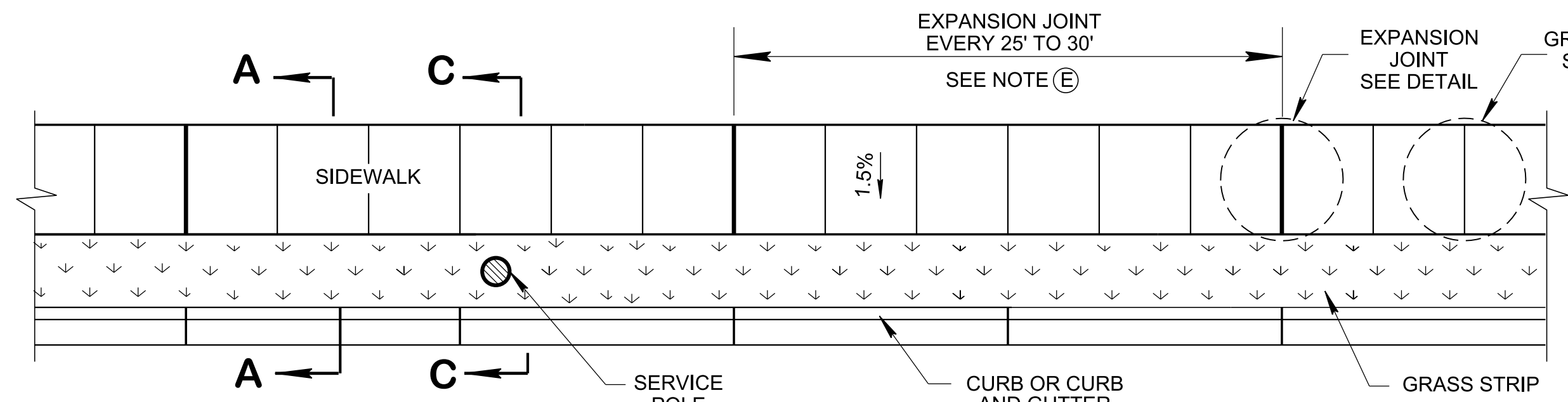
**SECTION A-A**  
**(TYP.)**

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

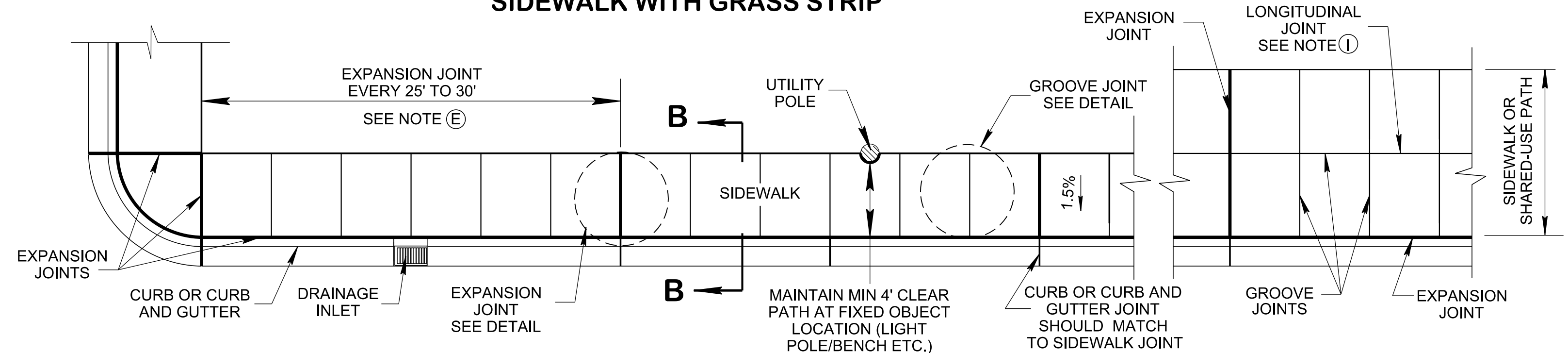
GENERAL NOTES	
(A)	THIS DRAWING SHOWS A DESIGN FOR A 46' MEDIAN WIDTH, ASSUMING 55 MPH POSTED SPEED AND A DESIGN BUMP OUT TO ACCOMMODATE WB-50. WHEN OTHER MEDIAN WIDTHS, DESIGN VEHICLE, AND POSTED SPEEDS ARE USED, ENGINEERING JUDGEMENT SHALL BE USED TO ESTABLISH APPROPRIATE GEOMETRY.
(B)	REFERENCE SHOULD 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.



7/5/2023 2:30:11 PM P:\StandDraw\DESIGN STANDARDS\Standards Drawings\Standard Roadway Drawings - CURRENT\In Progress\10-105.00 Multimodal IP\160.04 Sidewalk IP\MMSW1-20230707.dgn

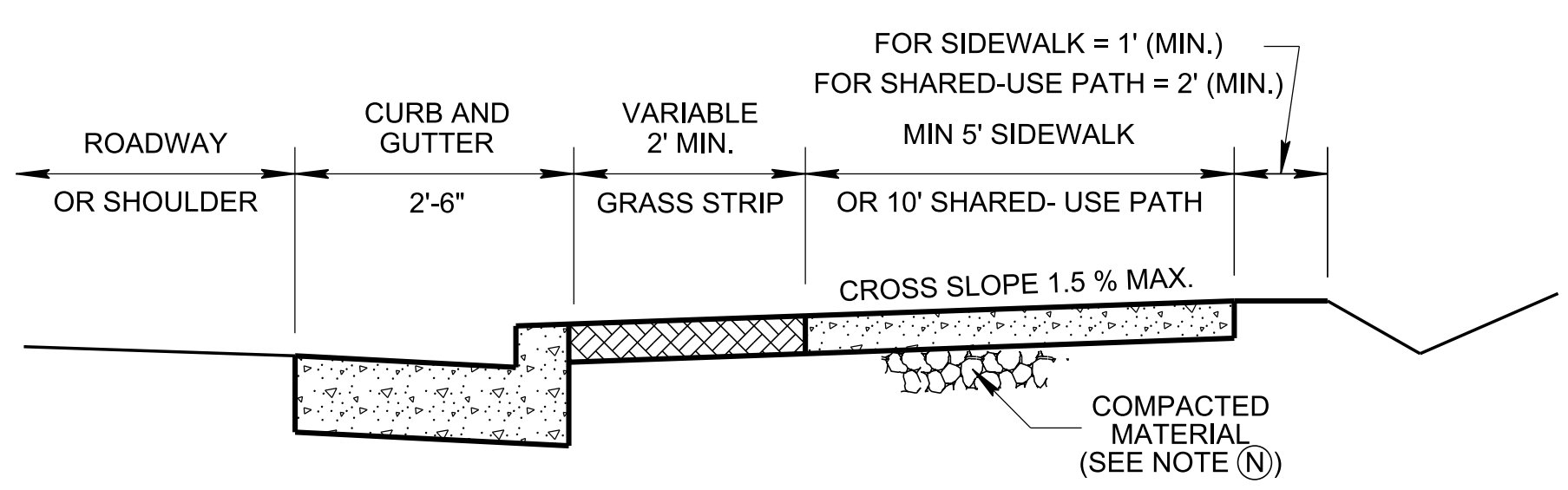


**PLAN VIEW  
SIDEWALK WITH GRASS STRIP**

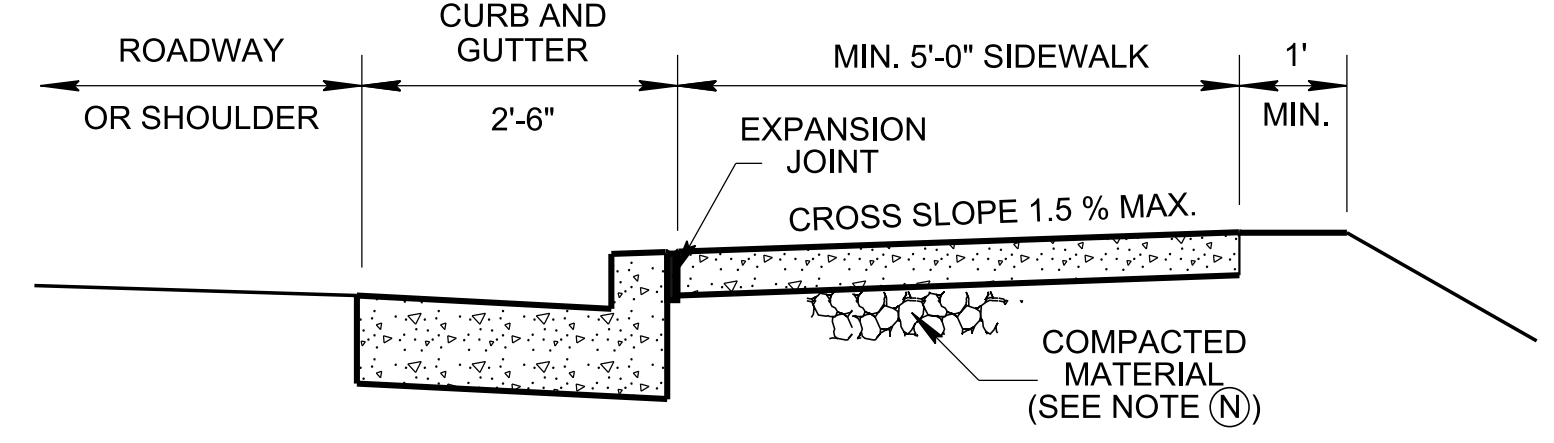


**PLAN VIEW  
SIDEWALK WITHOUT GRASS STRIP**

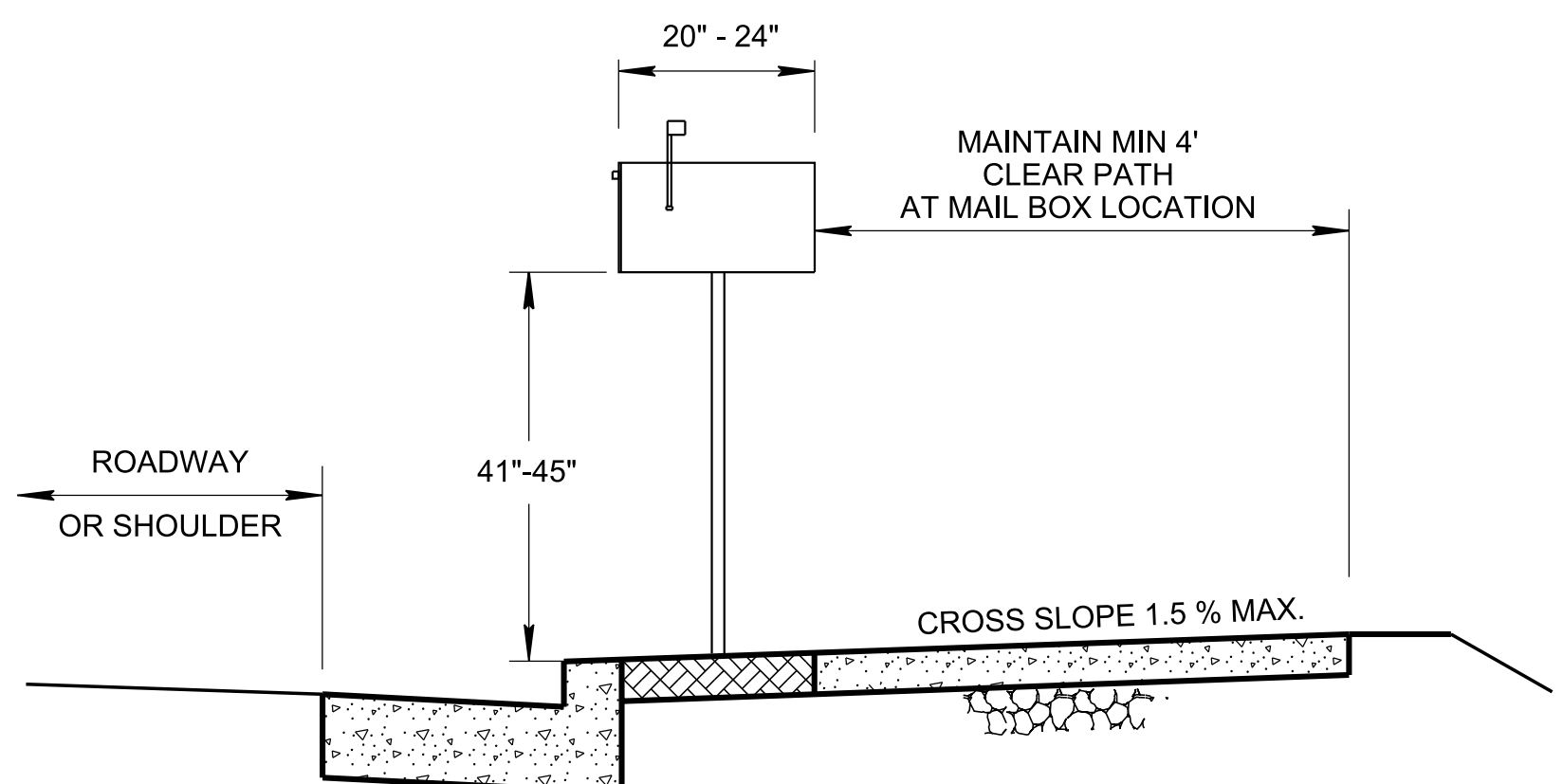
(NOTE: WHEN NEEDED DUE TO EXTREME SITE CONDITIONS THE PLACEMENT OF SERVICE APPURTENANCES SHALL PROVIDE MINIMUM 4' CLEAR PATH.)



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



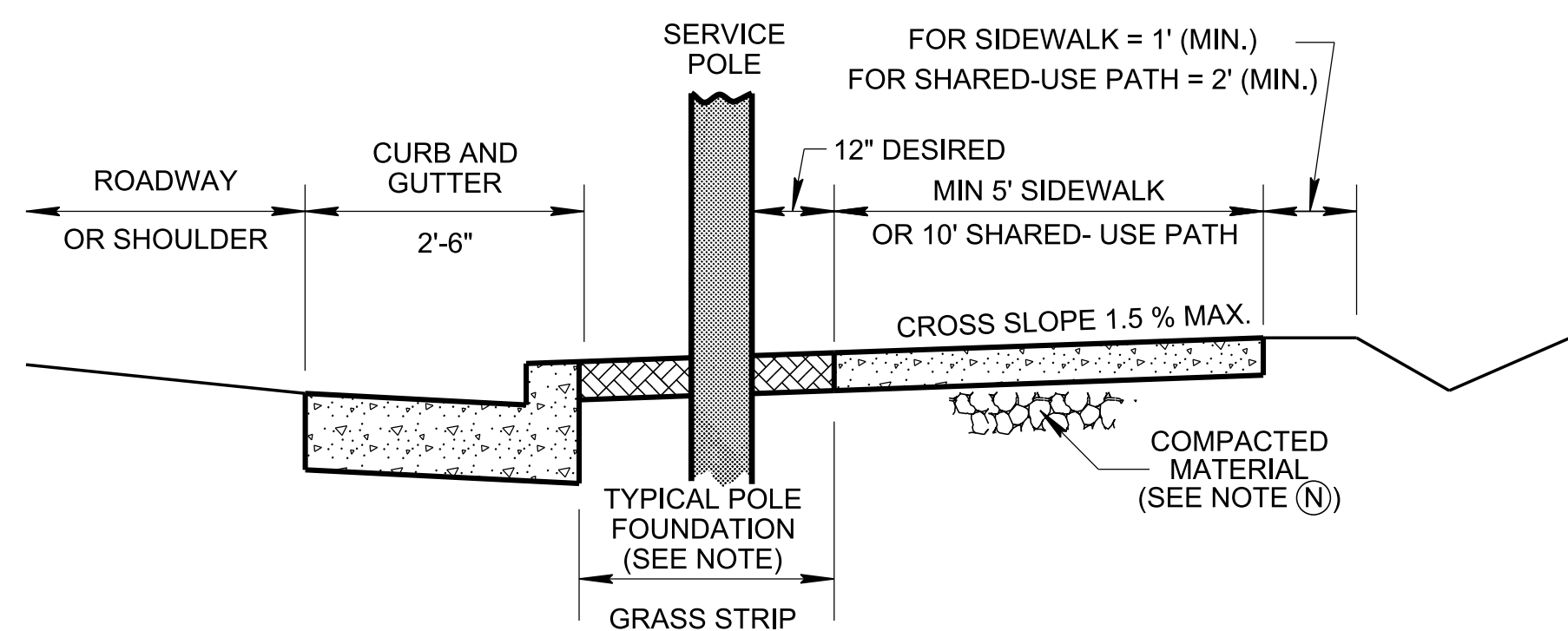
**SECTION B-B  
TYPICAL SIDEWALK CROSS SECTION  
WITHOUT GRASS STRIP**



**MAILBOX DETAIL**

NOTE: EDGE OF MAILBOX SHALL NOT OVERHANG BEYOND THE BACK OF THE CURB. NOR SHALL THE MAILBOX OVERHANG THE SIDEWALK SUCH THAT THE USABLE WIDTH IS LESS THAN 4 FEET.

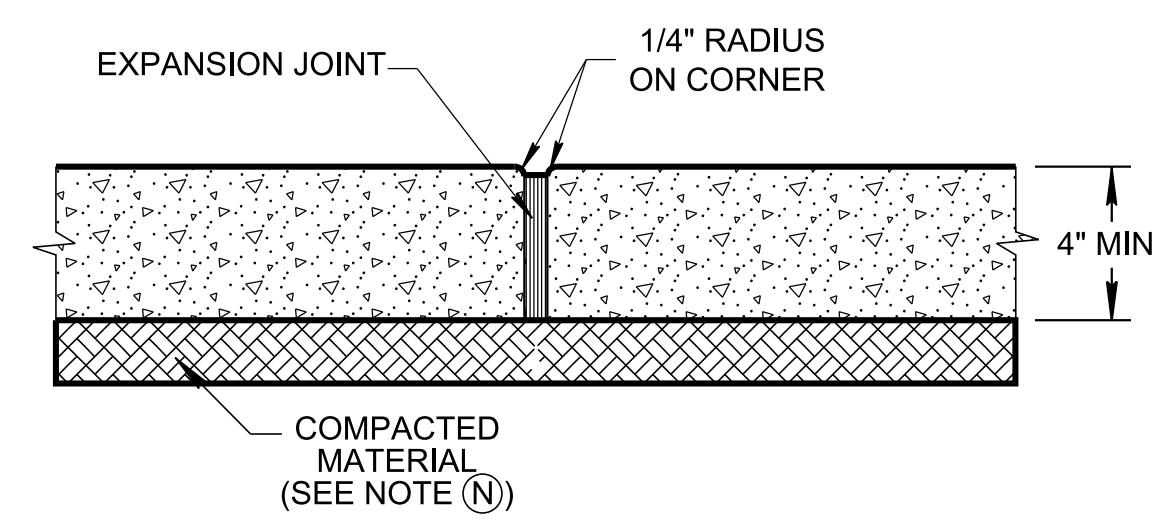
IF NEEDED, REMOVAL AND RESETTING MAILBOXES TO BE INCLUDED IN THE COST OF SIDEWALK.



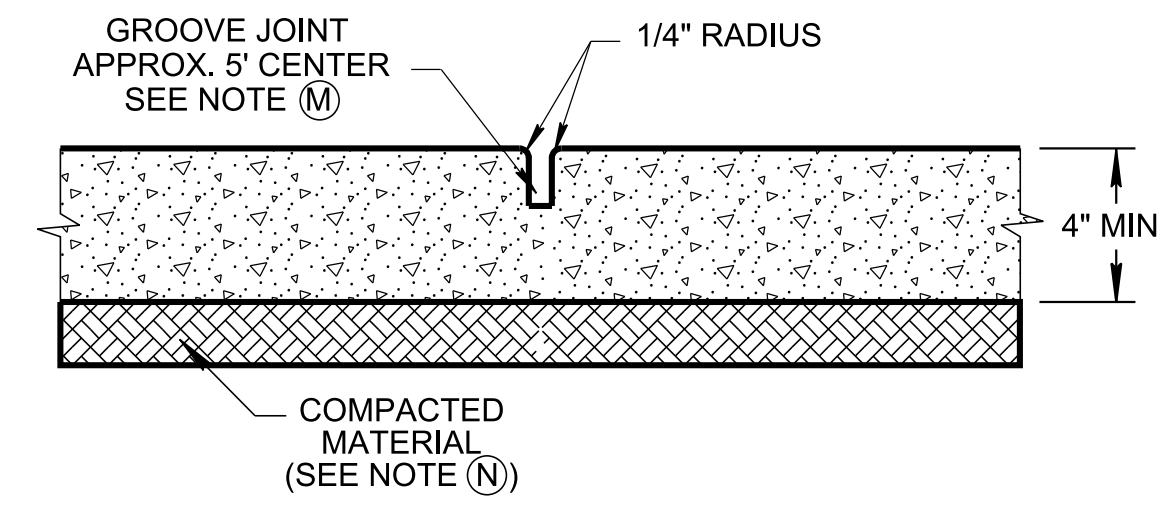
**SECTION C-C  
TYPICAL SIDEWALK CROSS SECTION  
WITH GRASS STRIP AND SERVICE APPURTENANCES**

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.



**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.

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.  
REV. 07-07-2023: REVISED MAILBOX DETAIL AND NOTE.

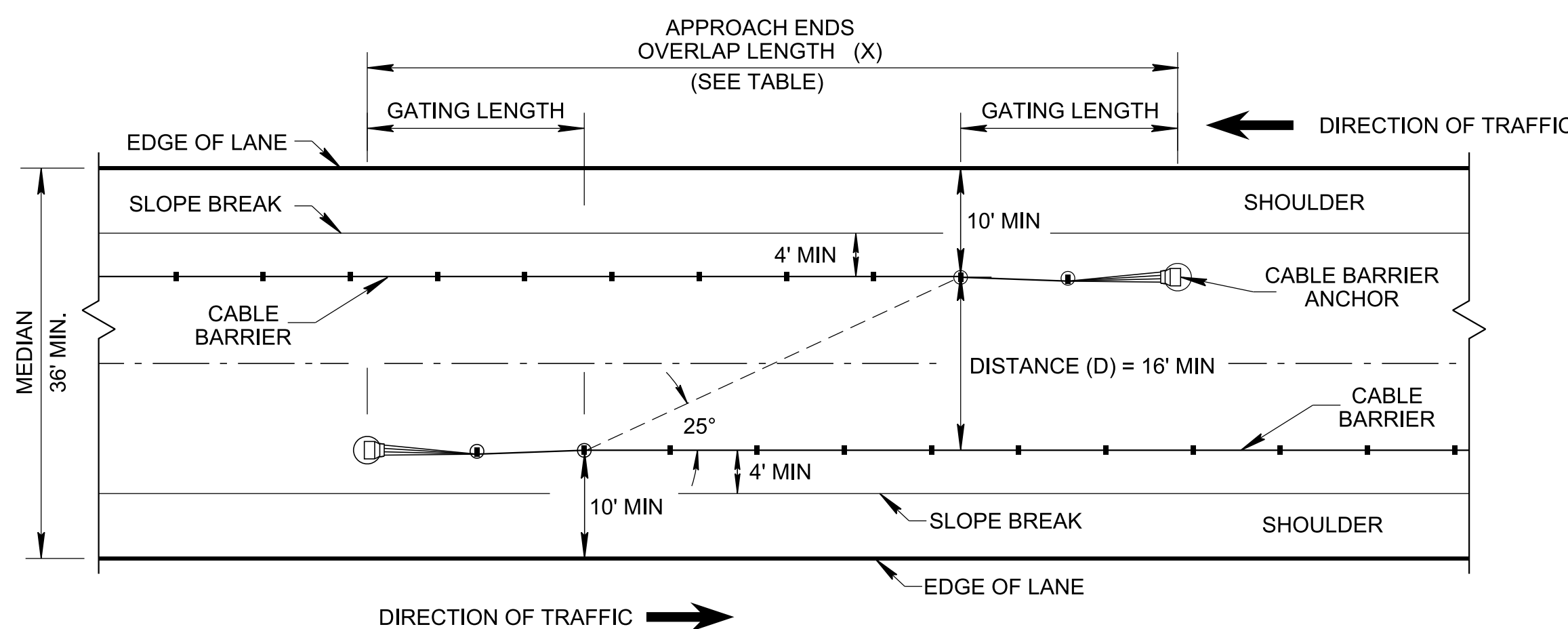
(Replaced Std Dwg RP-S-7)

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

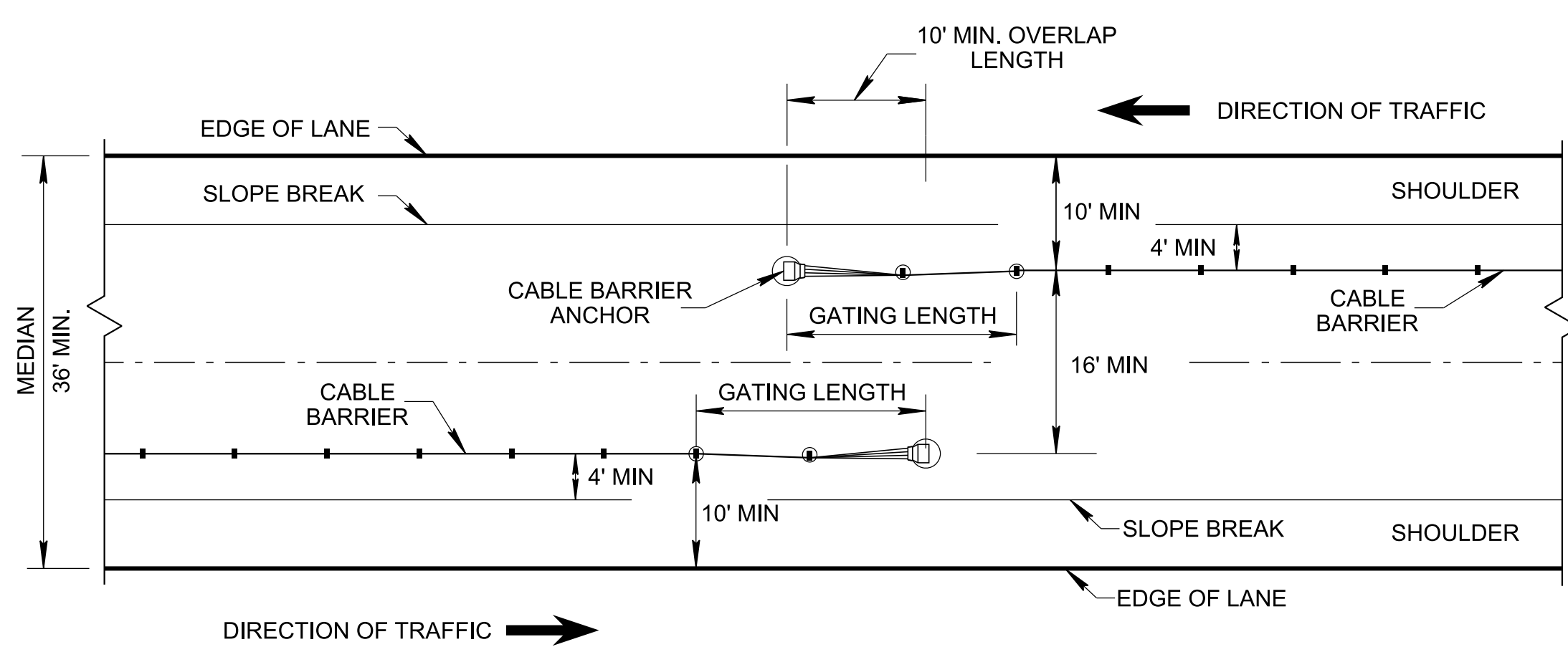
**DETAILS  
FOR  
CONCRETE  
SIDEWALK**

01-07-2019 MM-SW-1

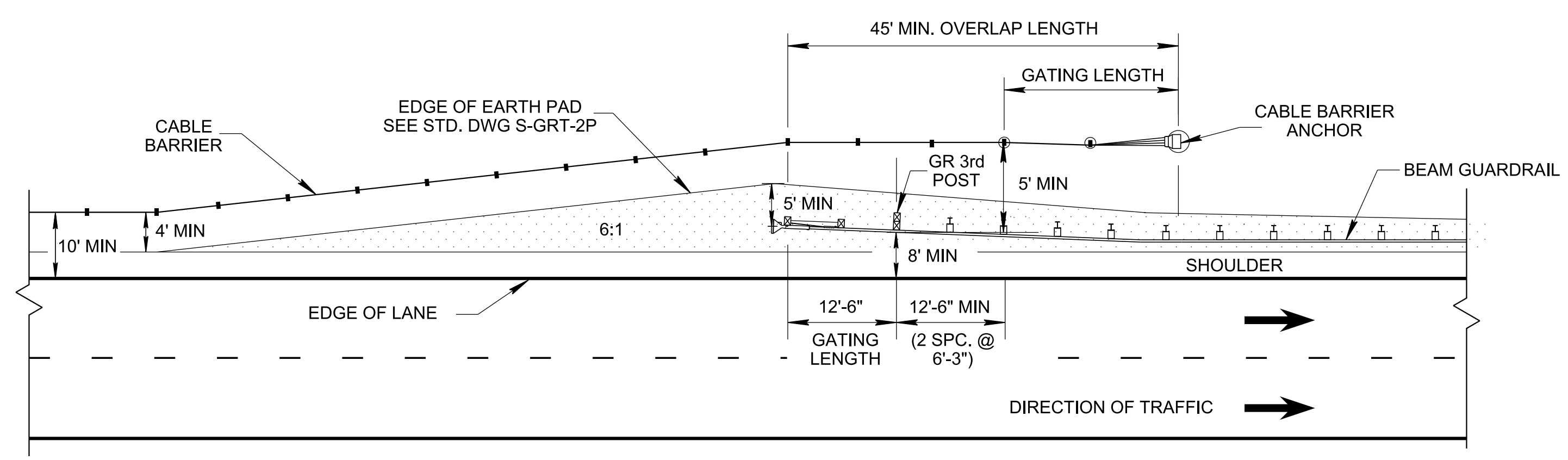
7/14/2023 2:40:42 PM P:\StandDraw\DESIGN STANDARDS\Standards Drawings\Standard Roadway Drawings - CURRENT\In Progress\10-106.00 Safety Design and Guardrails IP\106.02 Cable Barrier IP\SCB1-20230707.dgn



**DETAIL A  
OVERLAP AT APPROACH ENDS OF CABLE BARRIER**



**DETAIL B  
OVERLAP AT TRAILING ENDS OF CABLE BARRIER**  
(USE A MINIMUM OF 10 FEET OVERLAP LENGTH AT TRAILING ENDS OF CABLE BARRIER INSTALLATION.)

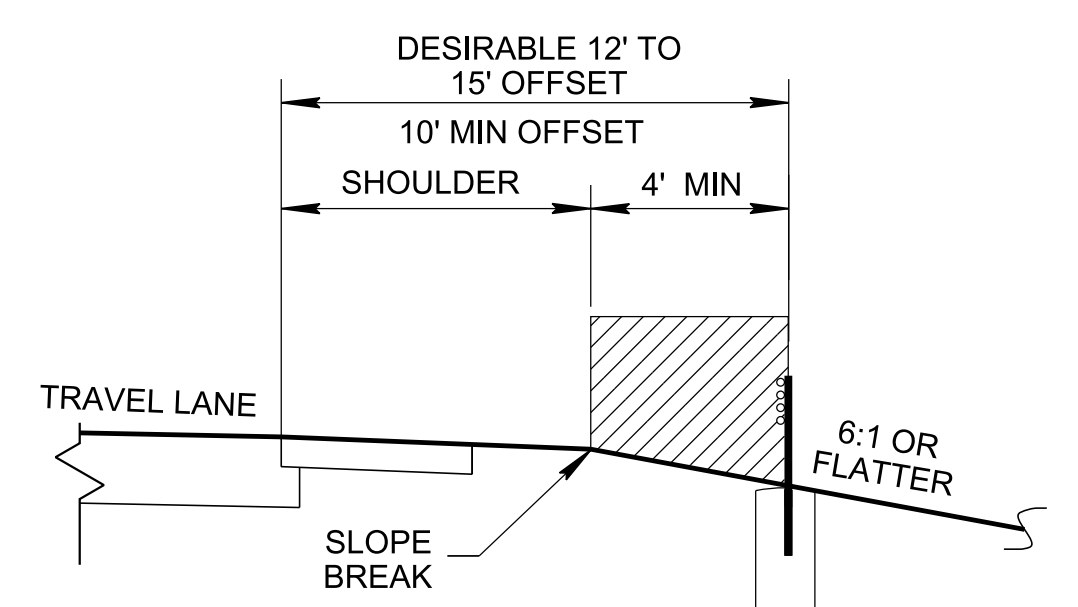


**DETAIL C  
CABLE BARRIER TERMINATION INSTALL BEHIND BEAM GUARDRAIL**

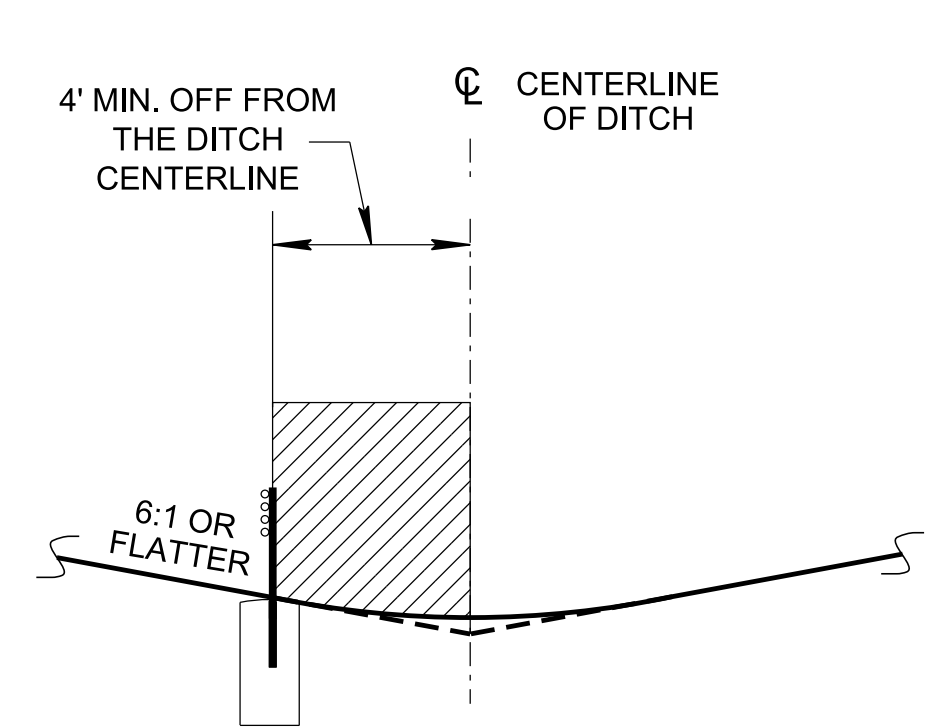
NOTE: TABLE ABOVE REFERS GATING LENGTH OF 20 FEET. FOR CABLE BARRIER GATING LENGTH REFER TO MANUFACTURER SPECIFICATIONS AND SHOP DRAWINGS.

TABLE	
DISTANCE (D) (FT)	APPROACH ENDS OVERLAP LENGTH (X) (LF)
16	75
20	83
24	91
28	100
32	109

$$X (FT) = 2(GATING LENGTH) + \frac{D}{\tan 25^\circ}$$

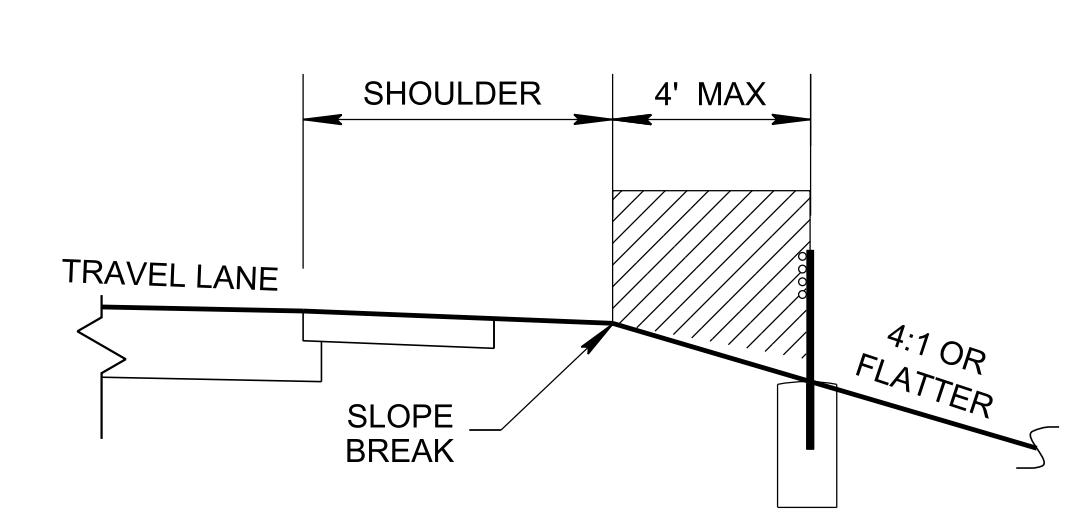


**CABLE BARRIER PLACEMENT  
NEAR SLOPE BREAK**

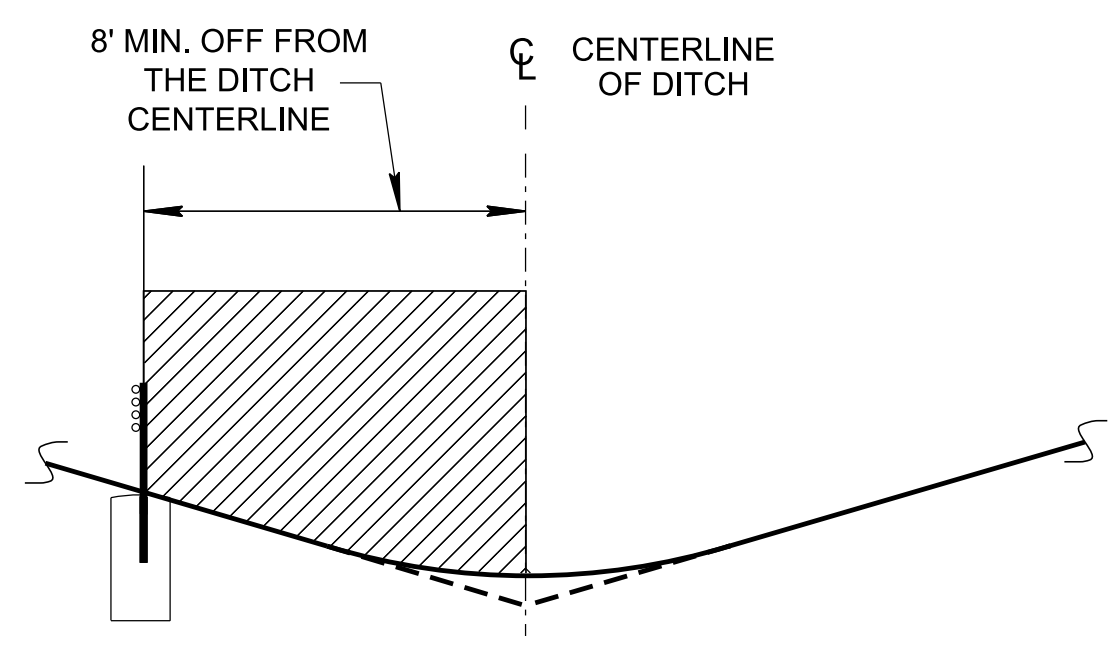


**CABLE BARRIER PLACEMENT  
NEAR DITCH BOTTOM  
(PREFERRED PLACEMENT LOCATION)**

**FOR FILL SLOPES 6:1 OR FLATTER**



**CABLE BARRIER PLACEMENT  
NEAR SLOPE BREAK**



**CABLE BARRIER PLACEMENT  
NEAR DITCH BOTTOM  
(PREFERRED PLACEMENT LOCATION)**

**FOR FILL SLOPES 4:1 MAX**

**TYPICAL PLACEMENT LOCATIONS FOR CABLE MEDIAN BARRIER**  
(MINIMUM WIDTH SHOWN (B))

**LEGEND** CABLE BARRIER INSTALLATION  
 NOT PERMITTED

**GENERAL NOTES**

- (A) CABLE BARRIERS SHOULD BE CONSIDERED ALONG ROADWAYS WITH DEPRESSED MEDIANS THAT HAVE LOCATIONS THAT: EXPERIENCE HIGHER ROADWAY DEPARTURE RATES, HAVE HIGH ADTS WITH A HISTORY OF MEDIAN CROSSOVERS, AND WHERE A TRAFFIC ENGINEER'S ANALYSIS JUSTIFIES CABLE BARRIERS.
- (B) CABLE BARRIER SHOULD BE USED ON DEPRESSED MEDIANS WIDER THAN 36 FEET.
- (C) CABLE BARRIER ANCHORS MAY VARY IN LENGTH AND DO NOT PROVIDE ANY REDIRECTIVE CAPACITY.
- (D) CABLE BARRIERS SHOULD NOT BE INSTALLED ON FILL SLOPES STEEPER THAN 4:1.
- (E) MAXIMUM RUN LENGTH IS 5000 FT.
- (F) CABLE BARRIERS SHOULD BE INSTALLED PER MANUFACTURER'S SPECIFICATION AND SHOP DRAWINGS LISTED ON THE QUALIFIED PRODUCTS LIST.
- (G) CABLE BARRIER SHOULD NOT BE USED TO SHIELD FIXED OBJECTS. CABLE BARRIER RUNS SHALL BE TERMINATED AND GUARDRAIL OR RIGID BARRIER SHALL BE INSTALLED TO SHIELD FIXED OBJECTS.
- (H) CABLE BARRIER SHOULD ONLY BE USED AT LOCATION WHERE THERE IS A MINIMUM OF 10 FEET SPACE IS AVAILABLE BEHIND THE BARRIER TO ALLOW FOR DEFLECTION.
- (I) CABLE BARRIER MAY BE PLACED ON THE INSIDE CURVE WHERE POSSIBLE.
- (J) REFER TO STANDARD DRAWING S-CB-2 FOR HIGH TENSION CABLE BARRIER (HTCB).
- (K) REFER TO STANDARD DRAWING T-M-18 FOR CABLE BARRIER DELINEATOR. DELINEATOR COST TO BE INCLUDED IN THE COST OF CABLE BARRIER.
- (L) MASH TEST LEVEL TL-4 CABLE BARRIER SYSTEMS SHALL BE INSTALLED AT LOCATIONS WHERE MEDIAN SLOPES LIMITED TO 6:1.
- (M) PAY ITEMS FOR CABLE BARRIER WILL BE UNDER THE FOLLOWING ITEM NUMBERS:

705-06.40	CABLE BARRIER (MASH TL-3)	L.F.
705-06.41	CABLE BARRIER ANCHOR (MASH TL-3)	EACH
705-06.50	CABLE BARRIER (MASH TL-4)	L.F.
705-06.51	CABLE BARRIER ANCHOR (MASH TL-4)	EACH

REV. 06-28-19: ADDED ITEM NO 'S 705-06.40, 705-06.41, AND 705-80.03. REMOVED TABLE. REDREW SHEET.

REV. 10-29-21: THE PLAN VIEW AND DETAILS B-1 AND B-2 WERE REMOVED. DETAIL A WAS REDRAWN AND DETAILS B AND C WERE ADDED. THE "TYPICAL PLACEMENT LOCATIONS FOR CABLE MEDIAN BARRIER" WAS REMOVED AND REPLACED WITH FOUR DETAILS. THE TABLE AND ASSOCIATED EQUATION AND NOTE WERE ADDED. ALL GENERAL NOTES WERE REVISED. ITEM NUMBERS 705-80.01 AND 705-80.03 WERE REMOVED. ITEM NUMBERS 705-06.50 AND 705-06.51 WERE ADDED.

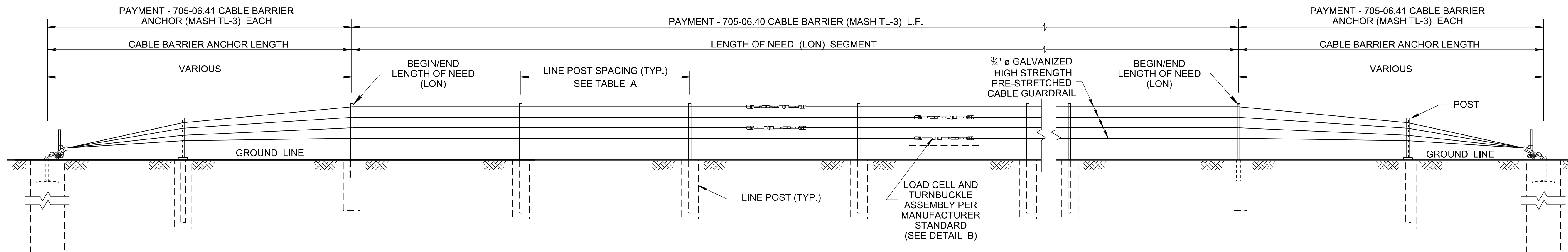
REV. 07-07-23: REVISED GENERAL NOTES (F) AND (K). ADJUSTED GENERAL NOTE NUMBERS AND ADDED GENERAL NOTE (I).

STATE OF TENNESSEE  
STANDARD DRAWING  
DEPARTMENT OF TRANSPORTATION

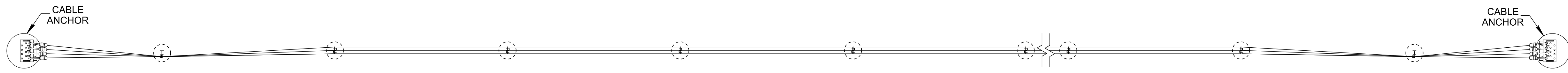
CABLE BARRIER PLACEMENT

7/14/2023 2:56:44 PM P:\StandDraw\DESIGN STANDARDS\Standards Drawings Library\Standard Roadway Drawings - CURRENT\In Progress\10-106.00 Safety Design and Guardrails IP\106.02 Cable Barrier IP\SCB2-20230707.dgn

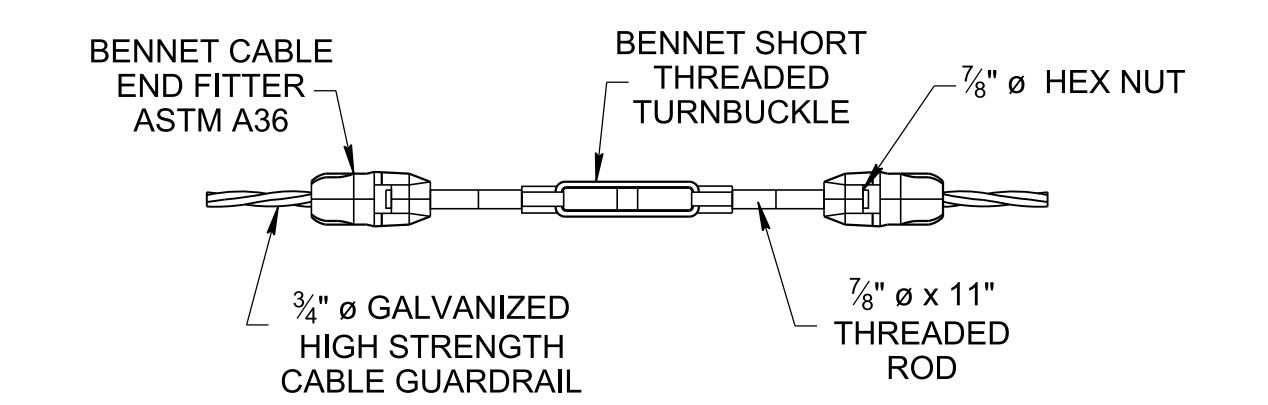
REV. 07-07-2023: REVISED ELEVATION AND PLAN VIEWS. REMOVED CABLE SPLICE AND MEDIAN CABLE BARRIER PLACEMENT DETAILS. DELETED GENERAL NOTES (B), (C) AND (N). ADJUSTED GENERAL NOTE NUMBERS AND ADDED GENERAL NOTES (B), (C), (D), (E), (F) AND (G).



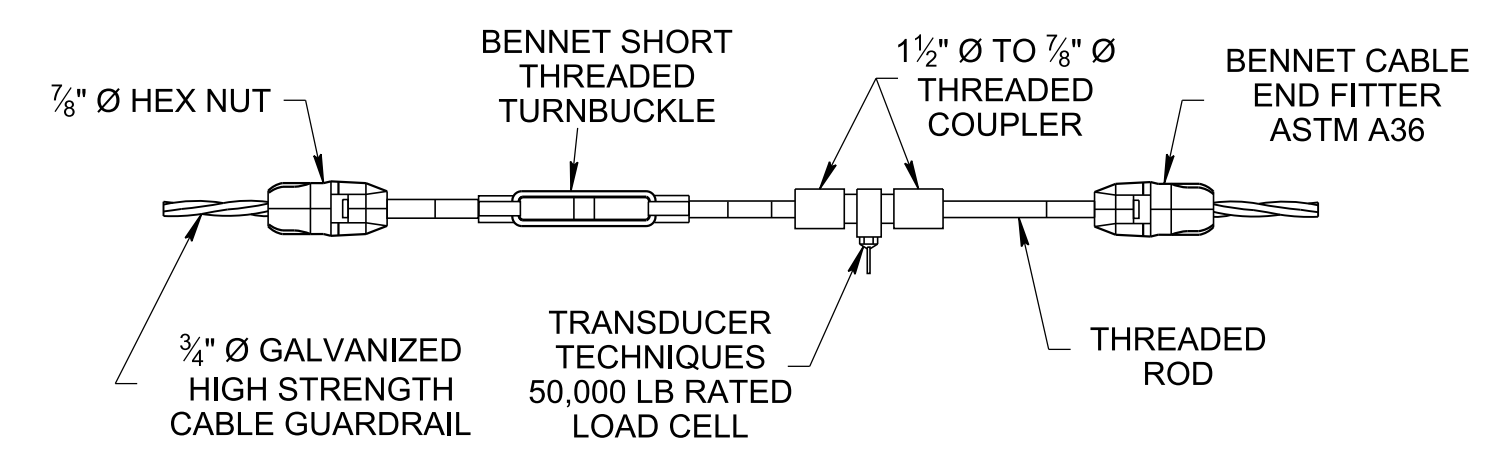
**ELEVATION VIEW**



**PLAN VIEW**



**DETAIL A  
CABLE SPLICE**  
(SEE NOTE (G))



**DETAIL B  
CELL AND TURNBUCKLE**  
(THREADED TERMINAL TURNBUCKLES AND FITTINGS SHALL BE GALVANIZED AFTER TREADING AND MEET THE REQUIREMENTS OF ASTM A-153. TURNBUCKLES SHALL BE INSTALLED AT A MAXIMUM SPACING OF 1000 FT INTERVALS.)

TABLE A	
POST SPACING (LF)	DEFLECTION (LF)
8	7
10	8.5
16*	11

\* ONLY AT LOCATIONS WHERE EXPECTED SAFETY PERFORMANCE ALLOWS.

TABLE B PRE-STRETCHED CABLE TENSION CHART	
AMBIENT TEMPERATURE (° F)	MIN. REQUIRED CABLE TENSION (LB)
110	2240
100	2500
90	2760
80	3021
70	3281
60	3541
50	3801
40	4062
30	4322
20	4582
10	4842
0	5102
-10	5363
-20	5623

**GENERAL NOTES**

- (A) HIGH TENSION CABLE BARRIER (HTCB) SYSTEMS CONSIST OF A GENERAL HTCB SEGMENT BETWEEN BEGIN/END LENGTH OF NEED AND CONCRETE ANCHOR ASSEMBLIES OUTSIDE THE LENGTH OF NEED. THE CABLE BARRIER SYSTEM INCORPORATES FOUR EVENLY SPACED CABLES SUPPORTED BY WEAK POSTS AND INSTALLED WITHIN 4H:1V OR FLATTER FILL SLOPE ON MEDIAN DITCH.
- (B) THE HIGH TENSION CABLE BARRIER (HTCB) SYSTEM MEETING THE REQUIREMENTS OF MASH FOR A CABLE BARRIER SYSTEM, END TERMINALS AND APPURTENANCES. IT CONSIST OF PRE-TENSIONED WIRE (CABLE), STEEL LINE POSTS SET IN STEEL SOCKETS IN CONCRETE FOOTINGS, END-ANCHORS AND ALL FITTINGS MEETING MASH TL-3.
- (C) ALL MATERIALS INCLUDING WIRE ROPES, FITTINGS, POSTS, REFLECTORIZED SPACERS OR POST CAPS AND TERMINALS SHALL MEET THE APPROVED MANUFACTURER'S SPECIFICATIONS AND DETAILS.
- (D) ONLY PRODUCTS LISTED ON THE DEPARTMENT QPL SHALL BE USED.
- (E) THE WIRE ROPES SHALL BE INSTALLED AT THE ELEVATIONS AND PROPER HEIGHT AS SHOWN ON SHOP DRAWINGS. THE TENSION SHALL BE APPLIED MEETING MANUFACTURER'S RECOMMENDATION AND TABLE B.
- (F) THE LINE POSTS SHALL MEET THE MANUFACTURER'S SPECIFICATIONS. FURNISH STEEL POSTS MEETING THE REQUIREMENTS OF ASTM A-36 GALVANIZED TO ASTM A-123. POST SHALL BE DESIGNED TO HOLD THE WIRE AT THE DESIGN HEIGHT. THE POST SHALL BE INSTALLED IN GALVANIZED METAL SOCKETS OR SLEEVES CONFORMING TO THE MANUFACTURER'S DESIGN.
- (G) THE NUMBER AND LOCATION OF SPLICES WILL BE SUBJECT TO THE APPROVAL OF THE ENGINEER. SPLICES SHALL BE STAGGERED AND MADE IN ACCORDANCE WITH THE RECOMMENDATION OF THE CABLE MANUFACTURER.
- (H) TABLE A INDICATES DEFLECTION TO DETERMINE THE REQUIRED POST SPACING. THE POST SPACING VARIES BETWEEN 8 FT TO 16 FT MAXIMUM PER SPECIFIED DEFLECTIONS. 8 FT POST SPACING TO BE USED WITHIN 4:1 SLOPE AND 8 FT OR 10 FT POST SPACING TO BE USED FOR 6:1 SLOPE. THE 16 FT SPACING IS NOT DESIRABLE, MAY BE USED IN THE VICINITY OF THE DITCH SLOPE. POST SPACING MAY VARY WHEN ENCOUNTERING UNDERGROUND CONFLICTS AS LONG AS THE POST SPACING REMAINS BETWEEN 8 FT TO 16 FT.
- (I) HTCB INSTALLATION LENGTH SHALL BE MINIMUM 600 FT TO MAXIMUM 5000 FT.
- (J) CABLE BARRIER SHALL BE 3/4" DIAMETER CLASS A GALVANIZED 3x7 (PRE-STRETCHED) AASHTO M30-92/ASTM A741-98 MINIMUM BREAKING STRENGTH OF 39 KIPS.
- (K) REFER TO STANDARD DRAWING S-CB-1 FOR CABLE BARRIER PLACEMENT DETAILS.
- (L) REFER TO STANDARD DRAWING RD11-TS-SERIES FOR TYPICAL ROADWAY SECTION INFORMATION.
- (M) REFER TO STANDARD DRAWING T-M-18 FOR CABLE BARRIER DELINEATOR. DELINEATOR COST TO BE INCLUDED IN THE COST OF CABLE BARRIER.
- (N) HIGH TENSION CABLE BARRIER SHALL BE PLACED ON A SMOOTH SURFACE. ADDITIONAL COMPACTED FILL MAYBE REQUIRED TO MAINTAIN THE MAXIMUM HEIGHT FROM THE BOTTOM HTCB CABLE TO THE TOP OF THE GROUND.
- (O) BARRIER INSTALLATIONS REQUIRE ADEQUATE CLEAR SPACE BETWEEN THE BARRIER AND OPPOSING HAZARDS TO ACCOMMODATE THE ANTICIPATED DYNAMIC DEFLECTION.
- (P) PAYMENT:  
FURNISHING AND INSTALLING CONCRETE ANCHOR AND POST FOUNDATIONS, CABLE BARRIER HARDWARE, INCLUDING BUT NOT LIMITED TO LINE POSTS, SOCKET SLEEVES, TURNBUCKLES, TERMINAL FITTINGS, TERMINAL ANCHORAGE DEVICES, CABLE-TO-LINE POST CONNECTORS, AND SPLICE FITTINGS HARDWARE INCLUDING THREADED RODS, NUTS AND BOLTS, WASHERS AND ALL PLATES SHALL BE PAID UNDER HIGH TENSION CABLE BARRIER ITEM NUMBERS.  
  
PAY ITEMS FOR HIGH TENSION CABLE BARRIER WILL BE UNDER THE FOLLOWING ITEM NUMBERS:  
  
705-06.40 CABLE BARRIER (MASH TL-3) L.F.  
705-06.41 CABLE BARRIER ANCHOR (MASH TL-3) EACH

NOT TO SCALE

STATE OF TENNESSEE  
STANDARD DRAWING  
DEPARTMENT OF TRANSPORTATION

HIGH TENSION  
CABLE BARRIER

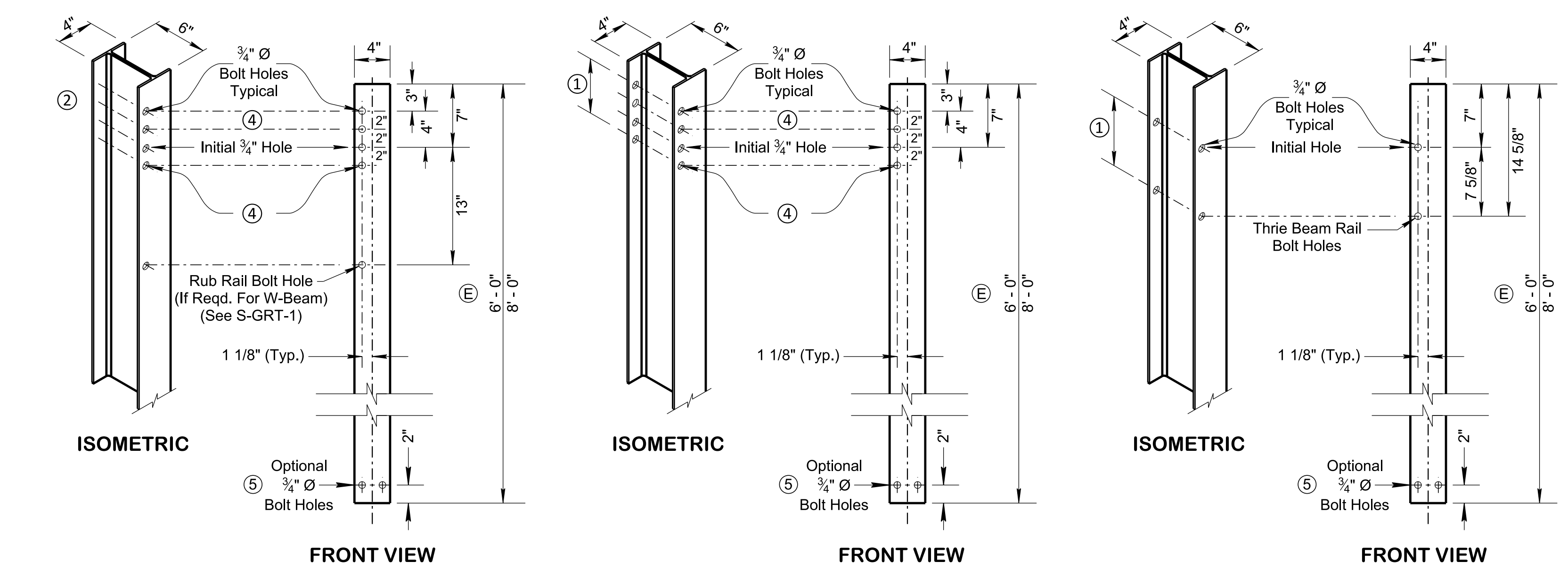
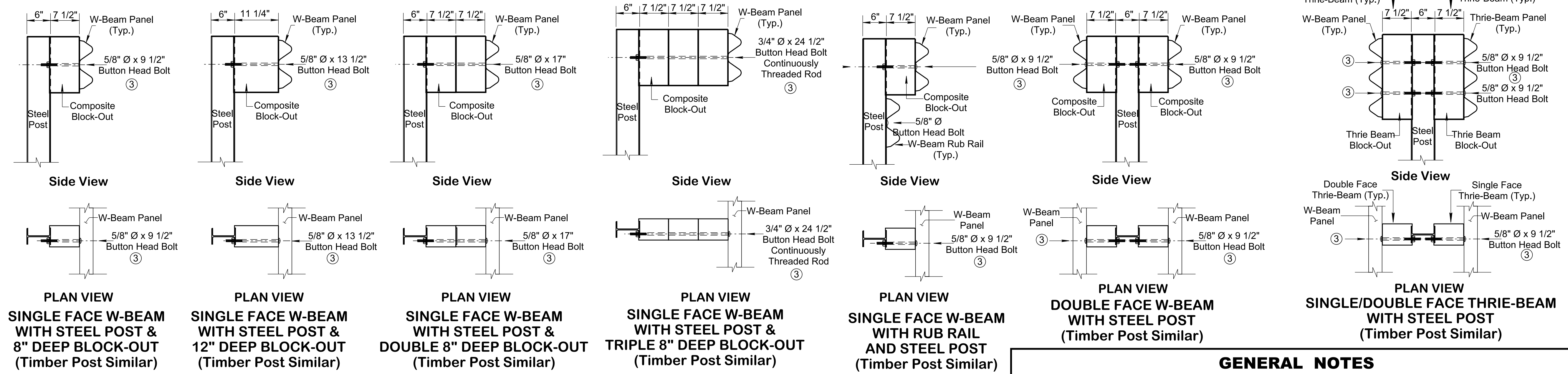
06-03-2021

S-CB-2



7/5/2023 2:29:17 PM P:\StandDraw\DESIGN STANDARDS\Standards Drawings Library\Standard Roadway Drawings - CURRENT\In Progress\10-106.00 Safety Design and Guardrails IP\106.04 Guardrail Details IP\SGR311C-20230707

## STEEL POST GUARDRAIL DETAILS



FOOTNOTES	
①	BOLT HOLES ON THE BACKSIDE ARE FOR DOUBLE FACE GUARDRAIL (IF REQUIRED).
②	ADDITIONAL 3/4" HOLES ON OTHER SIDE OF THE FLANGE OR BACK FLANGE WILL BE ACCEPTABLE IF THEY ARE LOCATED WITHIN TOP 9" OF THE POST (FOR SINGLE FACE).
③	BUTTON HEAD BOLT WITH RECESSED NUT OR HEX NUT AND 1 WASHER PER BOLT: 5/8" DIA. x 9 1/2" LENGTH, FOR 8" DEEP BLOCK-OUT, 5/8" DIA. x 13 1/2" LENGTH, FOR 12" DEEP BLOCK-OUT, 5/8" DIA. x 17" LENGTH, FOR DOUBLE 8" BLOCK-OUT AND 3/4" DIA. x 24 1/2" LENGTH, CONTINUOUSLY THREADED ROD FOR TRIPLE 8" DEEP BLOCK-OUT.
④	2 EXTRA 3/4" HOLES IN POST ABOVE INITIAL HOLE AND 1 EXTRA 3/4" HOLE BELOW FOR VERTICAL ADJUSTMENT.
⑤	ADDITIONAL BOLT HOLES ON THE POST BOTTOM MAY BE ACCEPTABLE FOR MANUFACTURING PURPOSES.

GENERAL NOTES	
<b>POST</b>	<p>(A) THE CONTRACTOR MAY HAVE THE CHOICE OF EITHER HOT ROLLED OR WELDED STEEL W6 X 8.5 OR W6 X 9 OR 8" X 6" WOOD POST EXCEPT AS NOTED:</p> <ol style="list-style-type: none"> <li>THE MIXING OF ANY POST TYPES ON A GIVEN PROJECT WILL BE AVOIDED IF AT ALL POSSIBLE.</li> <li>SHOULD IT BECOME NECESSARY TO MIX POST TYPES ON A GIVEN PROJECT POSTS SHALL NOT BE MIXED ON A SINGLE RUN OF GUARDRAIL EXCEPT AS NECESSARY AT END TERMINALS.</li> <li>W6 X 15 IS USED WITH GUARDRAIL CONNECTION TO STRUCTURES FOR MAINTENANCE ACTIVITIES ONLY.</li> </ol> <p>(B) STEEL POSTS SHALL CONFORM TO ASTM A36 AND BE GALVANIZED IN ACCORDANCE WITH ASTM A123. BOLT HOLES SHALL BE APPROXIMATELY CENTERED BETWEEN WEB AND EDGE OF FLANGE OF SPACERS AND POSTS.</p> <p>(C) WOOD POSTS SHALL CONFORM WITH TDOT CONSTRUCTION STANDARD SPECIFICATIONS.</p> <p>(D) WELDED STEEL POSTS SHALL CONFORM TO ASTM A769 AND BE GALVANIZED IN ACCORDANCE WITH ASTM A123, UNLESS OTHERWISE SPECIFIED ON THE PLANS.</p> <p>(E) SEE STANDARD DRAWING S-PL-6 FOR POST LENGTH REQUIREMENTS AND PAID UNDER ITEM NUMBERS.</p>
<b>BLOCK-OUTS</b>	<p>(F) BLOCK OUTS SHALL BE WOOD CONFORMING TO THE REQUIREMENTS OF TDOT CONSTRUCTION STANDARD SPECIFICATIONS OR PLASTIC GUARDRAIL BLOCK-OUTS LISTED ON THE TDOT QUALIFIED PRODUCT LIST.</p> <p>(G) ONLY WOODEN BLOCK-OUTS MAY BE USED WITH WOODEN POSTS, PLASTIC OR WOODEN BLOCK-OUTS MAY BE USED WITH STEEL POSTS.</p> <p>(H) ALL BLOCK-OUTS SHALL MEET MASH GUIDELINES AND NCHRP-350 GUIDELINES.</p> <p>(I) FOR BLOCK-OUT DETAILS SEE STANDARD DRAWING S-GR31-1A.</p> <p>(J) RECYCLED PLASTIC GUARDRAIL BLOCK-OUTS LISTED ON THE TDOT QUALIFIED PRODUCTS LIST MAY BE SUBSTITUTED FOR WOOD BLOCK-OUTS. THE USE OF RECYCLED PLASTIC GUARDRAIL BLOCK-OUTS ARE SUBJECT TO THE FOLLOWING STIPULATIONS:</p> <ol style="list-style-type: none"> <li>THE MIXING OF BLOCK-OUTS ON A GIVEN PROJECT WILL BE AVOIDED IF POSSIBLE.</li> <li>SHOULD IT BECOME NECESSARY TO CHANGE THE BLOCK-OUT TYPE ON A GIVEN PROJECT, THE BLOCK-OUTS SHOULD NOT BE MIXED ON A GIVEN RUN OF GUARDRAIL.</li> <li>THE COST OF BLOCK-OUTS SHALL BE INCLUDED IN THE BID PRICE FOR GUARDRAIL.</li> </ol>
<b>FUTURE ADJUSTMENTS</b>	<p>(K) WOOD BLOCK OUTS SHALL HAVE ONE ADDITIONAL 3/4" HOLE, FOUR INCHES BELOW THE INITIAL HOLE FOR FUTURE ADJUSTMENT.</p> <p>(L) INITIAL INSTALLATION REQUIRES ONE BOLT CONNECTION, EACH ADJUSTMENT THEREAFTER REQUIRES TWO BOLT CONNECTIONS.</p>
<b>END TREATMENTS</b>	<p>(M) ALL RUNS OF GUARDRAIL WILL BEGIN AND END WITH AN ANCHOR SYSTEM (SEE S-GRA-SERIES).</p> <p>(N) GUARDRAIL ENDS THAT ARE INSIDE THE CLEAR ZONE AND EXPOSED TO ONCOMING TRAFFIC SHALL HAVE A CRASH WORTHY END TERMINAL AS NOTED:</p> <ol style="list-style-type: none"> <li>ANY ROAD WITH SUITABLE BACK SLOPES SHALL USE END TERMINALS BURIED IN BACK SLOPE (SEE S-GRT-1).</li> <li>ALL HIGHWAY SYSTEM ROADS WITHOUT SUITABLE BACK SLOPES SHALL USE MASH TL-3 TANGENTIAL END TERMINALS (SEE S-GRT-2).</li> <li>ALL OTHER ROADS WITH POSTED SPEED &lt; 45 MPH SHALL USE MASH TL-2 END TERMINALS UNLESS OTHERWISE NOTED (SEE S-GRT-3).</li> </ol>
<b>DESIGN</b>	<p>(O) 4 FEET BEHIND GUARDRAIL SHALL BE CLEAR OF OBSTRUCTIONS FOR DEFLECTION.</p> <p>(P) REFER TO SAFETY PLAN STANDARDS FOR HOW TO DETERMINE THE LENGTH OF NEED.</p> <p>(Q) SEE STANDARD DRAWING S-GR31-1B FOR FASTENING HARDWARE DETAILS.</p>

REV. 06-15-2021: REVISED GENERAL NOTES (A) AND (E). REVISED PLASTIC BLOCK-OUT TO COMPOSITE BLOCK-OUT ON SIDE VIEWS.

REV. 07-07-2023: REVISED FOOT NOTE (J) AND GENERAL NOTE (J). ADDED PLAN VIEW AND SIDE VIEW DRAWINGS FOR 12" DEEP, DOUBLE 8" DEEP, AND TRIPLE 8" BLOCK-OUTS.

**STATE OF TENNESSEE**

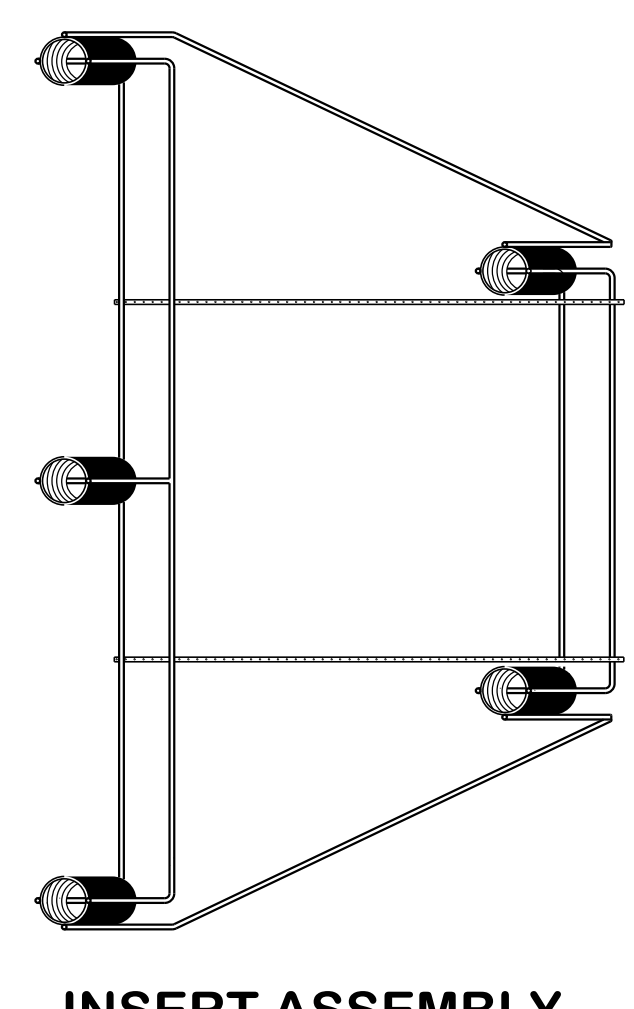
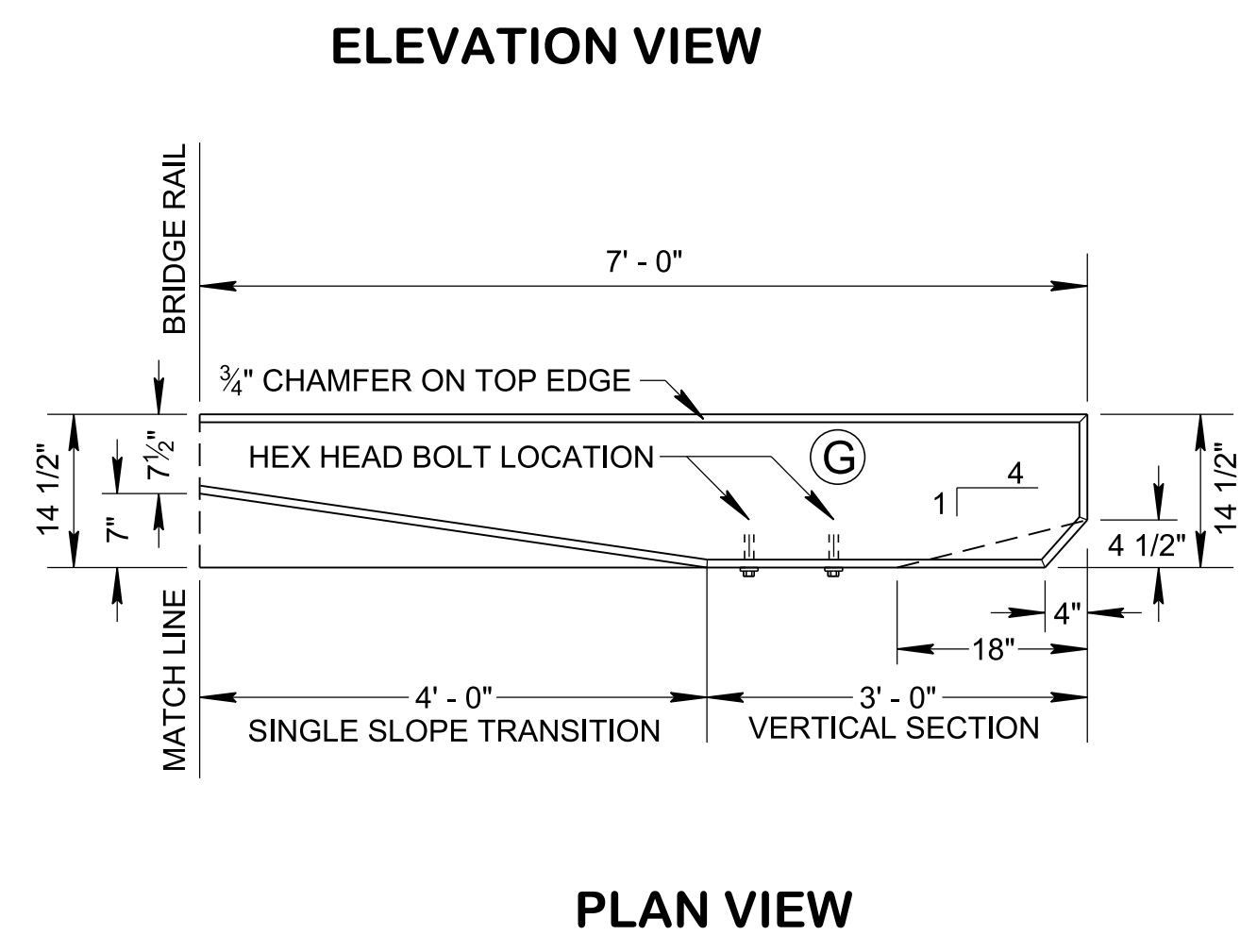
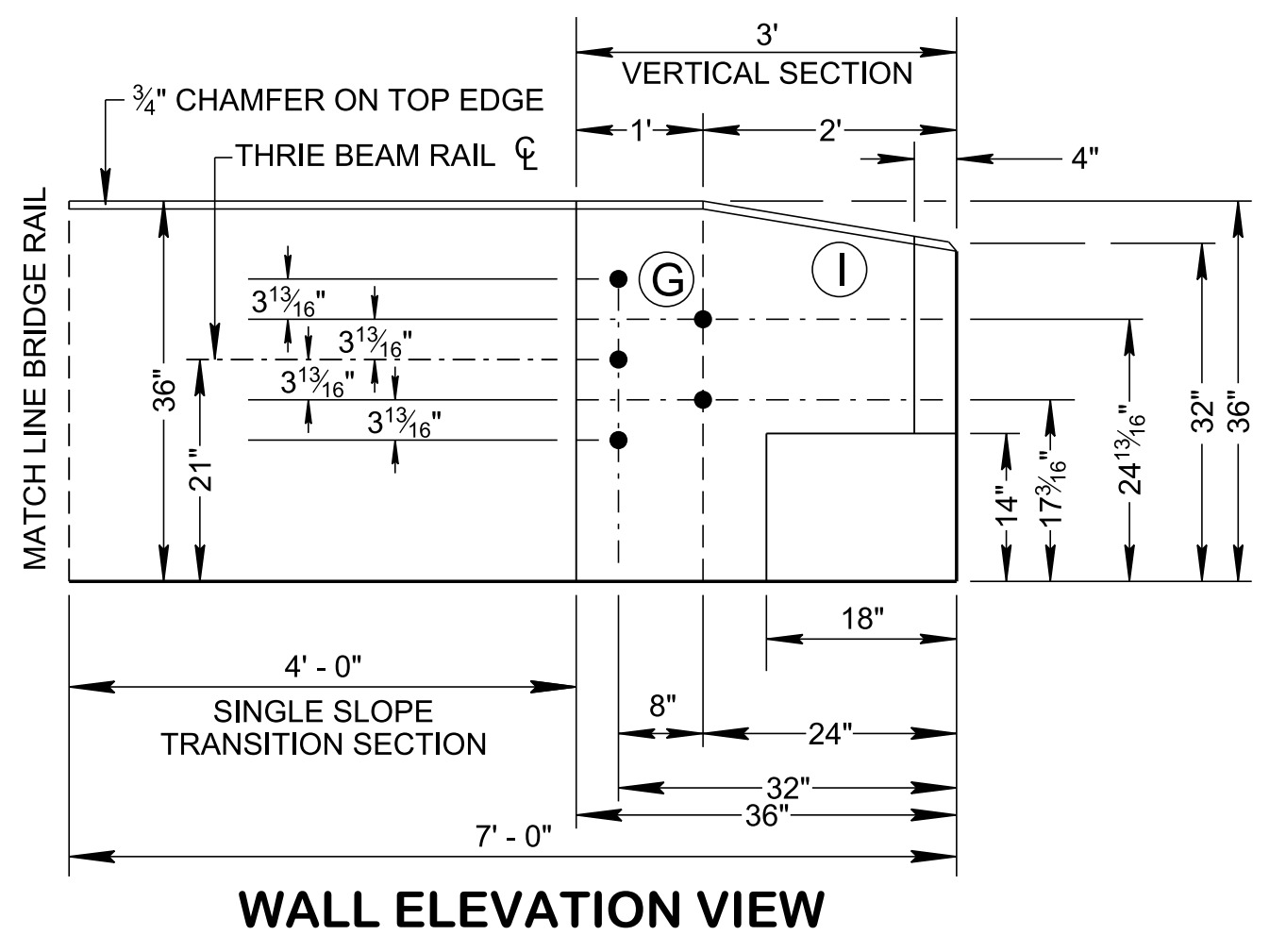
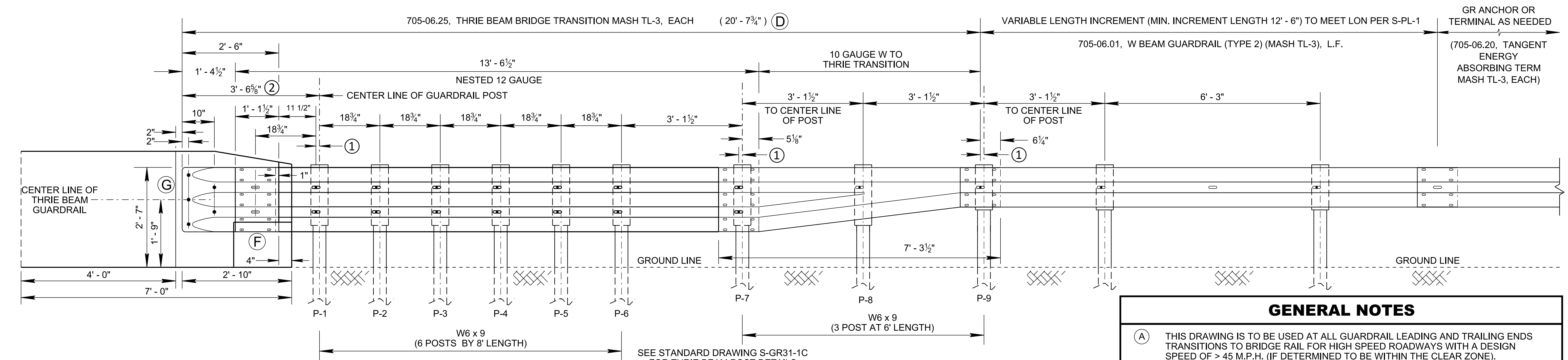
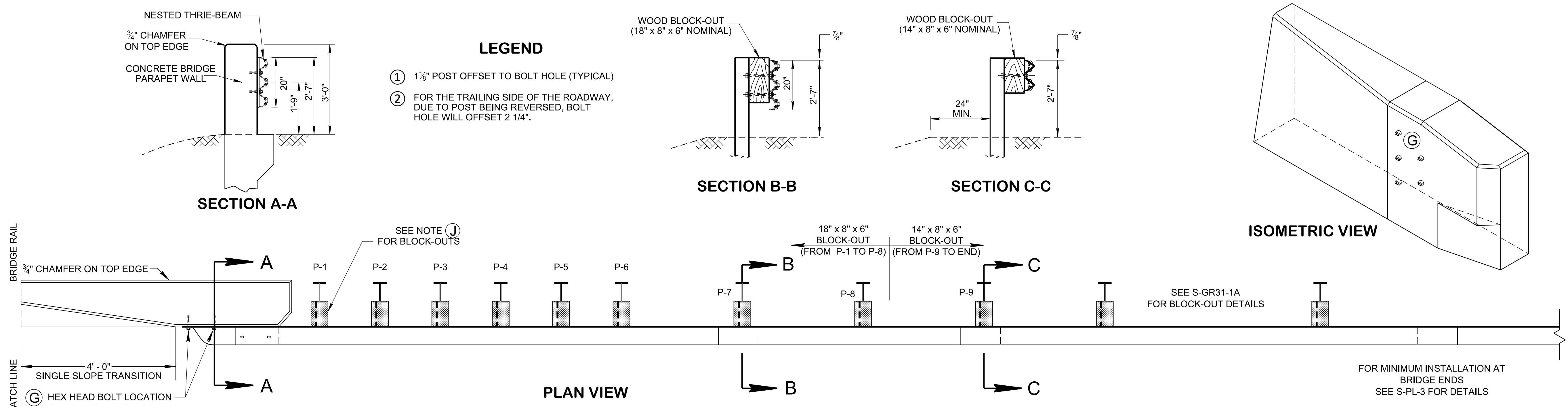
**DEPARTMENT OF TRANSPORTATION**

**GUARDRAIL  
GENERAL NOTES  
AND  
POST DETAILS**



7/5/2023 2:26:22 PM P:\StandDraw\DESIGN STANDARDS\Standards Drawings\Standard Roadway Drawings - CURRENT\In Progress\10-106.00 Safety Design and Guardrails IP\SGRC4-20230701

REV. 02-28-20: REVISED GENERAL NOTE (A).  
 REV. 10-16-20: RELOCATED SECTION C-C AND ADDED BLOCK-OUT NOTES ON PLAN VIEW. ADDED POST NUMBERS. ADJUSTED THE NUMBER OF POSTS ON ELEVATION VIEW. REVISED GENERAL NOTES (D), (E) AND (G).  
 REV. 06-15-21: REVISED PLAN AND ELEVATION VIEWS AND GENERAL NOTE (D). REVISED LEGEND NOTE 2.  
 REV. 07-07-23: GENERAL NOTE (J) WAS ADDED.



**GENERAL NOTES**

- THIS DRAWING IS TO BE USED AT ALL GUARDRAIL LEADING AND TRAILING ENDS TRANSITIONS TO BRIDGE RAIL FOR HIGH SPEED ROADWAYS WITH A DESIGN SPEED OF > 45 M.P.H. (IF DETERMINED TO BE WITHIN THE CLEAR ZONE).
- CONNECTION TO BRIDGE RAIL SHOWN. FOR CONNECTION TO CONCRETE MEDIAN BARRIER WALLS, SEE STANDARD DRAWING S-SSMB-6F.
- SEE STANDARD DRAWINGS STD-1 SERIES FOR BRIDGE RAILING DETAILS. S-GR31-1 SERIES FOR ALL OTHER GUARDRAIL DETAILS AND MATERIAL PROPERTIES NOT SHOWN AND S-PL-3 FOR MINIMUM LENGTH AND DELINEATOR REQUIREMENTS.
- INSTALLATION OF GUARDRAIL CONNECTOR TO THE BRIDGE RAIL SHALL BE INCLUDED UNDER ITEM 705-06.25, THRIE BEAM BRIDGE TRANSITION MASH TL-3, PER EACH. COMPONENTS INCLUDE BUT NOT LIMITED TO, THRIE BEAM TERMINAL CONNECTION, THRIE BEAM RAIL, THRIE BEAM TRANSITION PANEL, ALL COMPONENTS REQUIRED FOR ATTACHMENT OF THE THRIE BEAM RAILS TO THE BRIDGE RAIL AND POSTS.
- BUTTON HEAD "POST" BOLTS (ASTM A307) SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT (ASTM A563) AND WASHER AND NOT MORE THAN 1" BEYOND IT. BUTTON HEAD "SPLICE" BOLTS (ASTM 307), 5/8" DIA. X 2" (AT THRIE-BEAM RAIL SPLICES) WITH 5/8" DOUBLE RECESSED NUTS.
- GALVANIZED WASHERS USED WITH THE 5/8" DIA. POST BOLTS SHALL BE TYPE A 1-3/4" O. D. WASHERS.
- USE INSERT ASSEMBLY TO CONNECT THE THRIE BEAM GUARDRAIL TO THE BRIDGE RAIL USING 5 HEX HEAD BOLTS AT 7/8" Ø X 2" AND WASHERS.
- SAFETY PERFORMANCE OF THIS DEVICE HAS BEEN EVALUATED PER TRB 2672(39) 41-51 DEVELOPMENT OF A STANDARDIZED BUTTRESS FOR APPROACH GUARDRAIL TRANSITIONS AND TTI REPORT 9-1002-12-3, FOR MASH TL-3.
- TRANSITION TO 36" MAY BE ELIMINATED WHEN 32" PARAPET WALL DESIGN IS USED.
- WHEN BRIDGE END DRAIN FLUME IS REQUIRED, USE 12 INCH DEEP BLOCK-OUTS SEE STANDARD DRAWINGS D-FLU-2 AND D-FLU-2A FOR DETAILS.

APPROVED BY FHWA  
 (ALL OTHERS APPROVED BY TDOT)

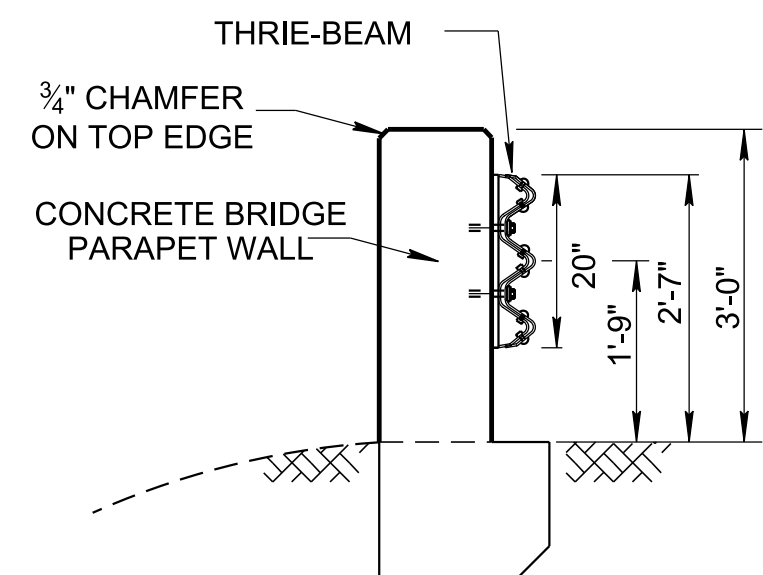
STATE OF TENNESSEE  
 STANDARD DRAWING  
 DEPARTMENT OF TRANSPORTATION

GUARDRAIL  
 CONNECTION  
 TO BRIDGE RAILING  
 CONCRETE  
 PARAPET

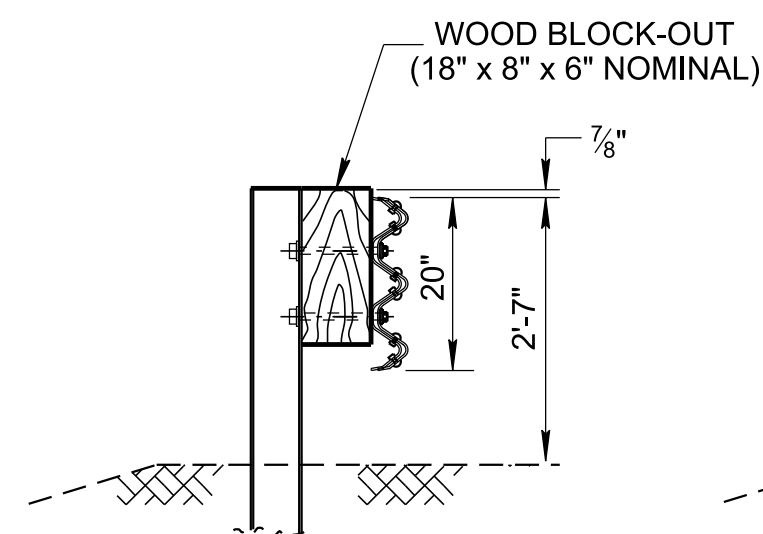
06-28-2019 S-GRC-4

NOT TO SCALE

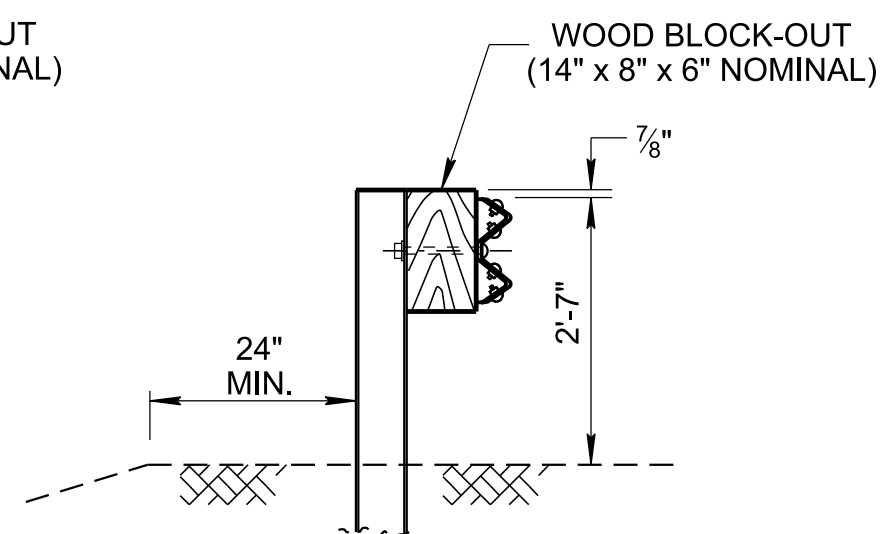
7/5/2023 2:25:51 PM P:\StandDraw\DESIGN STANDARDS\Standards Drawings\Standard Roadway Drawings - CURRENT\In Progress\10-106.00 Safety Design and Guardrails IP\106.05 Guardrail Connections IP\SGRC6-202307



**SECTION A-A**



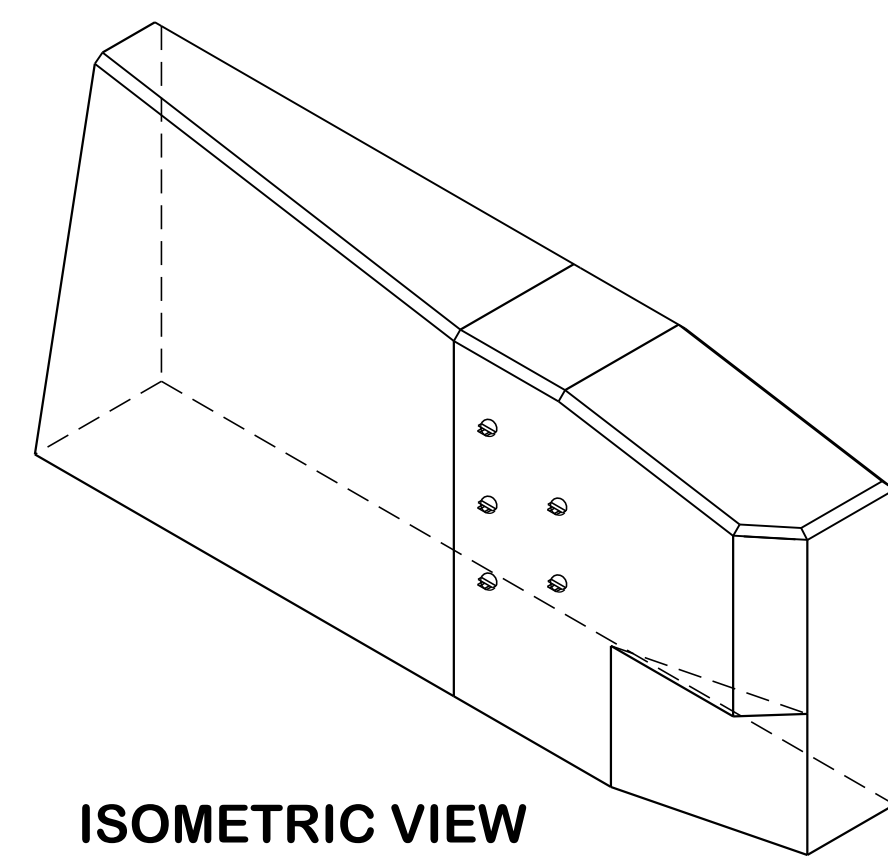
**SECTION B-B**



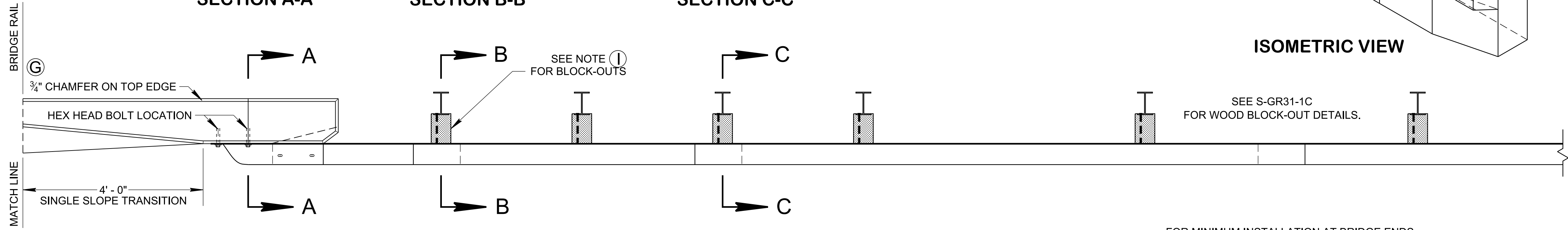
**SECTION C-C**

**LEGEND**

- ① 1/8" POST OFFSET TO BOLT HOLE (TYPICAL)
- ② FOR THE TRAILING SIDE OF THE ROADWAY, DUE TO POST BEING REVERSED, BOLT HOLE WILL OFFSET 2 1/4".

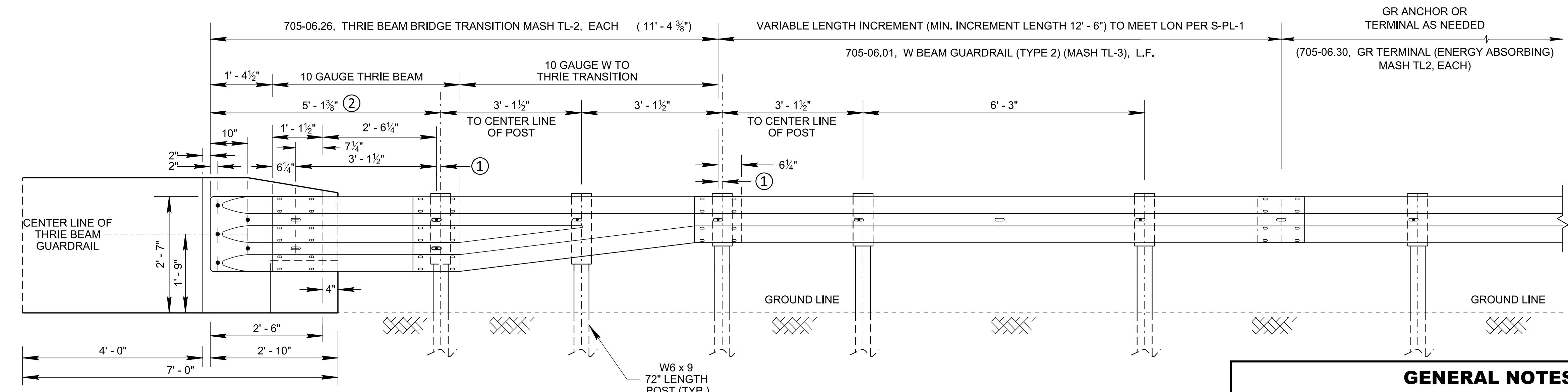


**ISOMETRIC VIEW**

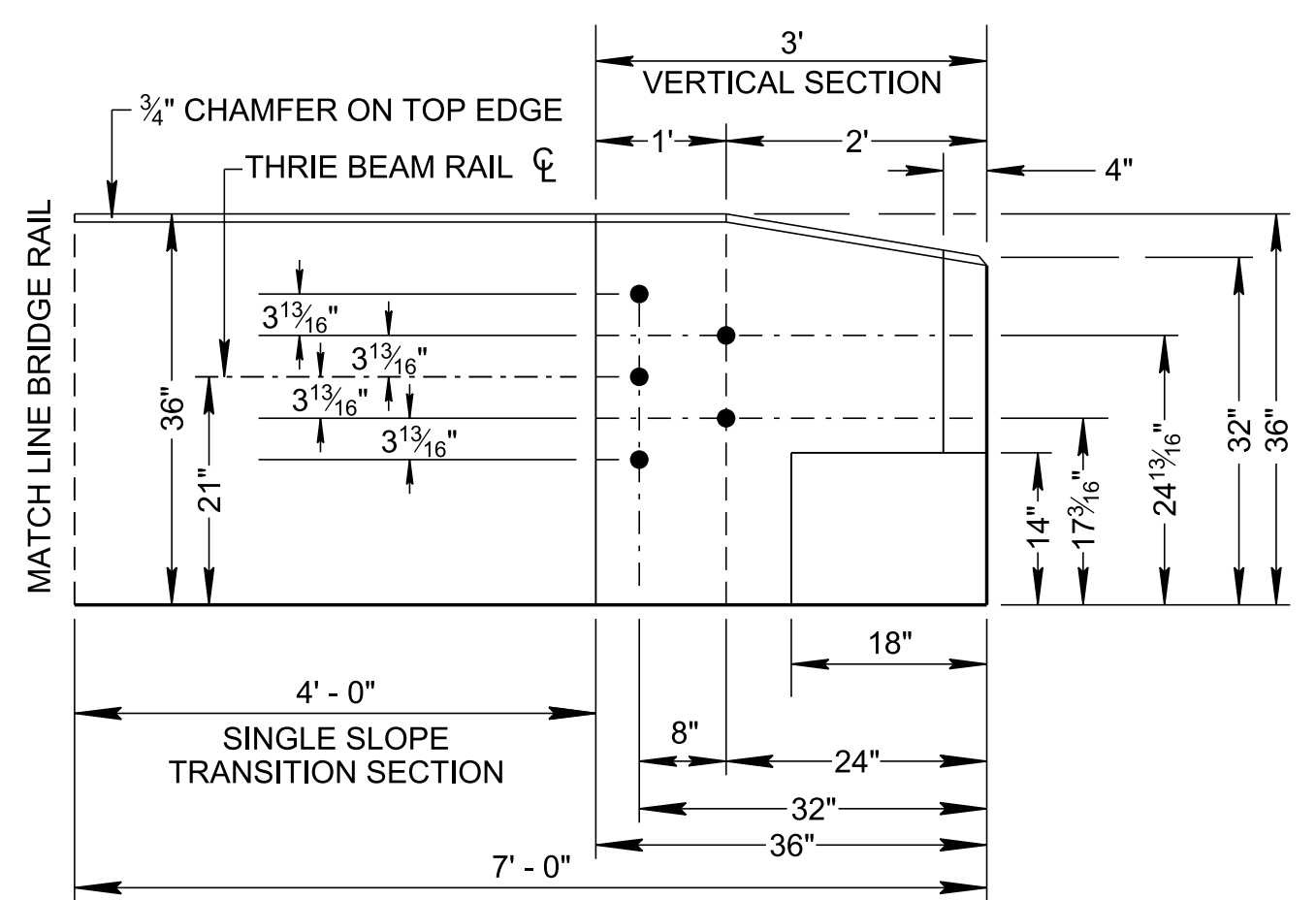


**PLAN VIEW**

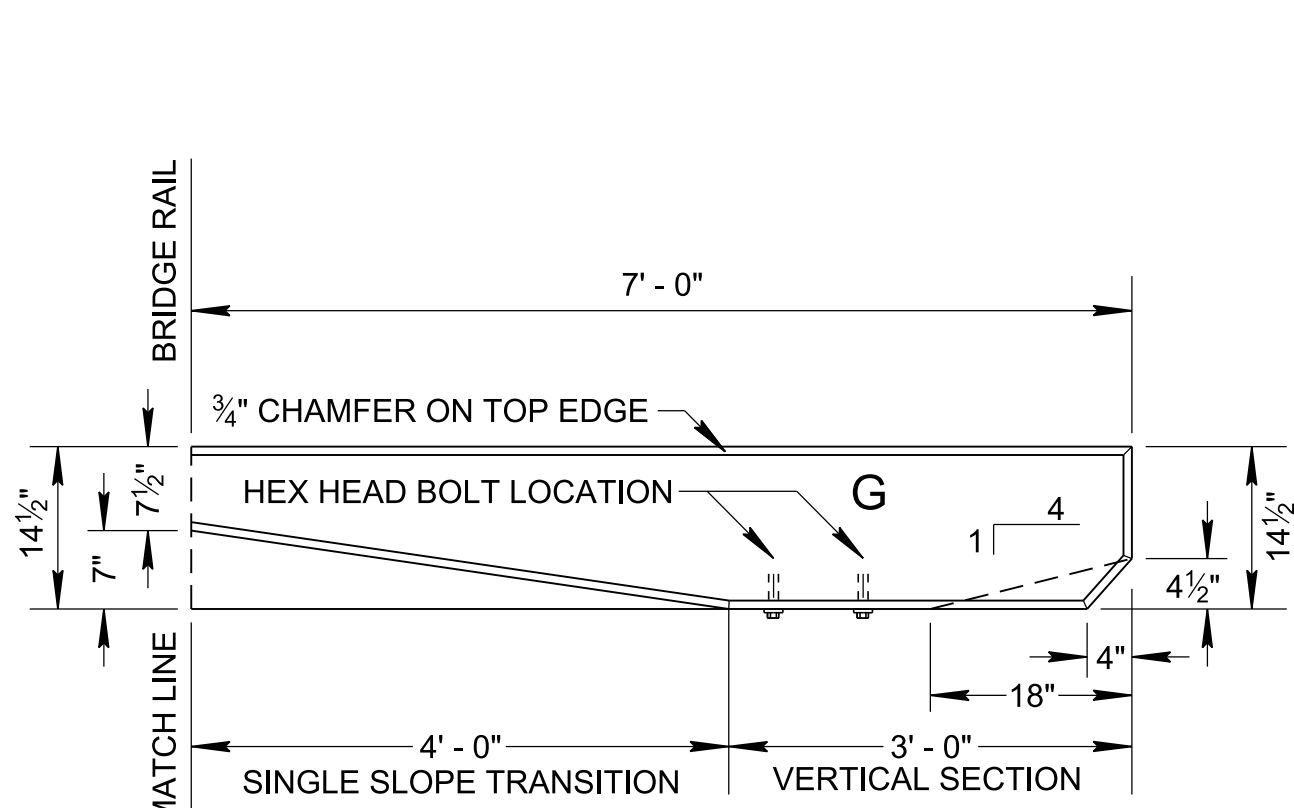
FOR MINIMUM INSTALLATION AT BRIDGE ENDS  
SEE S-PL-3 FOR DETAILS



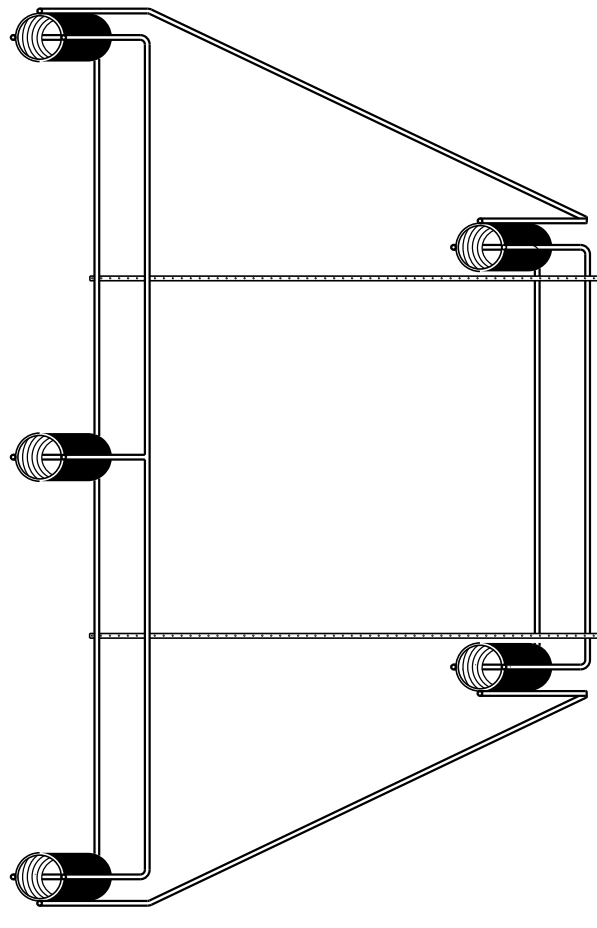
**ELEVATION VIEW**



**WALL ELEVATION VIEW**



**PLAN VIEW**



**INSERT ASSEMBLY**

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

**GENERAL NOTES**

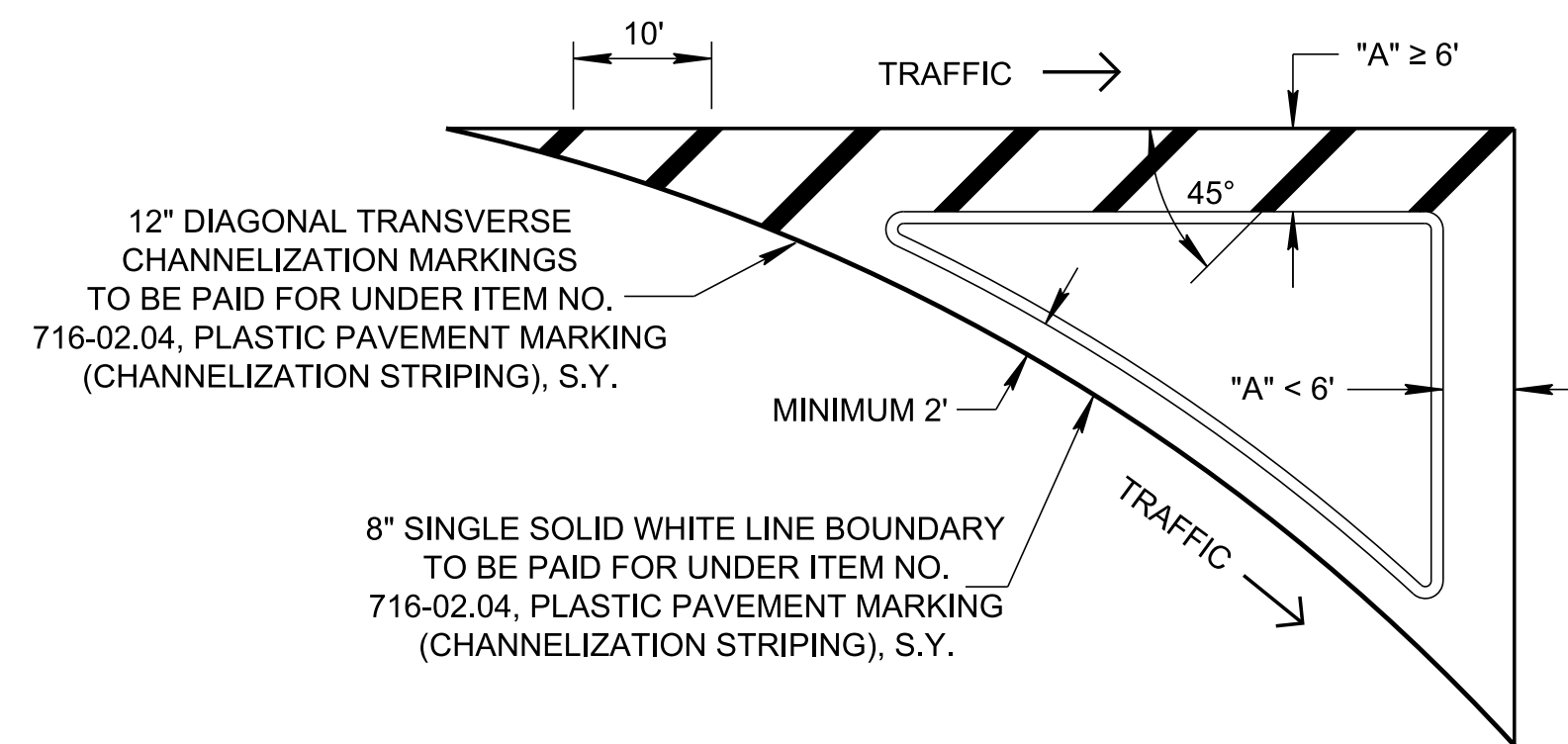
- (A) THIS DRAWING IS TO BE USED AT ALL GUARDRAIL LEADING AND TRAILING TRANSITIONS TO BRIDGE RAIL FOR LOWER SPEED ROADWAYS WITH DESIGN SPEED 45 M.P.H. OR LESS (IF DETERMINED TO BE WITHIN THE CLEAR ZONE).
- (B) CONNECTION TO BRIDGE RAIL SHOWN; FOR CONNECTION TO CONCRETE MEDIAN BARRIER WALLS, SEE S-SSMB-6.
- (C) SEE STANDARD DRAWINGS STD-1 SERIES FOR BRIDGE RAILING DETAILS, S-GR31-1 SERIES FOR ALL OTHER GUARDRAIL DETAILS AND MATERIAL PROPERTIES NOT SHOWN AND S-PL-3 FOR MINIMUM LENGTH AND DELINEATOR REQUIREMENTS.
- (D) INSTALLATION OF GUARDRAIL CONNECTOR TO THE BRIDGE RAIL SHALL BE INCLUDED UNDER ITEM 705-06.26, THRIE BEAM BRIDGE TRANSITION MASH TL-2, PER EACH. COMPONENTS INCLUDE BUT NOT LIMITED TO, THRIE BEAM TERMINAL CONNECTION, THRIE BEAM RAIL, THRIE BEAM TRANSITION PANEL, ALL COMPONENTS REQUIRED FOR ATTACHMENT OF THE THRIE BEAM RAILS TO THE BRIDGE RAIL AND POSTS.
- (E) BUTTON HEAD "POST" BOLTS (ASTM A307) SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT (ASTM A563) AND WASHER AND NOT MORE THAN 1" BEYOND IT. BUTTON HEAD "SPlice" BOLTS (ASTM 307) 5/8" DIA. X 2" (AT TRIPLE RAIL SPLICES) WITH 5/8" DOUBLE RECESSED NUTS.
- (F) GALVANIZED WASHERS USED WITH THE 5/8" DIA. POST BOLTS SHALL BE TYPE A 1-3/4" O. D. WASHERS.
- (G) USE INSERT ASSEMBLY TO CONNECT THE THRIE BEAM GUARDRAIL TO THE BRIDGE RAIL USING 5 HEX HEAD BOLTS AT 7/8" Ø X 2" AND WASHERS.
- (H) SAFETY PERFORMANCE OF THIS DEVICE HAS BEEN EVALUATED PER TRB 2672(39) 41-51 DEVELOPMENT OF A STANDARDIZED BUTTRESS FOR APPROACH GUARDRAIL TRANSITIONS AND TTI REPORT 9-1002-8, FOR MASH TL-2.
- (I) WHEN BRIDGE END DRAIN FLUME IS REQUIRED, USE 12 INCH DEEP BLOCK-OUTS SEE STANDARD DRAWINGS D-FLU-2 AND D-FLU-2A FOR DETAILS.

STATE OF TENNESSEE  
STANDARD DRAWING  
DEPARTMENT OF TRANSPORTATION

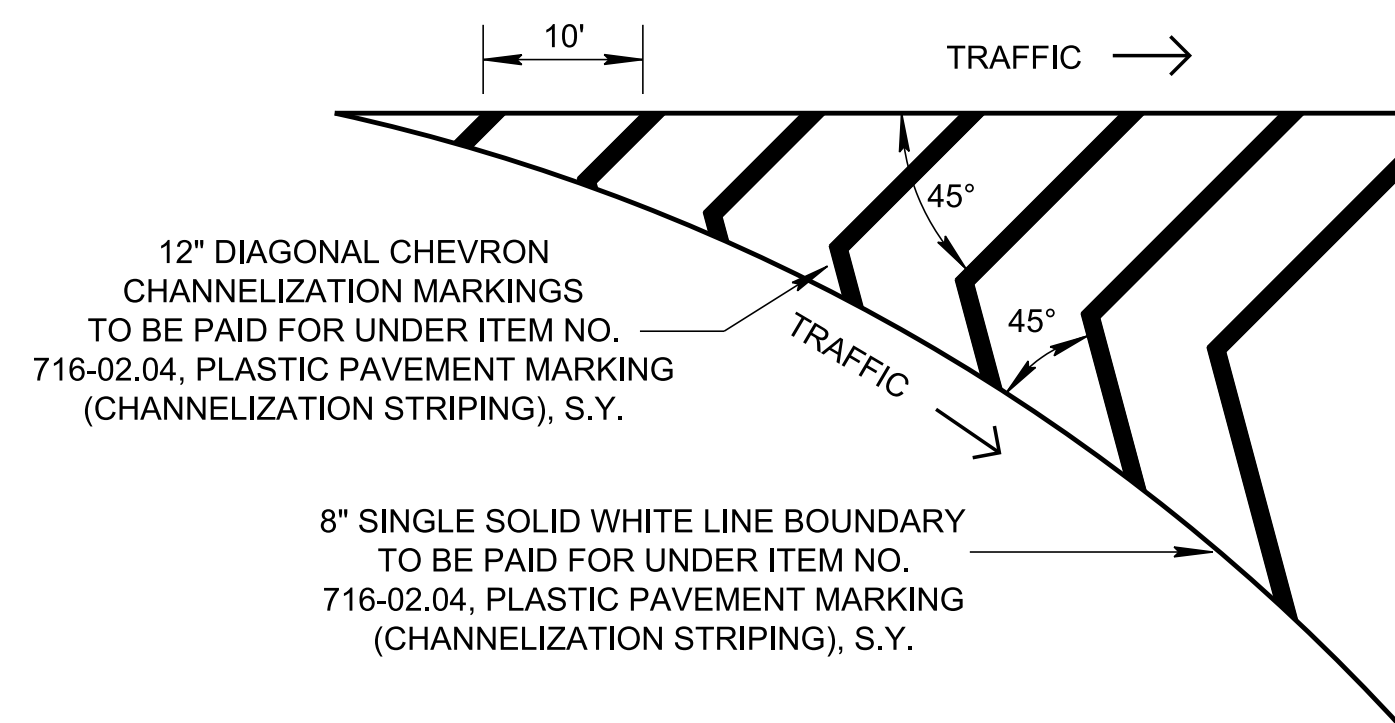
**GUARDRAIL CONNECTION TO BRIDGE ENDS FOR LOW SPEED ROADWAYS**

REV. 10-16-20: RELOCATED SECTION C-C AND ADDED BLOCK-OUT NOTES ON PLAN VIEW. ADDED POST NUMBERS. ADJUSTED THE NUMBER OF POSTS ON ELEVATION VIEW. REVISED GENERAL NOTES (A), (F) AND (G).  
REV. 06-15-21: REVISED PLAN AND ELEVATION VIEWS AND GENERAL NOTE (D). REVISED LEGEND NOTE 2.  
REV. 07-07-23: GENERAL NOTE (I) WAS ADDED.

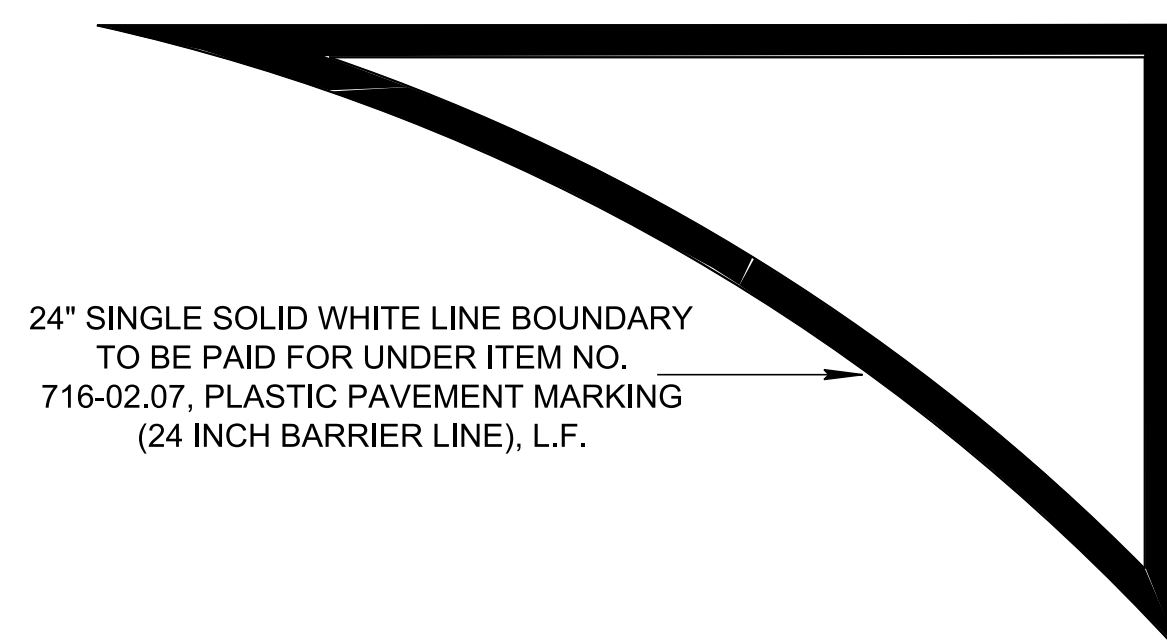
7/5/2023 2:22:30 PM P:\StandDraw\DESIGN STANDARDS\Standards Drawings Library\Standard Roadway Drawings - CURRENT\In Progress\10-107.00 Design - Traffic Control IP\170.01 Pavements Markings IP\TMS-20230707.dgn



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

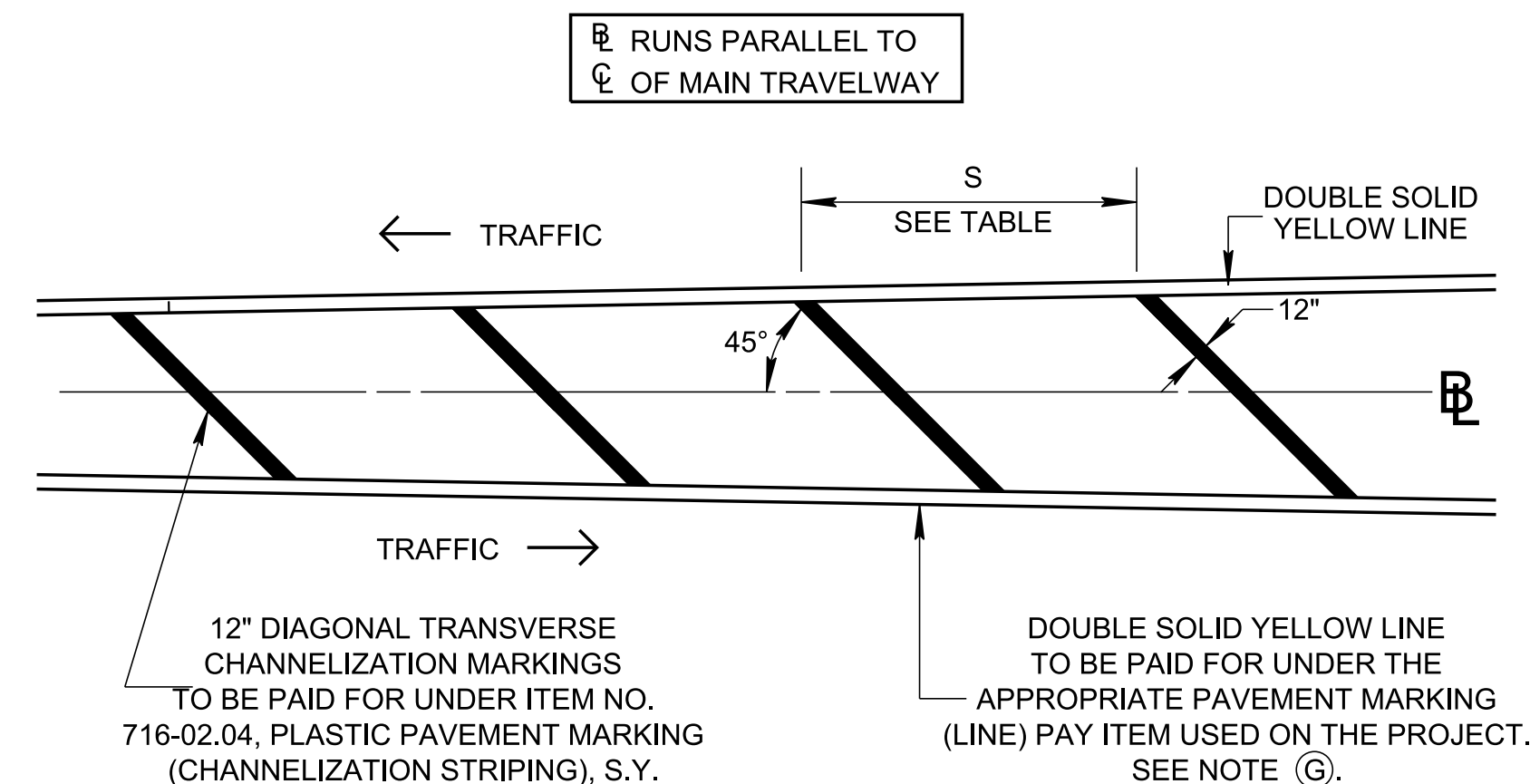


**MARKED ISLAND  
AREA GREATER THAN 400 SQUARE FEET**



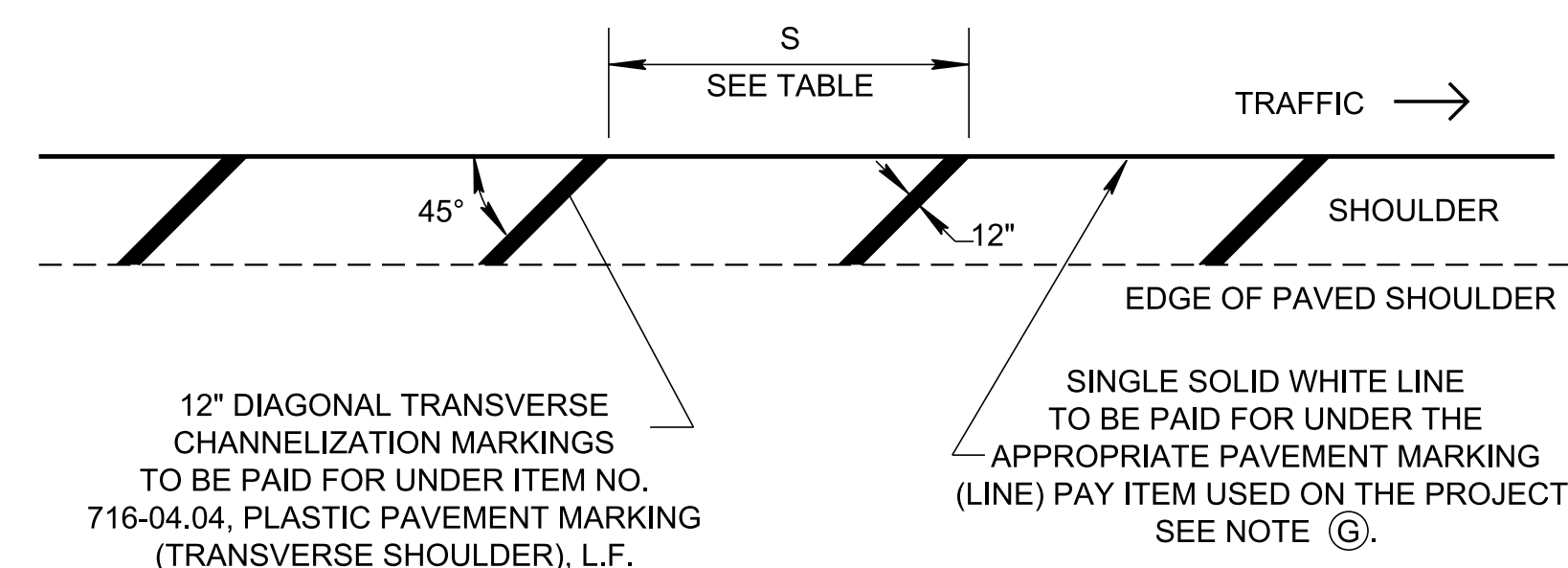
**MARKED ISLAND  
AREA EQUAL TO OR LESS THAN 400 SQUARE FEET  
(SEE NOTE (E))**

**TRAFFIC ISLANDS**

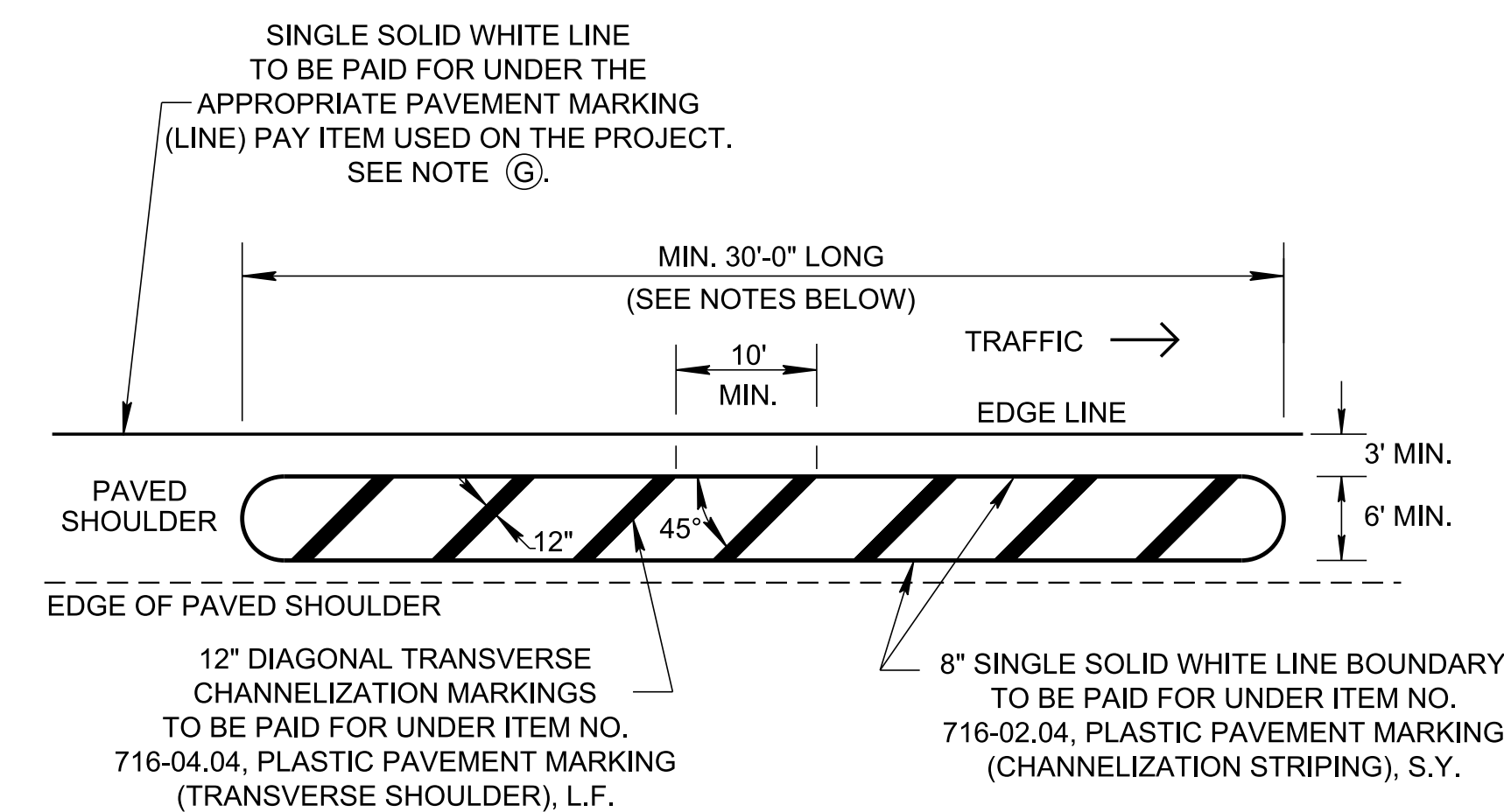


FOR MEDIAN WIDTH LESS THAN 6' NO DIAGONAL MARKING WILL BE REQUIRED (MEASURED OUTSIDE OF BOUNDARY LINES).

**MARKED MEDIAN ISLAND  
AND OBSTRUCTION APPROACH**



**TRANSVERSE SHOULDER MARKING**

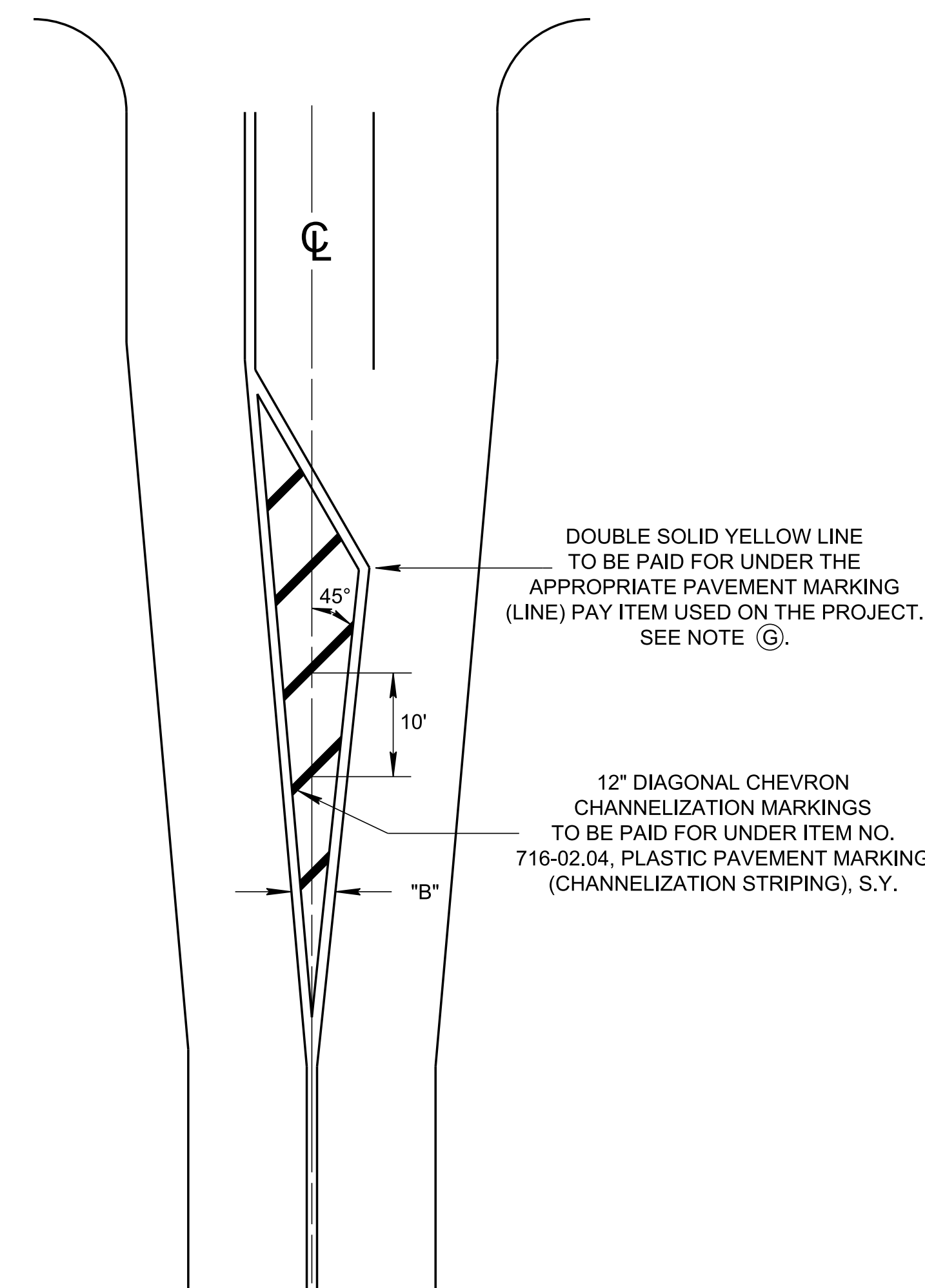


**PAVEMENT MARKING DELINEATING  
ACCESS CONTROLLED ISLAND PLACED ON SHOULDER  
FOR COMMERCIAL BUSINESS ENTRANCE ALONG THE HIGHWAY**

NOTES: COMMERCIAL ENTRANCES WILL RECEIVE THE TREATMENT. EACH APPLICATION SHOULD BE MINIMUM 30' LONG (EACH APPLICATION WILL RECEIVE A MINIMUM OF THREE DIAGONAL MARKINGS) AND SPACING SHOULD BE LIMITED TO 300' BETWEEN TWO COMMERCIAL ENTRANCES.

MINIMUM 10' PAVED SHOULDER IS REQUIRED TO APPLY CHANNELIZATION PAVEMENT MARKING FOR COMMERCIAL DRIVEWAY ACCESS CONTROL.

FOR ADDITIONAL INFORMATION SEE TDOT MANUAL FOR CONSTRUCTING DRIVEWAY ENTRANCES.



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

**TABLE FOR SPACING OF DIAGONAL LINES 'S'**

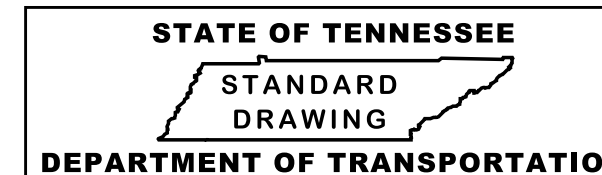
POSTED SPEED	SHOULDERS AND MARKED MEDIANS	OBSTRUCTION APPROACH
40 MPH OR LESS	50'	10'
45 MPH OR GREATER	100'	20'

**GENERAL NOTES**

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

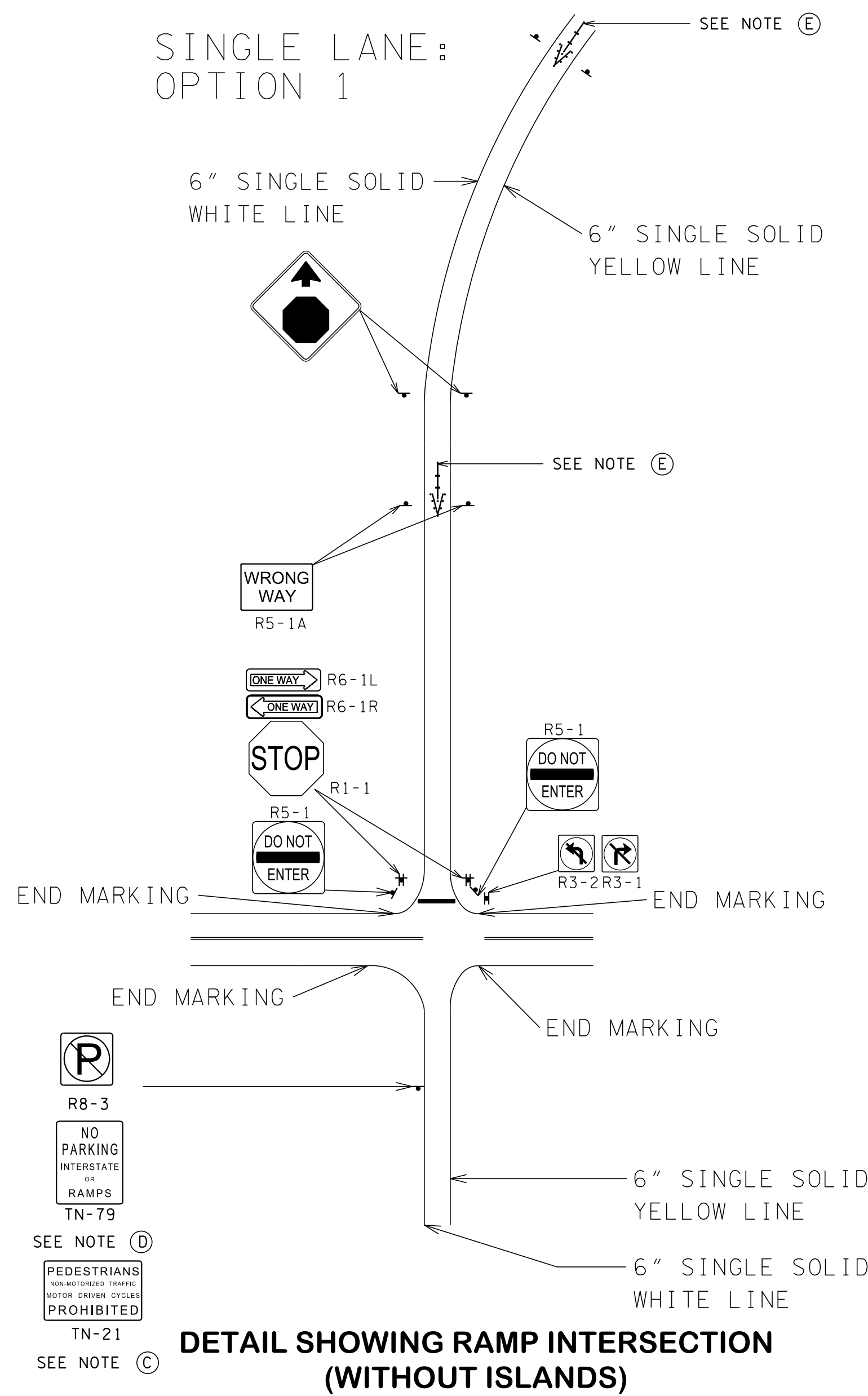
- REV. 06-20-83: GENERAL REVISIONS.
- REV. 03-22-85: ADDED NOTE 'SAME FOR DEPRESSED ISLAND' TO MARKING FOR RAISED ISLAND.
- REV. 2-22-88: CHANGED MINIMUM "B" DIMENSION TO 6'. CHANGED DWG. NO. FROM T-M-10 TO T-M-3. REVISED GENERAL NOTE (D). CHANGED MINIMUM "A" DIMENSION TO 6'.
- REV. 03-20-91: REDREW AND REORGANIZED SHEET.
- REV. 09-19-91: GENERAL REVISION.
- REV. 07-24-14: ADDED GENERAL NOTE (G).
- REV. 06-28-19: REMOVED FOOTNOTE (D). REVISED GENERAL NOTE (G) AND REDREW SHEET.
- REV. 07-07-23: ADDED PAVEMENT MARKING DELINEATING DRAWING AND NOTES FOR COMMERCIAL BUSINESS ENTRANCE.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED



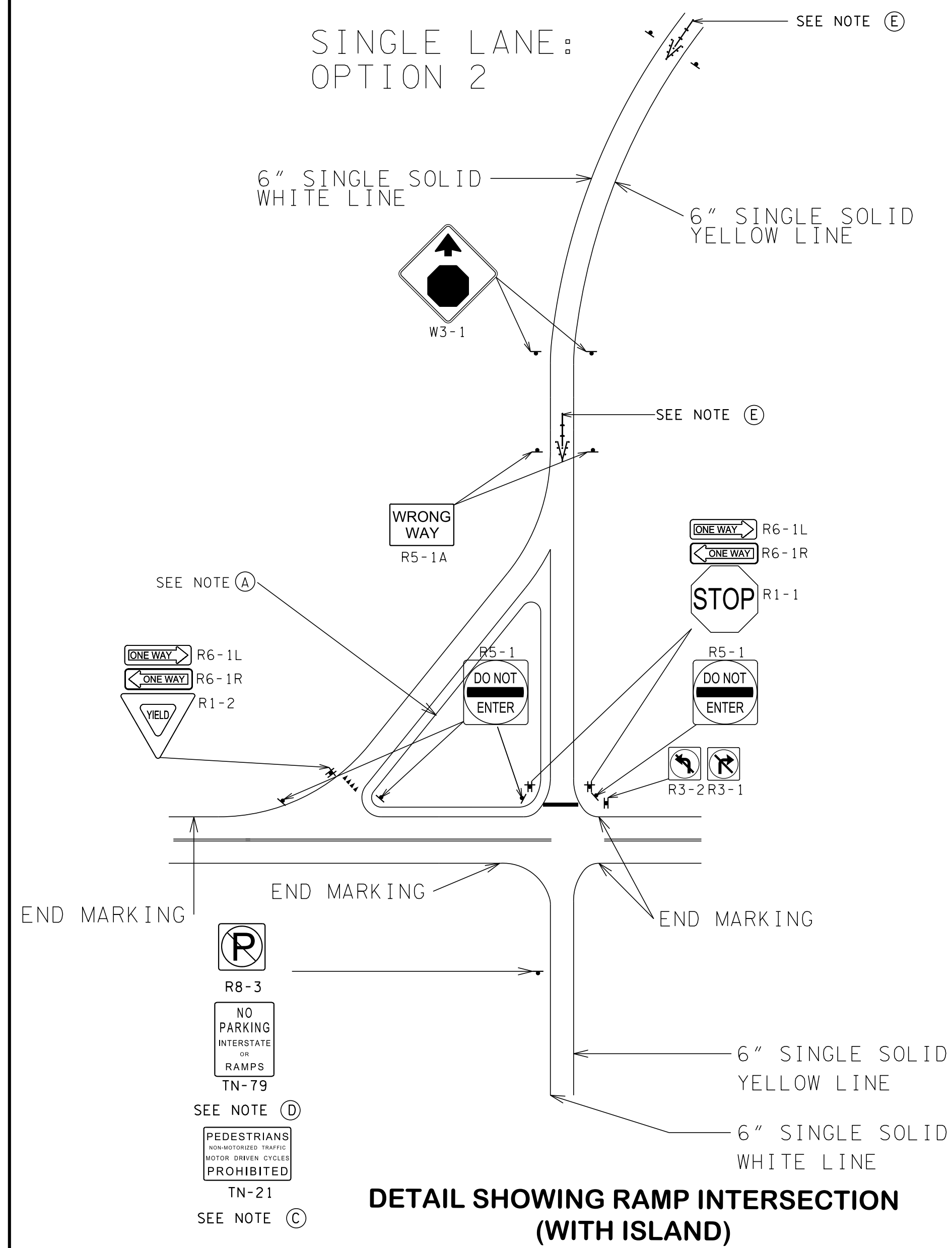
**MARKING STANDARDS  
FOR TRAFFIC ISLANDS,  
PAVED SHOULDER  
AND MEDIANS FOR  
CONVENTIONAL ROADS**

SINGLE LANE:  
OPTION 1



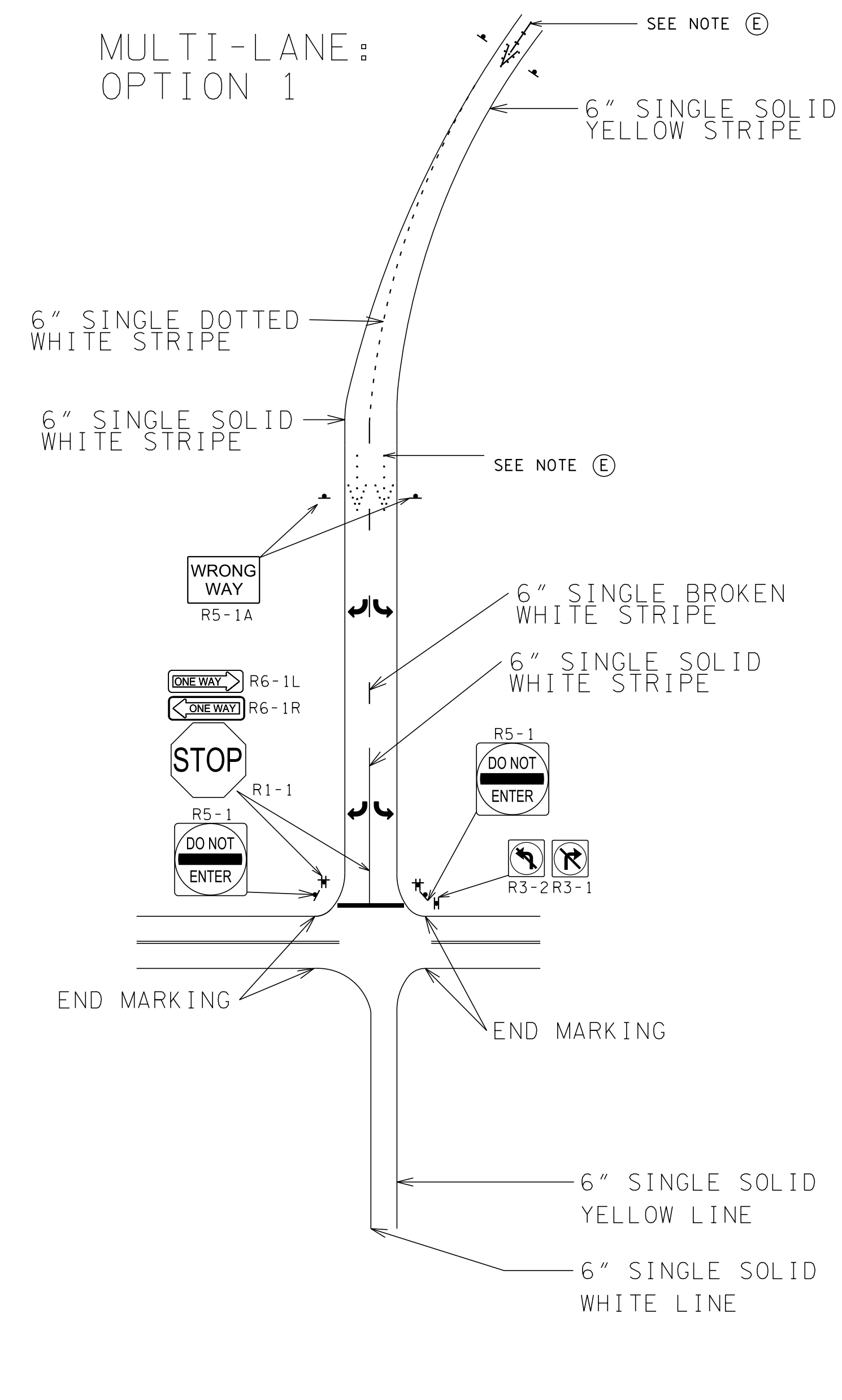
DETAIL SHOWING RAMP INTERSECTION  
(WITHOUT ISLANDS)

SINGLE LANE:  
OPTION 2



DETAIL SHOWING RAMP INTERSECTION  
(WITH ISLAND)

MULTI-LANE:  
OPTION 1



GENERAL NOTES

- (A) SEE STANDARD DRAWING NO. T-M-3 FOR ADDITIONAL DETAILS FOR ISLAND CHANNELIZATION MARKINGS.
- (B) SEE STANDARD DRAWING NO. T-M-9 AND T-M-9B FOR ADDITIONAL DETAILS FOR RAMP SIGNING, STRIPING, AND PAVEMENT MARKERS.
- (C) TN-21 TO BE INSTALLED ON ALL ON-RAMPS TO ACCESS CONTROLLED ROUTES. THIS SIGN SHOULD BE LOCATED AS NEAR TO THE ON-RAMP ENTRANCE AS POSSIBLE AND POSITIONED SO THAT ANY PEDESTRIAN, MOTOR DRIVEN CYCLE OR PROHIBITED NON-MOTORIZED TRAFFIC CAN SEE THE SIGN AS SOON AS POSSIBLE.
- (D) TN-79 AND R8-3 TO BE INSTALLED WHEN THE SHOULDER OF THE ENTRANCE AND EXIT RAMP WOULD ALLOW FOR SUCH PARKING. SEE TENNESSEE SUPPLEMENT TO THE STANDARD HIGHWAY SIGNS BOOK FOR GUIDANCE ON PLACEMENT ON ENTRANCE AND EXIT RAMP.
- (E) THE WRONG WAY PAVEMENT ARROWS SHOULD BE APPROXIMATELY 200' FROM STOP LINE EVEN WITH THE WRONG WAY SIGNS. FOR MULTI-LANE RAMPS, THERE SHOULD BE ONE ARROW PLACED IN EACH LANE. SEE TYPE A DETAIL FOR SPECIFICATIONS FOR ONE LANE RAMPS AND TYPE B DETAIL FOR MULTI-LANE RAMPS. ANOTHER SET OF WRONG WAY SIGNS MAY BE ADDED 200' FROM THE FIRST SET.
- (F) INSTALL RED RETROREFLECTIVE STRIPS ALONG THE SIGNS POSTS OF DO NOT ENTER AND WRONG WAY SIGNS. STRIPS SHALL BE TWO (2) INCHES WIDE AND SIX (6) FEET LONG.
- (G) ONE WAY SIGNS MAY BE MOUNTED WITH THE STOP, YIELD, OR DO NOT ENTER SIGNS.

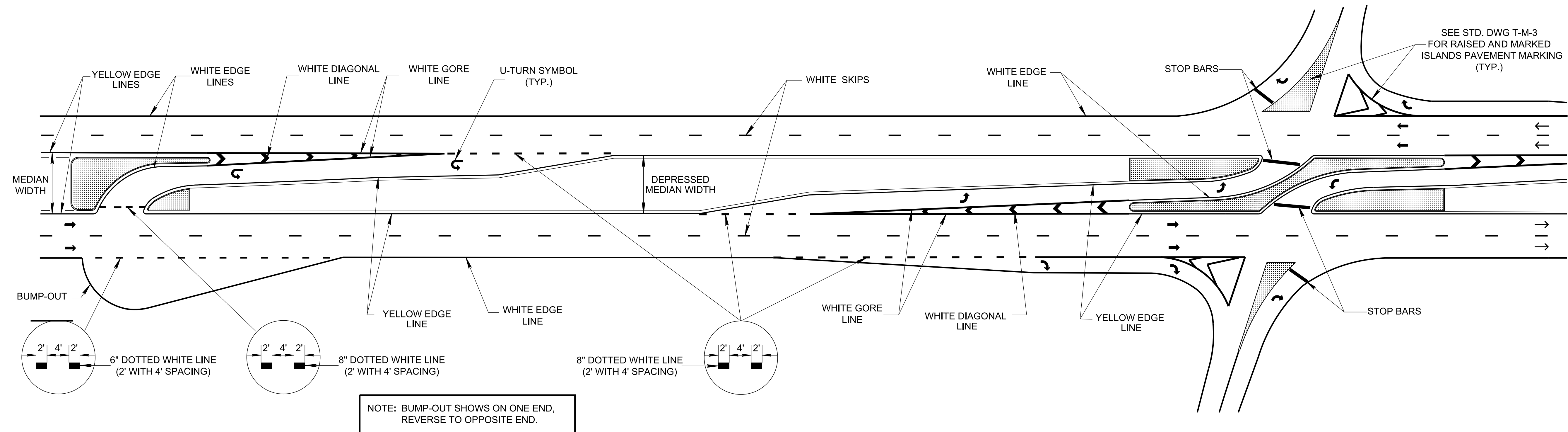
- REV. 3-22-85: REVISED TO SHOW 8" BOUNDARY AROUND ISLANDS.
- REV. 2-22-88: ADDED REFERENCE NOTE FOR DWG. NO. T-M-3. CHANGED DWG. NO. FROM T-M-6 TO T-M-9.
- REV. 7-15-91: REORGANIZED AND REDREW SHEET.
- REV. 7-29-98: CHANGED WIDTH OF CENTERLINES, EDGELINES AND DOTTED WHITE LANE LINES FROM 4 TO 6 INCHES.
- REV. 12-12-00: MOVED WRONG WAY PAVEMENT ARROW DETAILS FROM STD. DWG. NO. T-S-11. ADDED WRONG WAY SIGNS AND ARROWS TO ALL PLAN VIEWS. ADDED GENERAL NOTE (B).
- REV. 11-30-04: CHANGED WRONG WAY SIGN DESIGNATION FROM R5-9 TO R5-1a.
- REV. 11-1-11: ADDED ADDITIONAL SIGNS TO RAMP INTERSECTION DETAIL.
- REV. 06-28-19: REDREW SHEET.
- REV. 06-15-21: ADDED GENERAL NOTES (C) AND (E). ADDED ADDITIONAL SIGNS TO RAMP INTERSECTION DETAILS.
- REV. 05-01-23: REDREW SHEET.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED

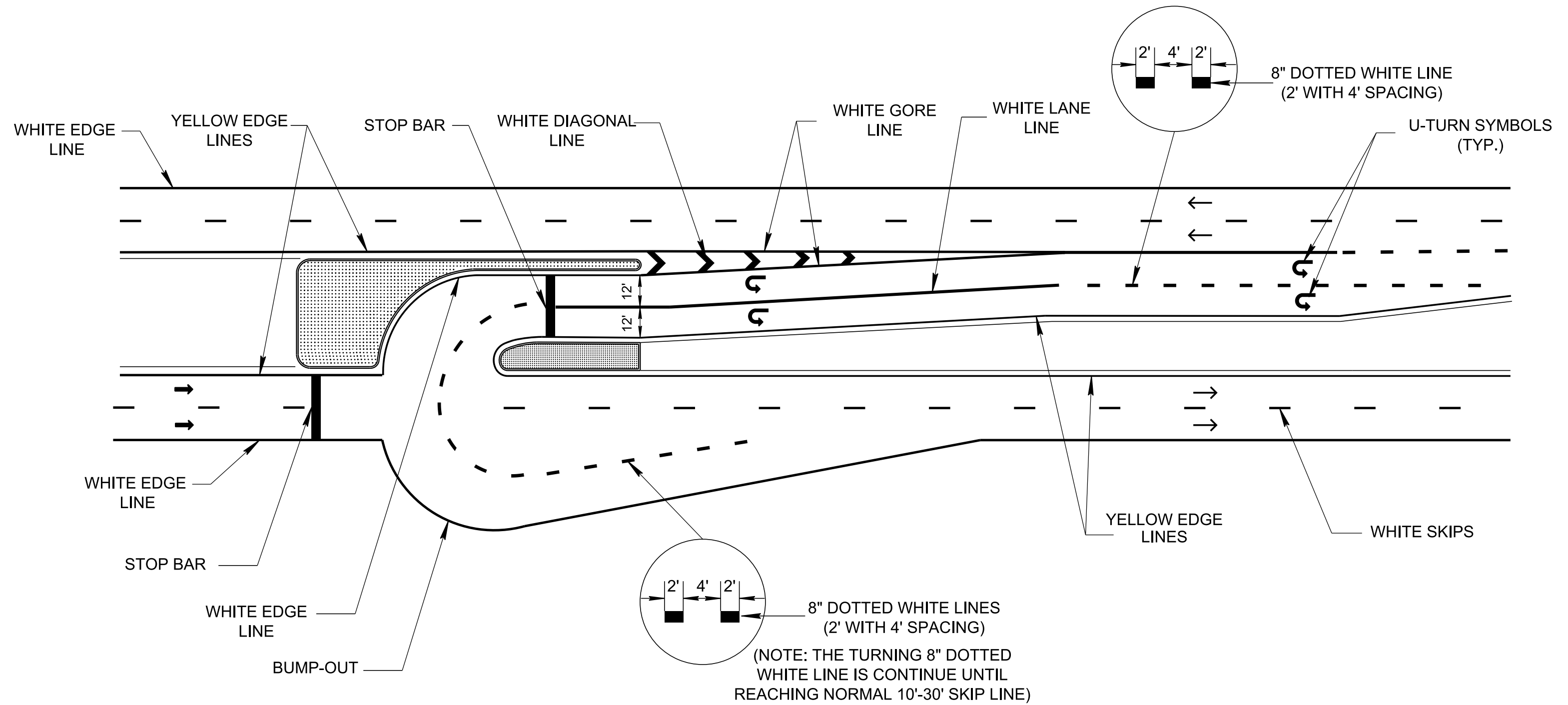
STATE OF TENNESSEE  
STANDARD DRAWING  
DEPARTMENT OF TRANSPORTATION

PAVEMENT MARKING AND SIGNING DETAILS FOR RAMP INTERSECTIONS

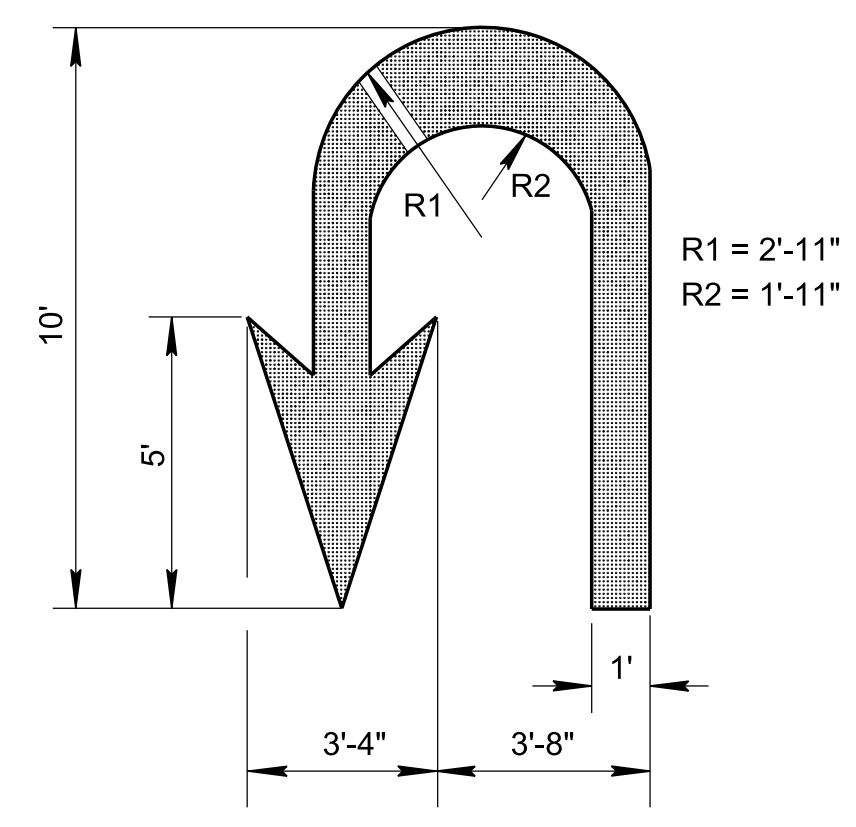




PLAN VIEW FOR J-TURN AND RESTRICTED CROSSING INTERSECTIONS



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



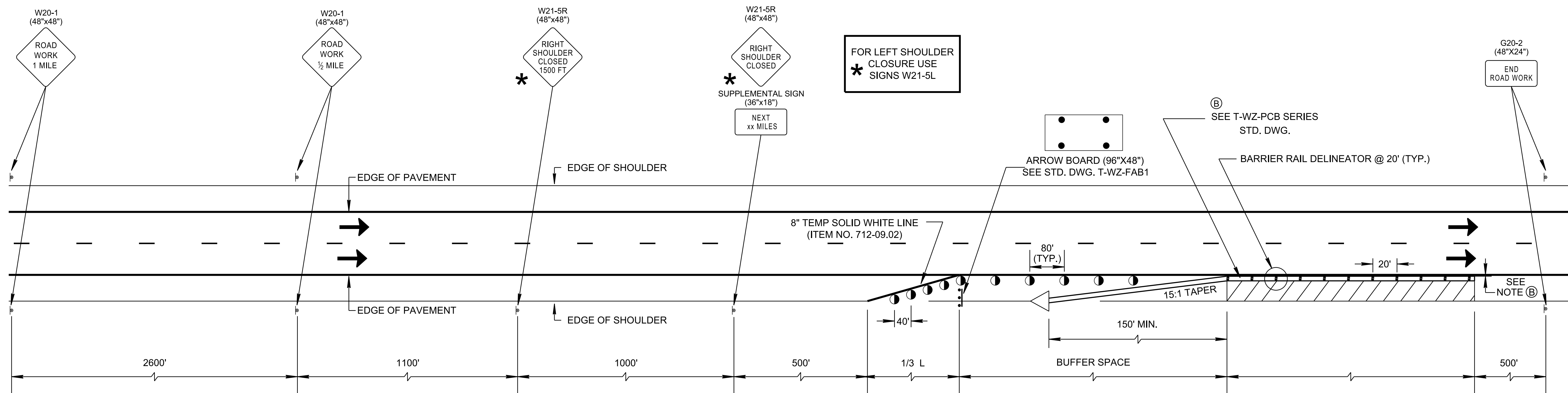
U-TURN LEFT-USE ARROW

**LEGEND**

- [Hatched Box] CONCRETE ISLANDS AND/OR SLOPING CURB
- [Arrows with symbols] PAVEMENT MARKING SYMBOLS
- [Straight Arrow] DIRECTION OF TRAFFIC

**GENERAL NOTES**

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



FOR LEFT SHOULDER CLOSURE USE SIGNS W21-5L

### COMPUTATION FOR DISTANCE L

$$L = W \times S$$

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

### BUFFER SPACE BASED ON PRE-CONSTRUCTION POSTED SPEED

SPEED	DISTANCE
45	360
50	425
55	495
60	570
65	645
70	730
75	820

**TRAFFIC CONTROL SHOULDER CLOSURE DETAIL**

### CHANNELIZATION DEVICE LEGEND

	FLEXIBLE DRUMS (ITEM NO. 712-04.01, PER EACH)
	FLASHING YELLOW ARROW BOARD (SEE STD. DWG. NO. T-WZ-FAB1, FOR DETAILS AND SPECIFICATIONS) (ITEM NO. 712-08.03, PER EACH)
	SIGN SUPPORT
	DIRECTION OF TRAFFIC
	WORK SPACE
	BARRIER RAIL DELINEATOR (ITEM NO. 712-04.50, PER EACH)
	ATTENUATOR SEE STD. DWG. S-CC-1 (ITEM NO. 712-02.60, PER EACH)

### SPECIAL NOTES

LANE WIDTHS SHALL BE A MINIMUM OF 11FT WITH 2FT SHOULDER. WHEN ALIGNMENT IS IN A HORIZONTAL CURVE WITH A RADIUS LESS THAN 2500FT, LANE WIDTHS SHALL BE A MINIMUM OF 12FT WITH 2FT SHOULDERS.

IF THE MINIMUM DESIGN REQUIREMENTS OF THIS STANDARD DRAWING CANNOT BE MET, A WORK ZONE DESIGN DEVIATION MUST BE SUBMITTED TO AND APPROVED BY THE STATE WORK ZONE ENGINEER.

### GENERAL NOTES

(A) THIS STANDARD CAN BE USED FOR THE CLOSURE OF AN INSIDE OR OUTSIDE SHOULDER OF ANY MULTI-LANE DIVIDED HIGHWAY. FOR THE CLOSURE OF AN INTERIOR LANE, SEE STANDARD DRAWING NOS. T-WZ-13, TWZ-14, OR T-WZ-15 FOR DETAILS.

(B) MINIMUM TWO FEET (2') OFFSET BETWEEN TRAVEL LANE AND PORTABLE BARRIER IS REQUIRED. THE MAXIMUM POSSIBLE OFFSET BETWEEN TRAVEL LANE AND PORTABLE BARRIER MUST BE OBTAINED. A 2' MINIMUM OFFSET IS REQUIRED BETWEEN THE TRAVELLED LANE AND BRIDGE PARAPET, PORTABLE BARRIER RAIL, CONCRETE MEDIAN BARRIERS, ETC.

(C) PORTABLE BARRIER RAIL WILL BE REQUIRED WHERE DROP OFFS EXCEED 18 INCHES. PORTABLE BARRIER RAIL MAY BE USED WHERE DROP OFFS EXCEED 6 INCHES. FOR MORE SPECIFIC INFORMATION SEE TDOT DESIGN GUIDELINES FOR DROP-OFF REQUIREMENT.

(D) TAPER LENGTH SHOWN FOR THE PORTABLE BARRIER RAIL IS A MINIMUM FOR A 10' SHOULDER. PORTABLE BARRIER RAIL SHOULD BE EXTENDED BEYOND THE CLEAR ZONE OR BE SHIELDED WITH A CRASH CUSHION WHEN IT IS NOT FEASIBLE TO EXTEND THE PORTABLE BARRIER RAIL. SEE STANDARD DRAWING S-CZ-1 FOR CLEAR ZONE DISTANCE.

(E) REFER TO THE QUALIFIED PRODUCT LIST FOR APPROVED BARRIER RAIL DELINEATORS. DELINEATORS SHOULD NOT BE MIXED IN THE SAME LINE. BARRIER RAIL DELINEATORS SHALL BE USED ON PORTABLE BARRIER RAIL.

(F) SEE STANDARD DRAWING T-WZ-10 FOR OTHER NECESSARY ADVANCE WARNING SIGNS.

(G) RAISED PAVEMENT MARKERS SHOULD NOT BE USED ON RIGHT EDGE LINE.

REV. 4-15-99: MODIFIED CHANNELIZATION DEVICE LEGEND.

REV. 12-18-99: MODIFIED GENERAL NOTE (E).

REV. 7-29-03: CHANGED GENERAL NOTE (E).

REV. 4-15-04: CHANGED GENERAL NOTE (E) TO COMPLY WITH 2003 MUTCD.

REV. 5-12-06: REPLACED VERTICAL PANEL WITH BARRIER RAIL DELINEATORS. ADDED GENERAL NOTES (E) & (F).

REV. 10-06-06: CHANGED ITEM NO. FOR BARRIER RAIL DELINEATOR. ADDED GENERAL NOTE (E). CHANGED GENERAL NOTE (F).

REV. 03-13-09: CHANGED GENERAL NOTE (E) AND ATTENUATOR LEGEND DESCRIPTION.

REV. 03-05-17: ADDED ITEM NO. 716-05.02 AND 712-09.02.

REV. 06-28-19: ADDED REFERENCED STD DWG S-CC-1 TO LEGEND FOR TEMPORARY CRASH CUSHION. ADDED ITEM NUMBER FOR FLEXIBLE DRUMS AND BARRIER RAIL DELINEATORS. REORGANIZED AND MODIFIED GENERAL NOTES FOR CLARITY. REVISED REFERENCE TO OTHER STD DWG. REDREW SHEET.

REV. 05-01-20: ADDED SPECIAL NOTES. ADDED BUFFER SPACE TABLE. CHANGED CALCULATION FOR DISTANCE L.

REV. 03-04-21: CHANGED ITEM NO. 712-02.60 FOR STD DWG S-CC-1. ADDED REFERENCED STD DWG T-WZ-PCB SERIES. REVISED GENERAL NOTE (B).

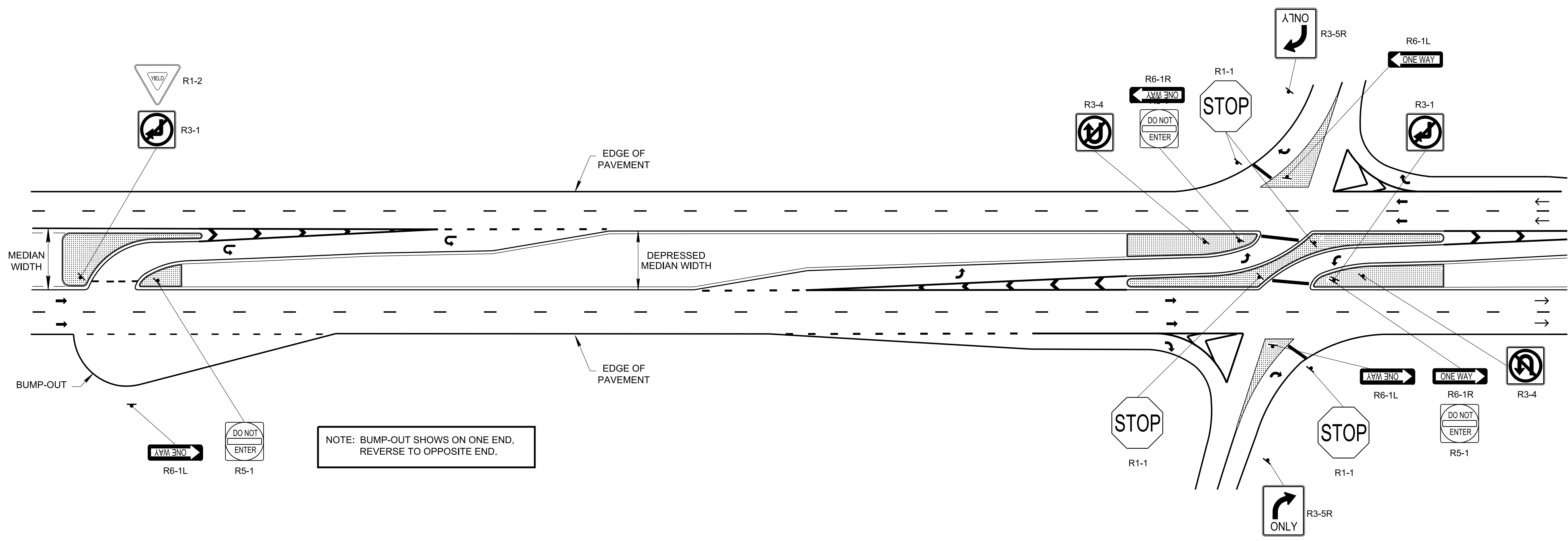
REV. 07-07-23: REVISED GENERAL NOTES (B), (C) AND (D). REMOVED W21-5R SIGNS FROM THE LEFT SIDE.

FHWA  
 APPROVAL NOT REQUIRED

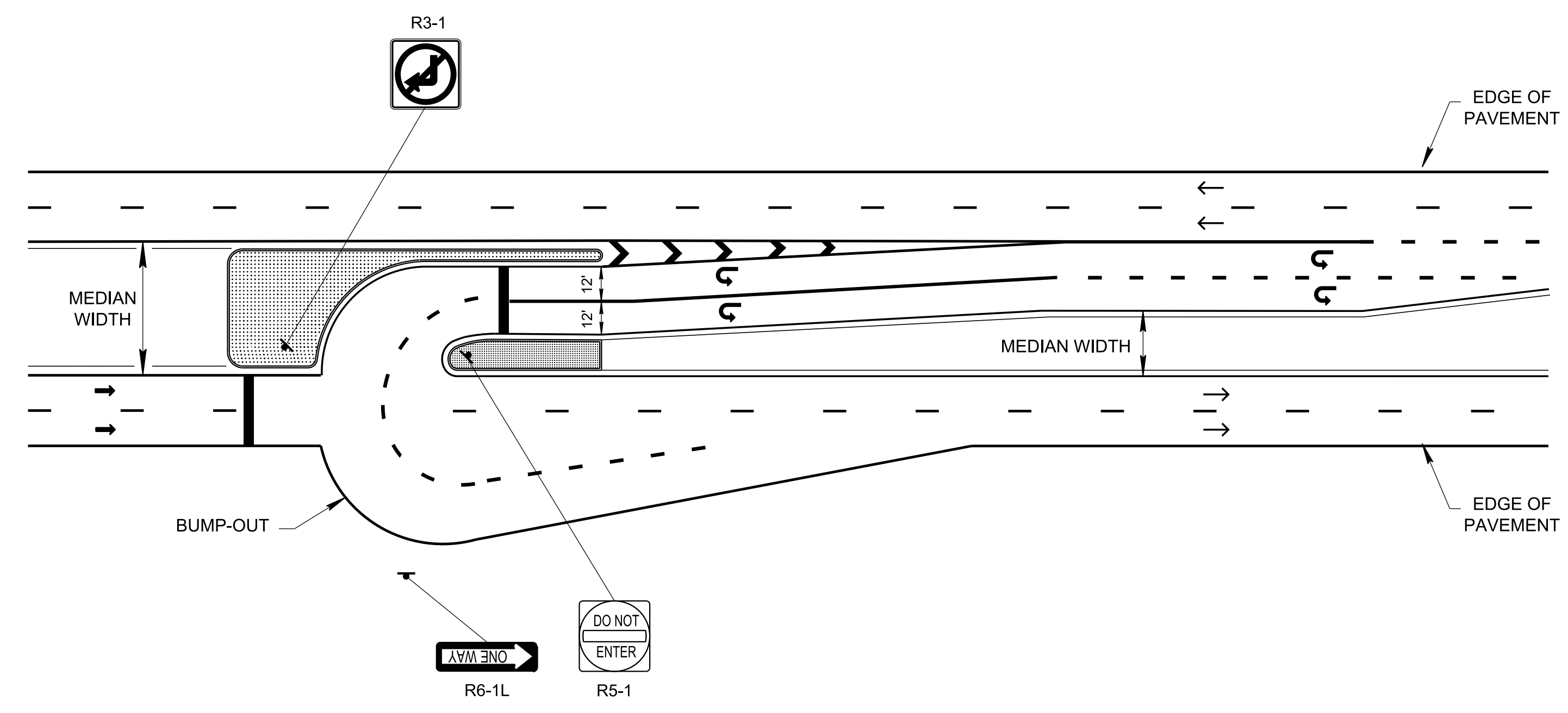
**STATE OF TENNESSEE**  
 STANDARD DRAWING  
**DEPARTMENT OF TRANSPORTATION**

## SHOULDER CLOSURE DETAIL FOR FREEWAYS AND DIVIDED HIGHWAYS

05-27-1998 T-WZ-18



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

09-22-2022 T-S-26

7/5/2023 2:21:02 PM P:\StandDraw\DESIGN STANDARDS\Standards Drawings Library\Standard Roadway Drawings - CURRENT\In Progress\10-107.00 Design - Traffic Control\IP170.01 Pavements Markings\PTS26-20230707.dgn

NOT TO SCALE