



**STATE OF TENNESSEE  
DEPARTMENT OF TRANSPORTATION**

**DESIGN DIVISION**  
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**JOE GALBATO III**  
COMMISSIONER

**BILL LEE**  
GOVERNOR

**INSTRUCTIONAL BULLETIN NO. 22-03**

**Regarding Various Revised and New Standard Drawings**

**Effective August 19, 2022 letting (June 8, 2022 Turn-in)**, the following Standard Drawings have been revised or are new. 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 CATCH BASINS AND MANHOLES**

**10-102.01 CATCH BASINS**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
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D-CB-12LPA		ALTERNATE REINFORCEMENT FOR PRECAST CONCRETE 32" X 32" NO. 12LP CATCH BASIN
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**10-106.00 SAFETY DESIGN AND GUARDRAILS**

**10-106.01 CLEAR ZONE & SAFETY PLANS**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
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S-PL-1A		SAFETY PLAN FOR BARRIER LENGTH OF NEED (FOR RIGID OBJECTS)
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S-PL-1B		SAFETY PLAN FOR BARRIER LENGTH OF NEED ON CURVED ROADWAYS
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**10-106.06 GUARDRAIL (SPECIAL CASES)**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
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S-GRS-6		SPECIAL CASE FLEXIBILITY ON GUARDRAIL POST INSTALLATIONS
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**Revised Standard Drawings:****10-101.00 PIPE CULVERTS AND ENDWALLS****10-101.01 PIPE CULVERTS AND FLUMES**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
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D-PB-2	01-28-22	STANDARD DETAILS FOR FLEXIBLE PIPE INSTALLATION
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**10-102.00 CATCH BASINS AND MANHOLES****10-102.01 CATCH BASINS**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
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D-CB-10RA	01-28-22	STANDARD PRECAST 48" CIRCULAR NO. 10 CATCH BASIN FOR USE WITH 6" VERTICAL CURB
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D-CB-12RA	01-28-22	STANDARD PRECAST 48" CIRCULAR NO. 12 CATCH BASIN FOR USE WITH 6" VERTICAL CURB
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D-CB-13RA	01-28-22	STANDARD PRECAST 48" CIRCULAR NO. 13 CATCH BASIN FOR USE WITH 6" VERTICAL CURB
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D-CB-25RA	01-28-22	STANDARD PRECAST 48" CIRCULAR NO. 25 CATCH BASIN (FOR USE WITH 6" SLOPING CURB)
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D-CB-99R	01-28-22	MISCELLANEOUS DETAILS FOR ROUND STRUCTURES
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**10-104.00 ROADWAY, PAVEMENT APPURTENANCES AND FENCE****10-104.01 CONCRETE PAVEMENT**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
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RP-J-18	01-28-22	DOWEL ASSEMBLY DEVICES
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RP-J-23	01-28-22	CONCRETE PAVEMENT REPAIR DETAILS
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**10-105.00 MULTIMODAL****10-105.03 SAFETY RAIL**

<b>DRAWING NUMBER</b>	<b>REVISION DATE</b>	<b>DESCRIPTION</b>
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MM-BPR-1	01-28-22	BIKE AND PEDESTRIAN SAFETY RAIL
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**10-105.03****TYPICAL SECTION****DRAWING  
NUMBER****REVISION  
DATE****DESCRIPTION**

MM-TS-3

01-28-22

SEPARATED SHARED USE PATH TYPICAL SECTIONS

**10-106.00****SAFETY DESIGN AND GUARDRAILS****10-106.01****CLEAR ZONE & SAFETY PLANS****DRAWING  
NUMBER****REVISION  
DATE****DESCRIPTION**

S-PL-1

01-28-22

SAFETY PLAN FOR BARRIER LENGTH OF NEED

**10-106.06****GUARDRAIL (SPECIAL CASES)**

S-GRS-2

01-28-22

SPECIAL CASE GUARDRAIL ATTACHMENT TO CONCRETE DECKS

**10-106.01****CONCRETE MEDIAN BARRIERS**

S-SSMB-1

01-28-22

32" SINGLE SLOPE CONCRETE BARRIER WALL

**10-106.10****GUARDRAIL MAINTENANCE**

S-GR28-3M

01-28-22

GUARDRAIL HEIGHT ADJUSTMENT

**10-107.00****DESIGN -TRAFFIC CONTROL****10-107.01****PAVEMENT MARKINGS**

T-M-4B

01-28-22

STANDARD SIGNALIZED MID-BLOCK CROSSING

**10-107.02****WORK ZONE****DRAWING  
NUMBER****REVISION  
DATE****DESCRIPTION**

T-WZ-PCB1

01-28-22

10 FOOT PORTABLE CONCRETE BARRIER RAIL

T-WZ-PCB2

01-28-22

20 FOOT PORTABLE CONCRETE BARRIER RAIL

T-WZ-PCB3

01-28-22

PORTABLE CONCRETE BARRIER RAIL DETAILS

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.

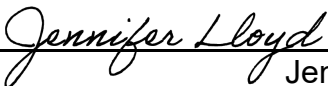
Standard Drawings:

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

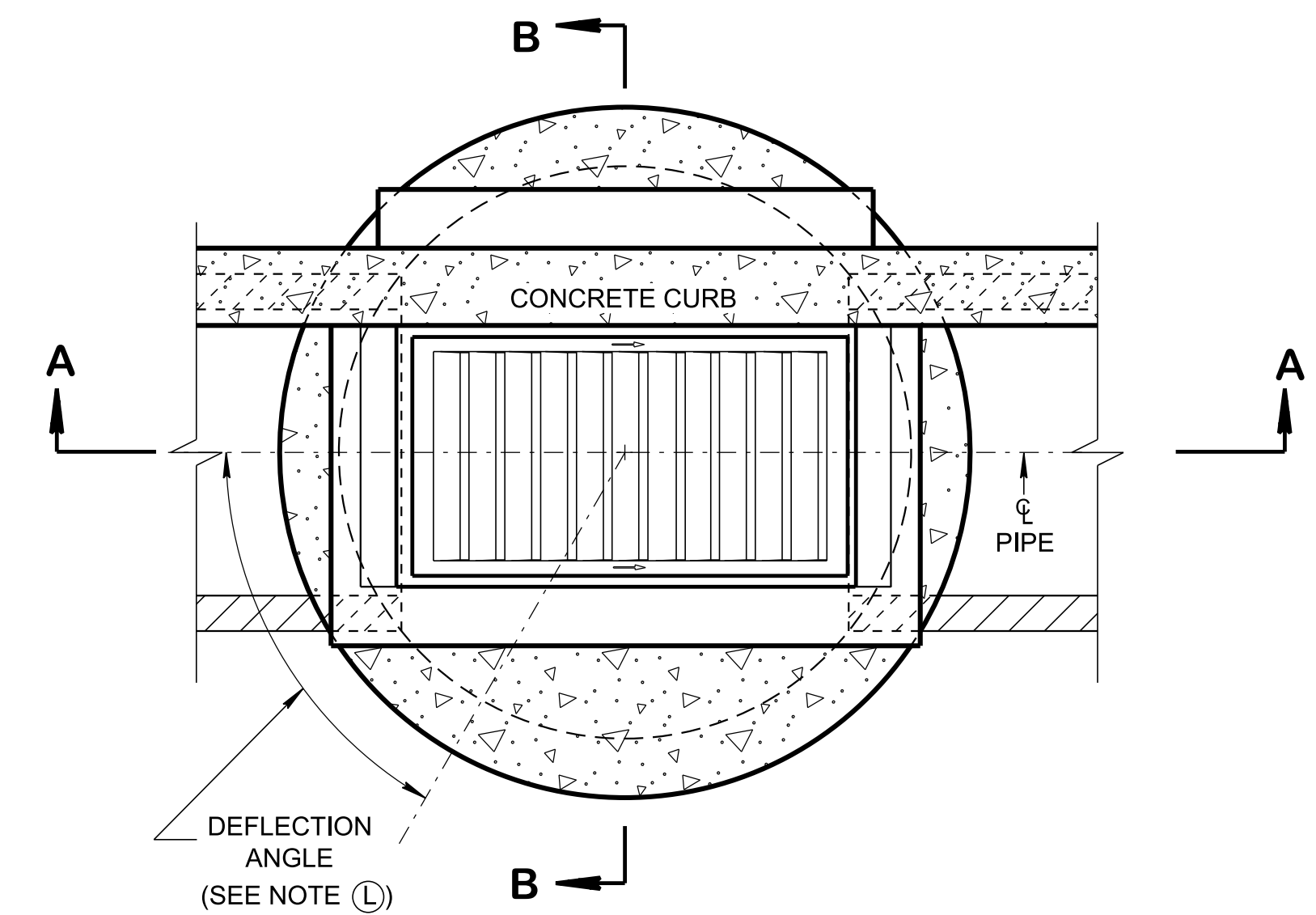
Chapter 10 - Index of Standard Drawings is available online at this location:

[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)

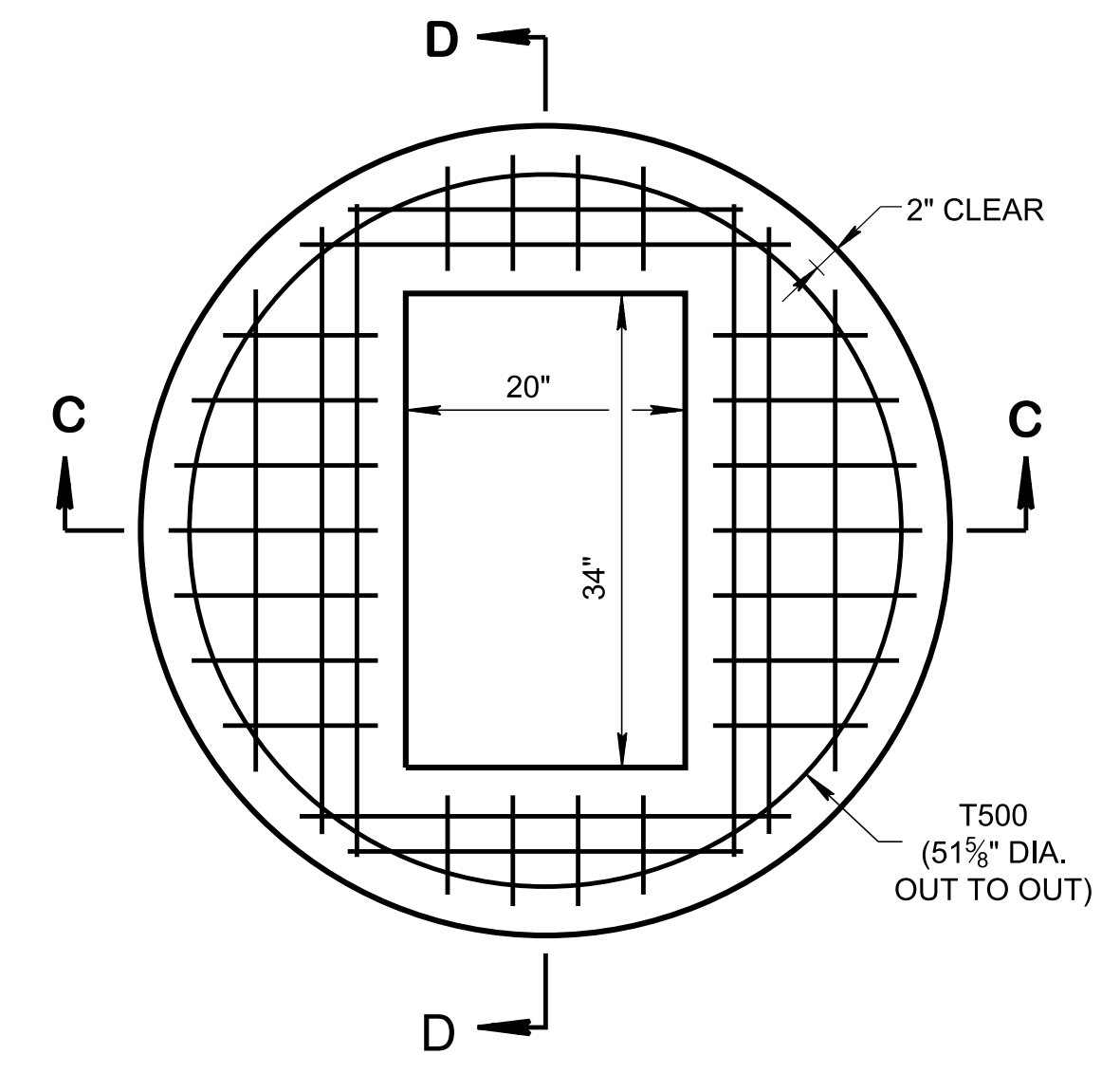
The following Instructional Bulletins are voided due to inclusion into Chapter 10 of the Roadside Design Guidelines: IB 19-10, 19-18, 19-21, 19-22, 20-01, 20-02, 20-08, 20-09, 20-10, 20-12, 20-15, 20-16, 20-21, 20-22, 21-08, 21-12, 21-13.

  
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Jennifer Lloyd, PE  
Civil Engineering Director  
Roadway Design Division

KJL:ARH:RBB  
January 28, 2022

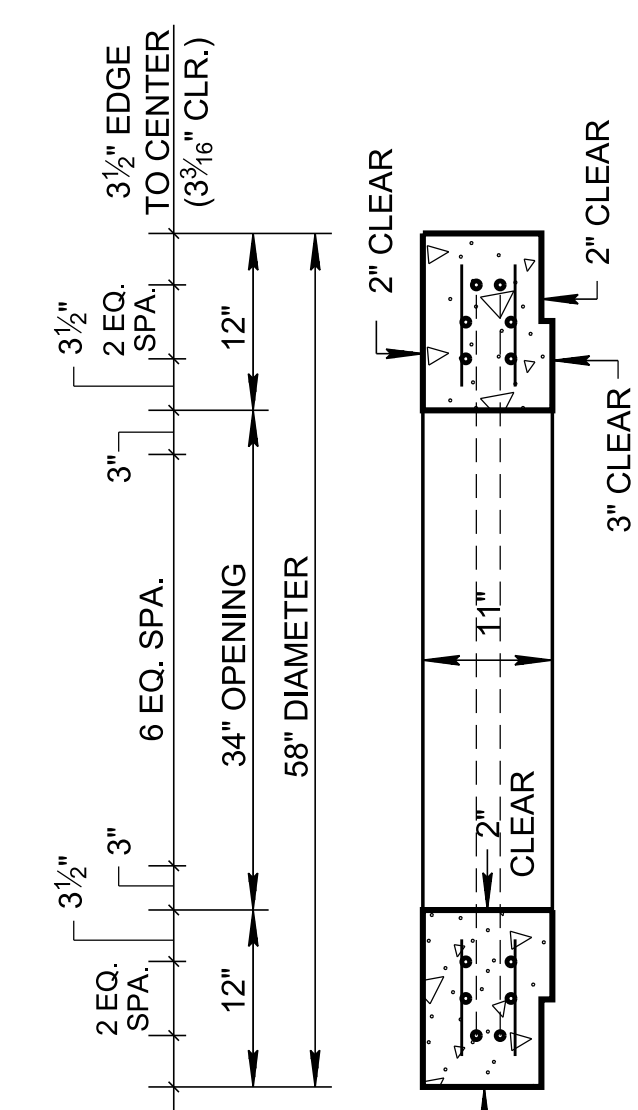


PLAN VIEW



LID REINFORCING

- \_\_\_\_\_ T500
- \_\_\_\_\_ A503
- \_\_\_\_\_ A504
- \_\_\_\_\_ A507
- \_\_\_\_\_ A508
- \_\_\_\_\_ A509
- \_\_\_\_\_ A510
- \_\_\_\_\_ A509
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- \_\_\_\_\_ A507
- \_\_\_\_\_ A504
- \_\_\_\_\_ A503
- \_\_\_\_\_ T500

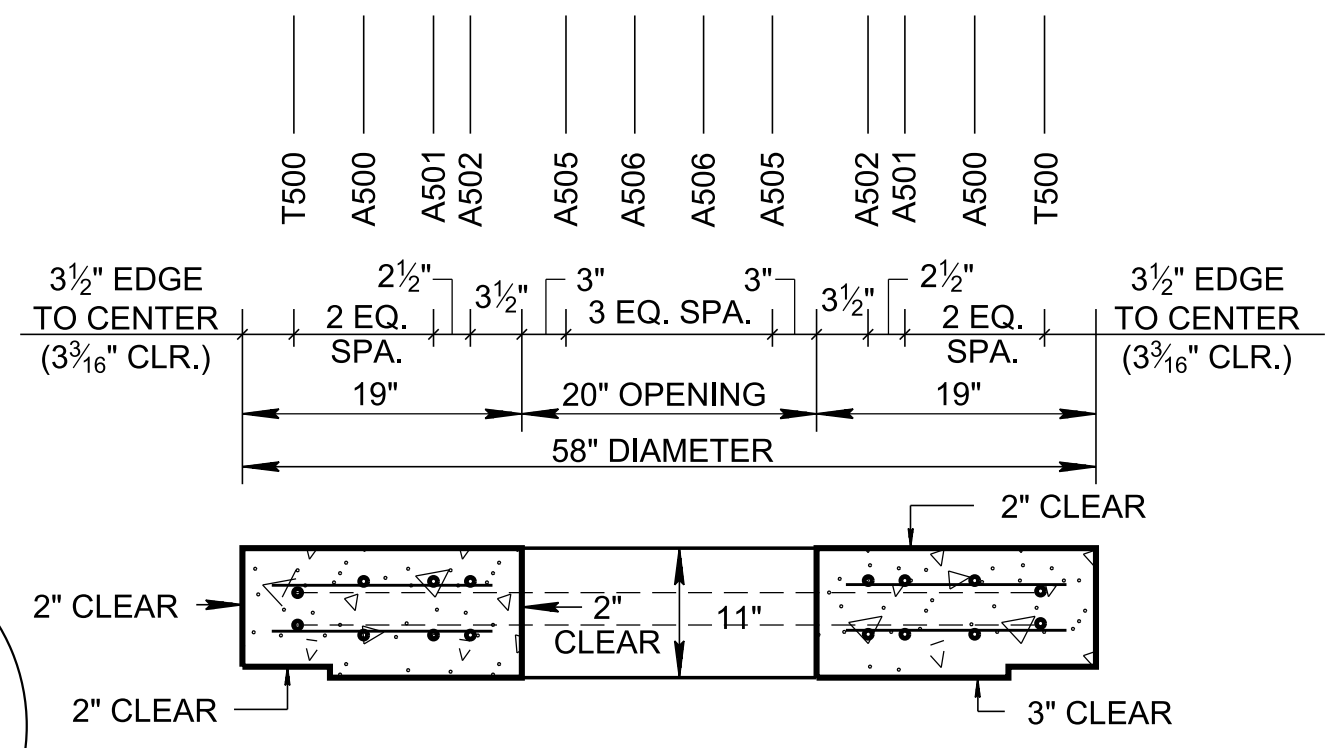


SECTION D-D

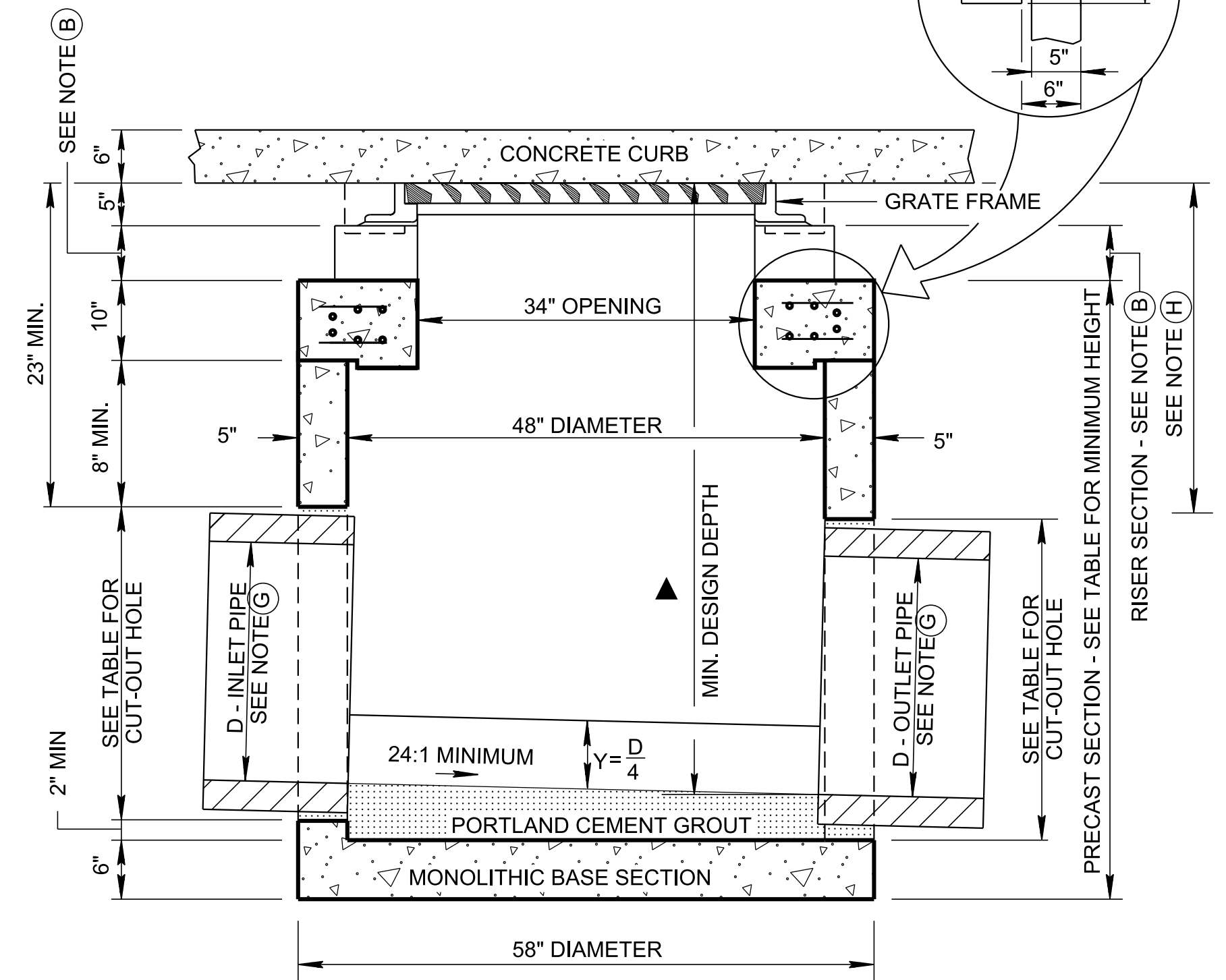
**CATCH BASIN MAXIMUM DEPTH NOTE**  
 MAXIMUM DEPTH FOR THIS STRUCTURE IS 20.00'

CATCH BASIN DIMENSIONS				FOR DESIGN USE ONLY CATCH BASIN MINIMUM DESIGN DEPTH (FEET) ▲
INSIDE DIAMETER (D) OF PIPE (INCHES)	PIPE WALL THICKNESS (INCHES)	DIAMETER OF CUT-OUT HOLES (INCHES)	BOX SECTION MINIMUM HEIGHTS (INCHES)	
18	2½	25	51	3.89
24	3	32	58	4.43

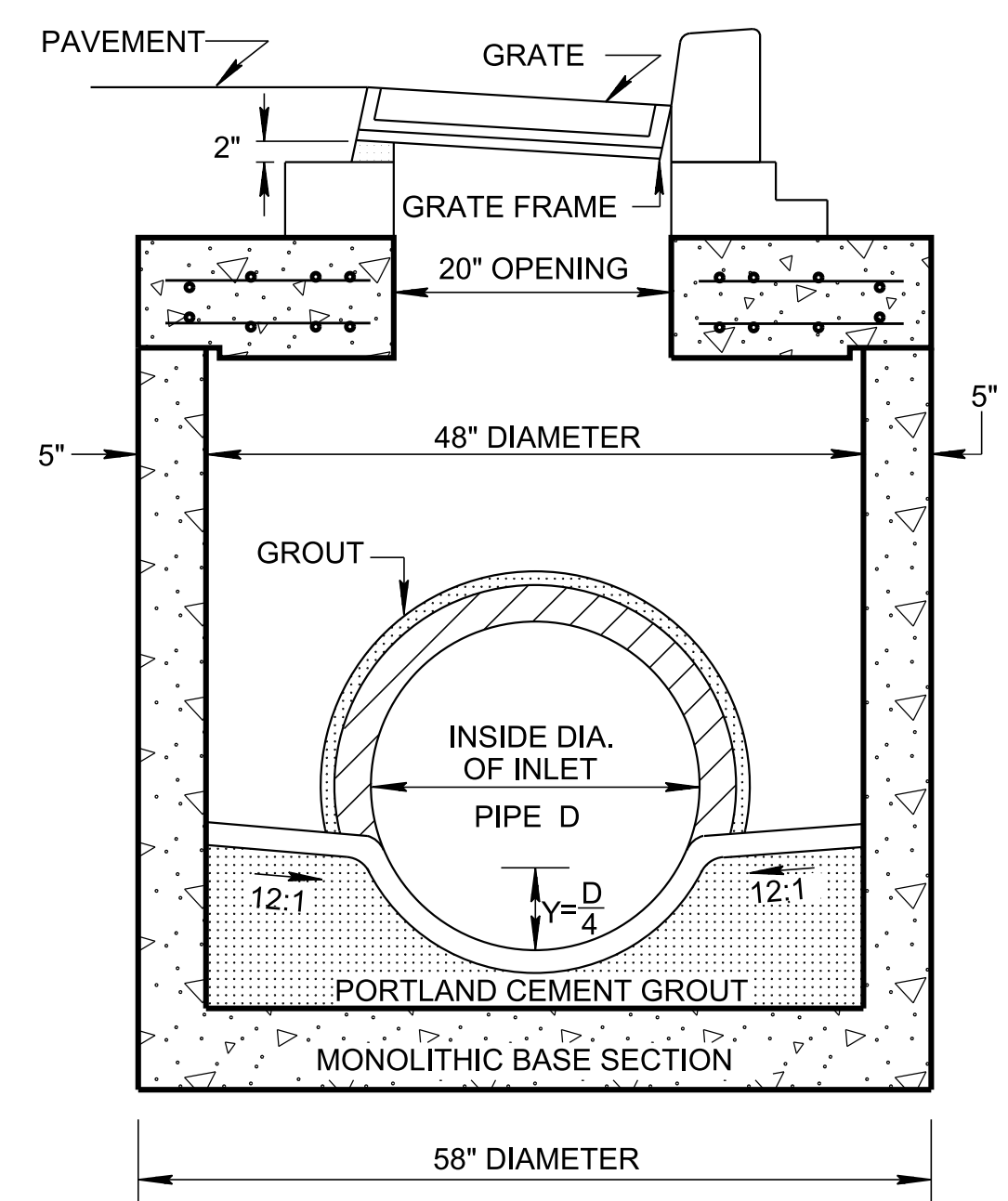
- ▲ SEE SECTION A-A FOR MINIMUM DESIGN DEPTH MEASUREMENT.
- ① CUT-OUT HOLES BASED ON REINFORCED CONCRETE PIPE WITH WALL TYPE "B".
  - ② ALL FLEXIBLE PIPE MATERIALS REQUIRE GASKET. SEE STANDARD DRAWING D-PB-2.
  - ③ CUT-OUT HOLES FOR PRECAST STRUCTURES TO BE FORMED IN ORDER TO OBTAIN A SMOOTH EDGED HOLE. SCORED OR ETCHED HOLES WITH REINFORCING STEEL LEFT UNCUT WILL NOT BE PERMITTED.



SECTION C-C



SECTION A-A



SECTION B-B

NON-SHRINK GROUT PER STANDARD SPECIFICATIONS SECTION 921 REQUIRED AROUND PIPE OPENINGS ONLY

**GENERAL NOTES**

- (A) ALL PRECAST ELEMENTS TO MEET ASTM C478 (CURRENT EDITION) AND AASHTO M199 (CURRENT EDITION) UNLESS SUPERSEDED BY THIS DRAWING.  
 CONCRETE:  $f_c = 4,000$  POUNDS PER SQUARE INCH AT 28 DAYS  
 REINFORCING STEEL: ASTM A615,  $F_y = 60,000$  POUNDS PER SQUARE INCH  
 ALL REINFORCING IS TO BE INSTALLED AS DETAILED ON THIS DRAWING.
- (B) THIS DIMENSION MAY VARY FROM A MINIMUM OF 0 INCHES TO A MAXIMUM OF 24 INCHES AS LONG AS 23 INCHES IS SATISFIED. THE CONTRACTOR HAS THE OPTION OF USING BRICK OR STANDARD PRECAST CONCRETE RISER FRAMES. THE USE OF BRICK SHALL BE LIMITED TO 6 INCHES. IF THIS DIMENSION EXCEEDS 6 INCHES, PRECAST CONCRETE RISER FRAMES SHALL BE USED AS SHOWN ON STANDARD DRAWING D-RF-1.
- (C) PRECAST CATCH BASIN UNITS WHICH ARE DAMAGED DURING SHIPMENT OR INSTALLATION WILL BE REJECTED. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REPLACE DAMAGED CATCH BASIN UNITS AT THEIR OWN EXPENSE.
- (D) APPROPRIATE SIZING AND LOCATION OF LIFTING DEVICES SHALL BE THE RESPONSIBILITY OF THE FABRICATOR.
- (E) THE CONTRACTOR IS TO PATCH ALL LIFTING DEVICE HOLES WITH GROUT AND PLACE A MINIMUM OF ONE(1) INCH OF COVER OVER THE HARDWARE OF THESE DEVICES ON BOTH TOP AND BOTTOM SURFACES.
- (F) ALTERNATIVE JOINT DETAILS MAY BE ACCEPTABLE. SEE STANDARD DRAWING D-CB-99R FOR ADDITIONAL DETAILS.
- (G) SEE ROADWAY PLANS DRAINAGE TABULATION FOR PIPE INLET AND OUTLET ELEVATIONS. IF NEEDED, INVERT ELEVATIONS MAY BE ADJUSTED AS DIRECTED BY THE ENGINEER IN ORDER TO ACCOMMODATE INLET AND OUTLET PIPES.
- (H) FOR CASES WHERE THE OUTLET PIPE DIAMETER IS LARGER THAN THE INLET PIPE DIAMETER, A MINIMUM 23 INCH DEPTH SHALL BE MAINTAINED ABOVE THE OUTLET PIPE.
- (I) SEE STANDARD DRAWING D-CBB-12A FOR DETAILS REGARDING CAST IRON GRATES, FRAMES AND CURB INLETS.
- (J) PAY DEPTH MEASUREMENT MADE FROM TOP OF GRATE TO OUTLET FLOW ELEVATION. PAYMENT INCLUDES RISER SECTION AND GRATE.  
 PAYMENT FOR CATCH BASIN WILL BE MADE UNDER ITEM NUMBERS:  
 611-10.01, CATCH BASINS, TYPE 10, 0'-4' DEPTH, EACH, (THROUGH)  
 611-10.05, CATCH BASINS, TYPE 10, > 16'-20' DEPTH, EACH.
- (K) SEE STANDARD DRAWING D-CB-99RA FOR BILL OF STEEL FOR CATCH BASIN LIDS.
- (L) CONNECTION OF 24" PIPES WILL BE LIMITED TO 60 DEGREE DEFLECTION ANGLE.

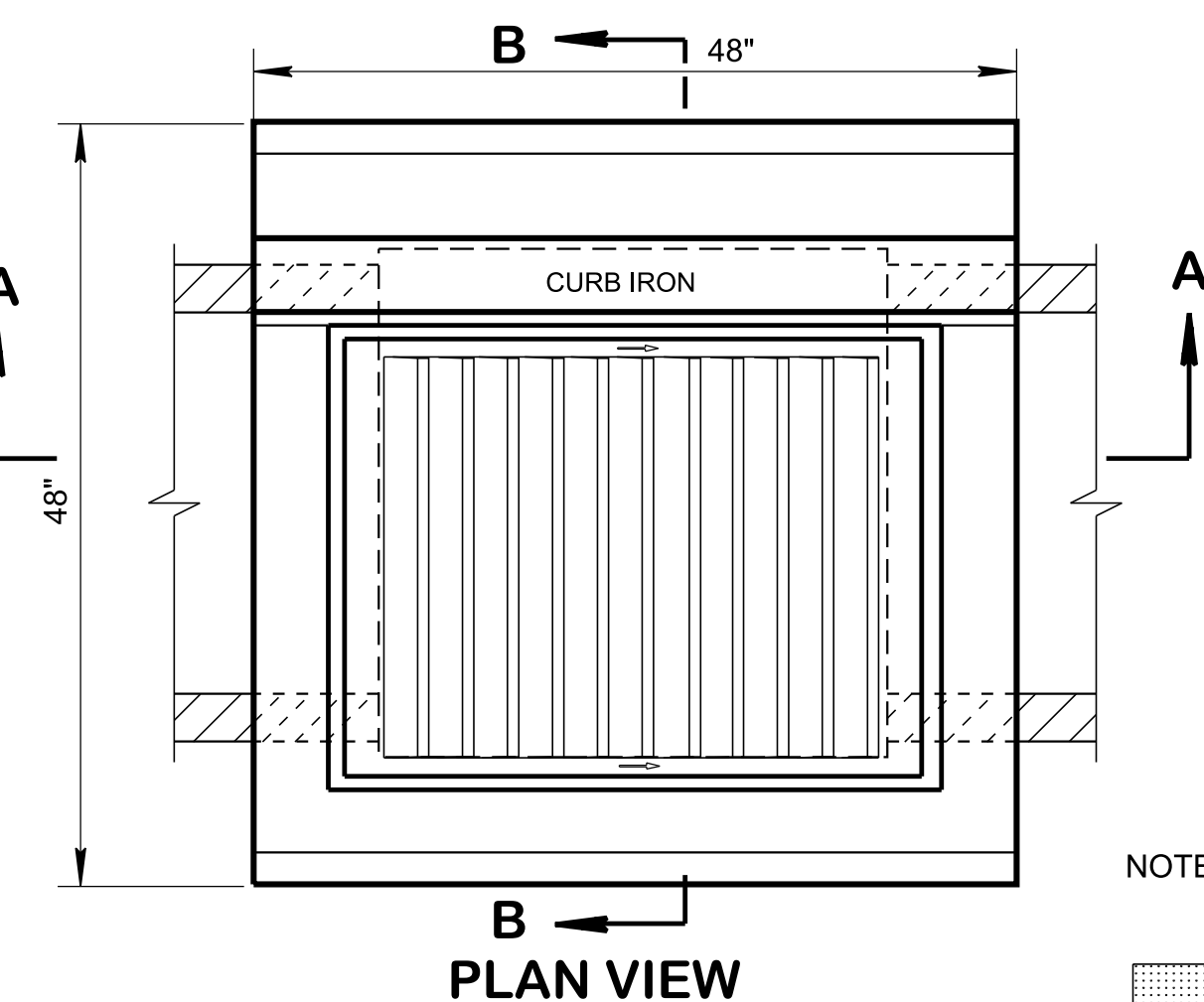
- REV. 8-01-12: REVISED CATCH BASIN LID FOR COMPLIANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 4TH EDITION WITH INTERIMS. REVISED REINFORCING, GENERAL NOTES AND ADDITIONAL MISC. DRAFTING EDITS.
- REV. 9-24-12: MODIFIED TOP SLAB AND MINIMUM DEPTH.
- REV. 3-11-14: ELIMINATED STIRRUPS.
- REV. 05-15-18: REVISED CATCH BASIN MINIMUM DESIGN DEPTH VALUES. CORRECTED STANDARD SPECIFICATIONS SECTION NUMBER TO 921 FOR NON-SHRINK GROUT. ADDED DIMENSION IN SECTION VIEW A-A FOR NOTE (E). ADDED DIMENSION IN SECTION A-A FOR MINIMUM DESIGN DEPTH. CHANGED TO "VERTICAL CURB" FROM "NONMOUNTABLE CURB". ADJUSTED BOX SECTION MINIMUM HEIGHTS.
- REV. 02-20-2020: REDREW SHEET.
- REV. 01-28-2022: DEFLECTION ANGLE NOTE ON PLAN VIEW, AND GENERAL NOTES (K) AND (L) WERE ADDED.

APPROVED BY FHWA  
 (ALL OTHERS APPROVED BY TDOT)

STATE OF TENNESSEE  
 STANDARD DRAWING  
 DEPARTMENT OF TRANSPORTATION

STANDARD PRECAST  
 48" CIRCULAR NO. 10  
 CATCH BASIN  
 FOR USE WITH 6"  
 VERTICAL CURB

1/24/2022 10:53:39 AM P:\StandDraw\DESIGN STANDARDS\Standards Drawings\Standard Roadway Drawings - CURRENT\In Progress\10-102.00 Catch Basins and Manholes\102.01 Catch Basins\IP\DCB12LP-A-20220128.DWG

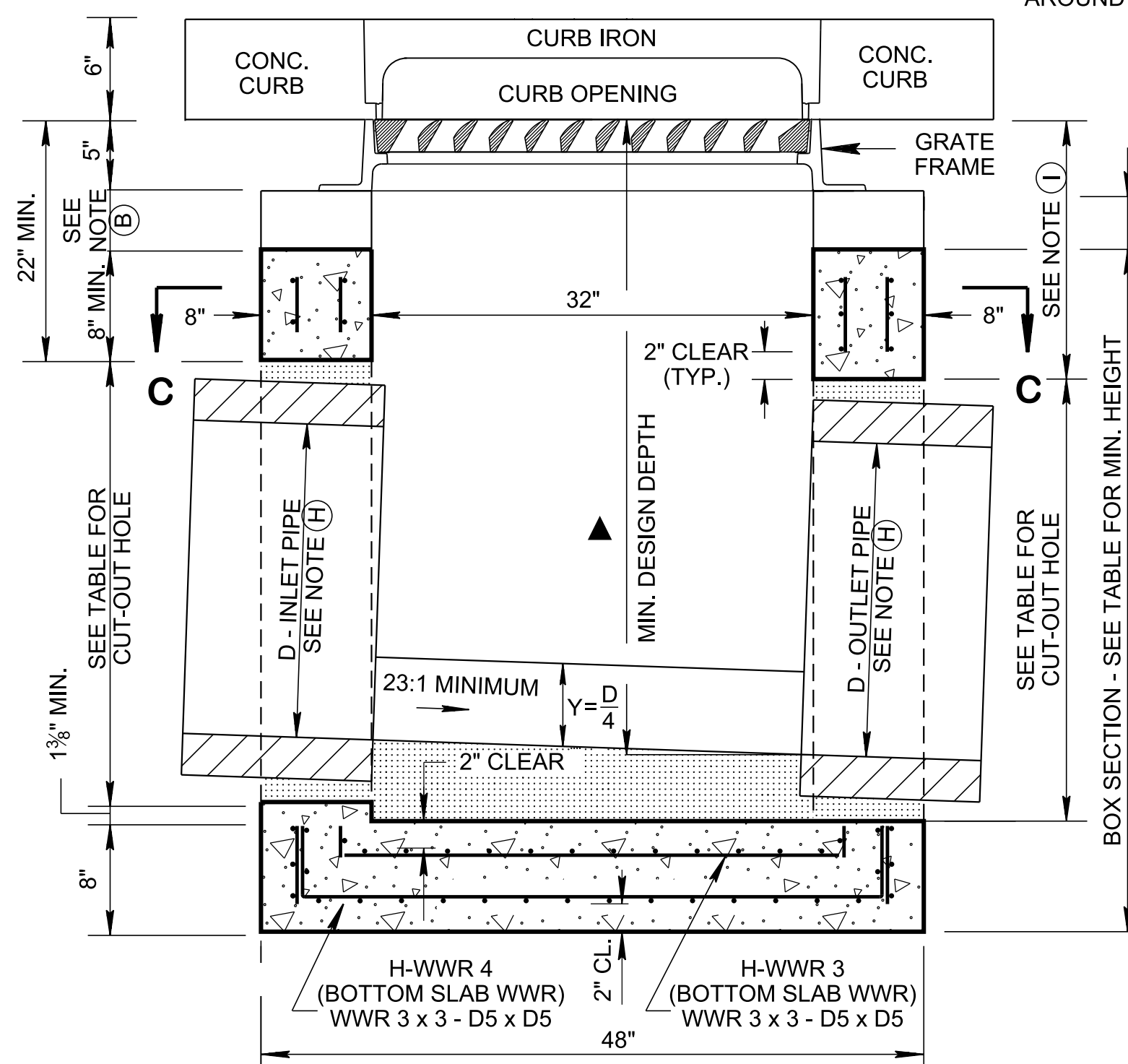


NOTE: WALL AND SLAB POURED MONOLITHICALLY.

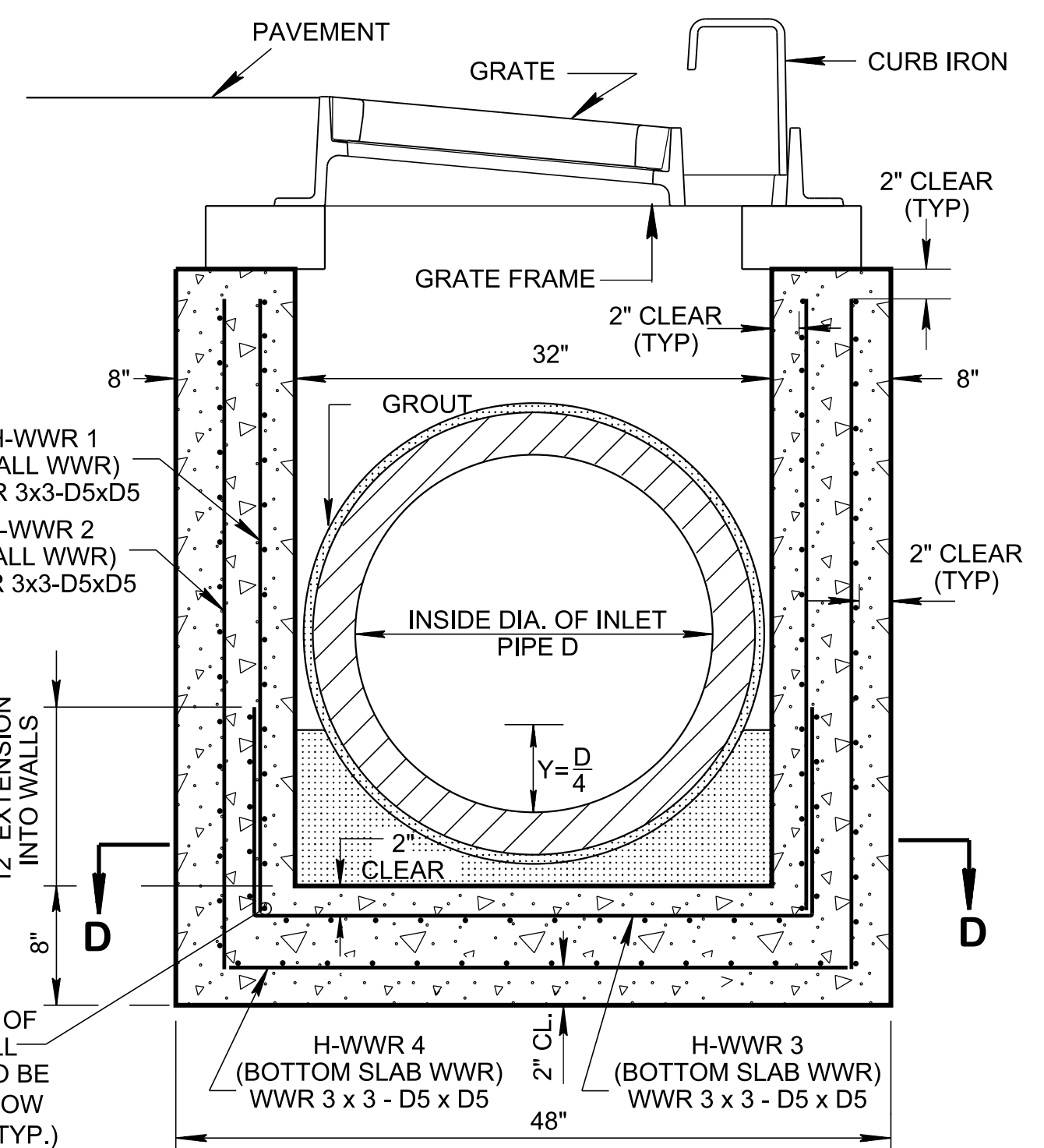
**CATCH BASIN MAXIMUM DEPTH NOTE**  
 MAXIMUM DEPTH FOR THIS STRUCTURE IS 4'-6". WHEN DEPTH REQUIREMENTS EXCEED THIS DEPTH THE CONTRACTOR IS TO USE OTHER VERSIONS OF THE NO. 12 CATCH BASIN.

CATCH BASIN DIMENSIONS				FOR DESIGN USE ONLY CATCH BASIN MINIMUM DESIGN DEPTH (INCHES) ▲
INSIDE DIAMETER (D) OF PIPE (INCHES)	PIPE WALL THICKNESS (INCHES)	DIAMETER OF CUT-OUT HOLES (INCHES)	BOX SECTION MINIMUM HEIGHTS (INCHES)	
18	2½	25	42¾	45¼"
24	3	32	49¾	51¾"

- ▲ SEE SECTION A-A FOR MINIMUM DESIGN DEPTH MEASUREMENT.
- CUT-OUT HOLES BASED ON REINFORCED CONCRETE PIPE WITH WALL TYPE "B".
  - ALL FLEXIBLE PIPE MATERIALS REQUIRE GASKET. SEE STANDARD DRAWING D-PB-2.
  - CUT-OUT HOLES FOR PRECAST STRUCTURES TO BE FORMED IN ORDER TO OBTAIN A SMOOTH EDGED HOLE. SCORED OR ETCHED HOLES WITH REINFORCING STEEL LEFT UN CUT WILL NOT BE PERMITTED.
  - THE SUM OF BOX SECTION HEIGHT & RISER SECTION HEIGHT SHALL NOT EXCEED 61".



SECTION A-A

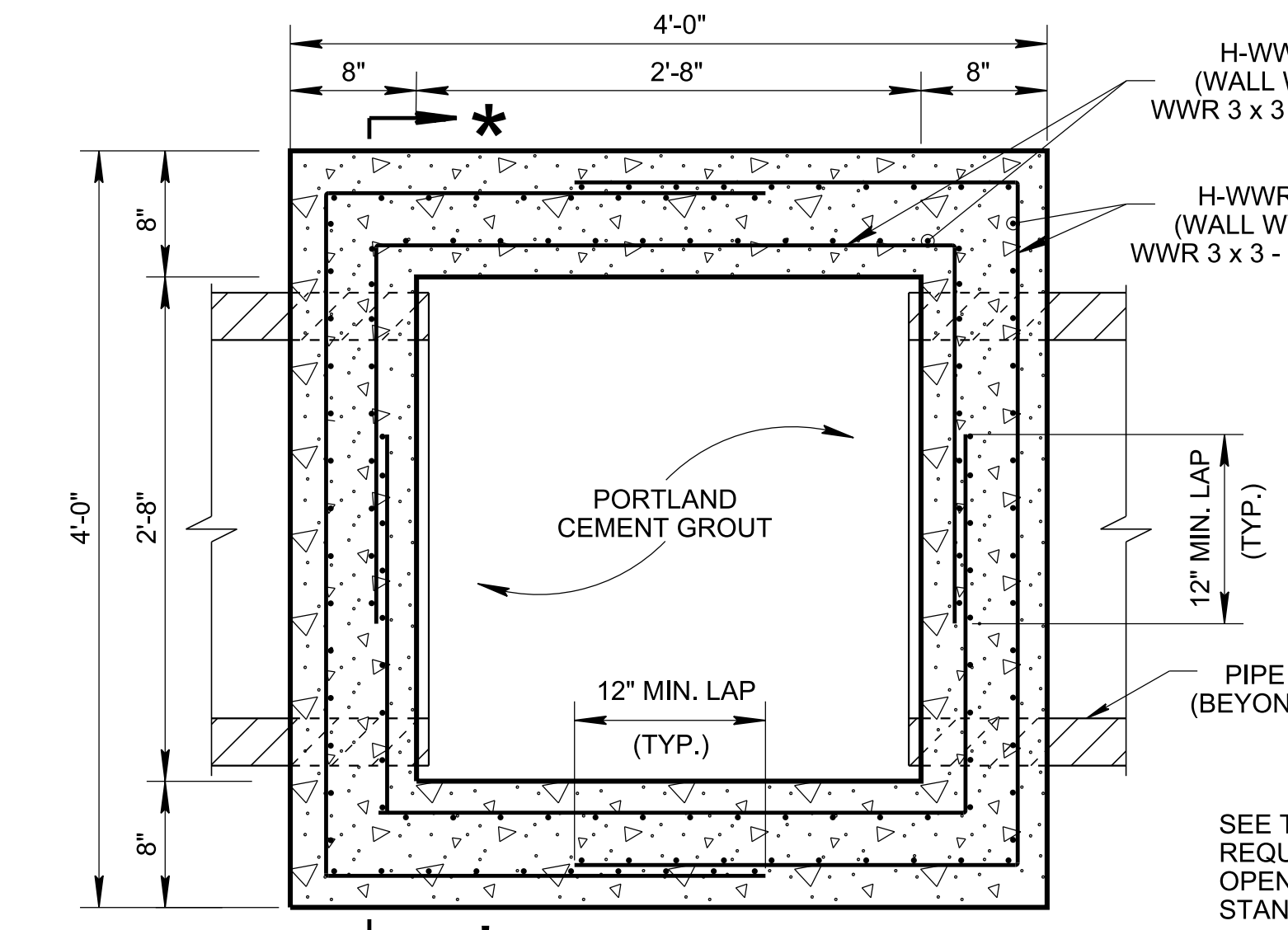


SECTION B-B

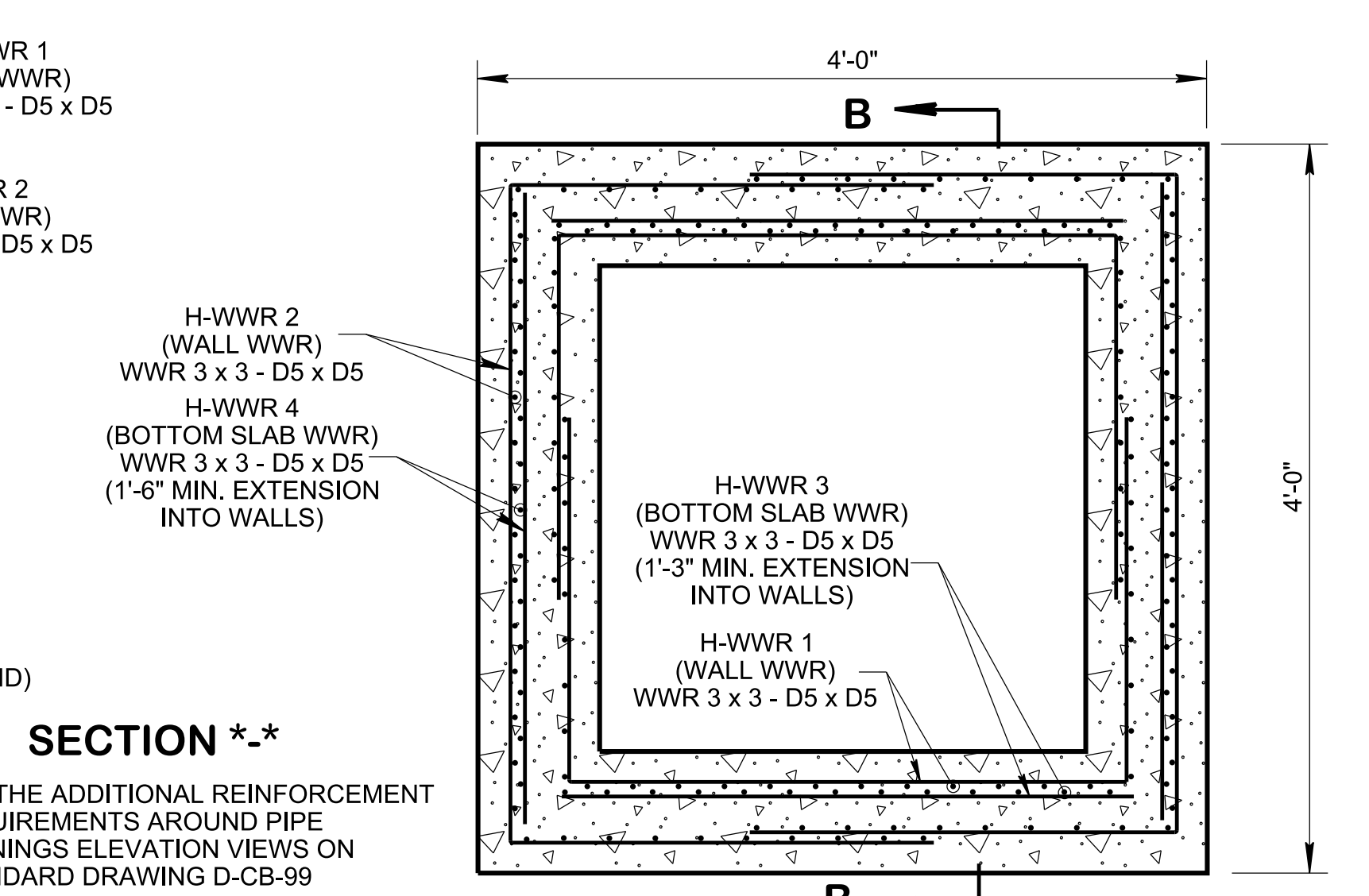
REINFORCING STEEL LEGEND			
H-WWR 1 (WALL WWR) WWR 3 x 3 - D5 x D5 (AREA PROVIDED = 0.20 SQ. IN / F.T. E.W.)	H-WWR 2 (WALL WWR) WWR 3 x 3 - D5 x D5 (AREA PROVIDED = 0.20 SQ. IN / F.T. E.W.)	H-WWR 3 (BOTTOM SLAB WWR) WWR 3 x 3 - D5 x D5 (AREA PROVIDED = 0.20 SQ. IN / F.T. E.W.)	H-WWR 4 (BOTTOM SLAB WWR) WWR 3 x 3 - D5 x D5 (AREA PROVIDED = 0.20 SQ. IN / F.T. E.W.)
NUMBER REQUIRED			
2	2	1	1

- GENERAL NOTES**
- THIS DRAWING TO BE USED AS AN ALTERNATE REINFORCEMENT DESIGN FOR PRECAST NO. 12LP (LOW PROFILE) CONCRETE CATCH BASINS. SEE STANDARD DRAWING D-CB-99 FOR ADDITIONAL CONSTRUCTION NOTES & DETAILS.
  - THIS DIMENSION MAY VARY FROM A MINIMUM OF 0 INCHES TO A MAXIMUM OF 9 INCHES AS LONG AS 22 INCHES IS SATISFIED. THE CONTRACTOR HAS THE OPTION OF USING BRICK OR STANDARD PRECAST CONCRETE RISER FRAMES. THE USE OF BRICK SHALL BE LIMITED TO 6 INCHES. IF THIS DIMENSION EXCEEDS 6 INCHES, PRECAST CONCRETE RISER FRAMES SHALL BE USED AS SHOWN ON STANDARD DRAWING D-RF-1.
  - REFER TO ASTM C1577 (LATEST EDITION) FOR DETAILS NOT SHOWN ON THIS DRAWING.
  - THE DESIGN OF THIS STRUCTURE SHOULD BE IN ACCORDANCE WITH THE CURRENT AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS. THIS CATCH BASIN IS STRUCTURALLY DESIGNED BASED ON HL-93 LIVE LOADS CAPACITY.
  - THE FOLLOWING MATERIAL PROPERTIES ARE REQUIRED FOR PRECAST STRUCTURES:
    - CONCRETE:  $f'_c = 5,000$  POUNDS PER SQUARE INCH AT 28 DAYS
    - REINFORCING STEEL: ASTM A615,  $F_y = 60,000$  PSI.
    - WELDED WIRE REINFORCEMENT (WWR): ASTM A1064, WITH A MINIMUM YIELD STRENGTH OF 70,000 PSI.
    - THE MINIMUM SPLICE LENGTH IS TO BE 12 INCHES. ALL REINFORCING STEEL TO BE INSTALLED AS DETAILED ON THIS DRAWING.
  - PRECAST CATCH BASIN UNITS WHICH ARE DAMAGED DURING SHIPMENT OR INSTALLATION WILL BE REJECTED. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REPLACE DAMAGED CATCH BASIN UNITS AT THEIR OWN EXPENSE.
  - THE CONTRACTOR IS TO PATCH ALL LIFTING DEVICE HOLES WITH GROUT AND PLACE A MINIMUM OF ONE (1) INCH OF COVER OVER THE HARDWARE OF THESE DEVICES ON BOTH TOP AND BOTTOM SURFACES.
  - SEE ROADWAY PLANS DRAINAGE TABULATION FOR PIPE INLET AND OUTLET ELEVATIONS. IF NEEDED, INVERT ELEVATIONS MAY BE ADJUSTED AS DIRECTED BY THE ENGINEER IN ORDER TO ACCOMMODATE INLET AND OUTLET PIPES.
  - FOR CASES WHERE THE OUTLET PIPE DIAMETER IS LARGER THAN THE INLET PIPE DIAMETER, A MINIMUM 22 INCH DEPTH SHALL BE MAINTAINED ABOVE THE OUTLET PIPE.
  - SEE STANDARD DRAWING D-CBB-12A OR 12D FOR DETAILS REGARDING CAST IRON GRATES, FRAMES AND CURB INLETS.
  - CONTRACTOR TO INSTALL PIPE COMPLETELY INTO WALL OPENING AND FILL VOID BETWEEN PIPE AND OPENING WITH NON-SHRINK GROUT PER STANDARD SPECIFICATION SECTION 921.
  - APPROPRIATE SIZING AND LOCATION OF LIFTING DEVICES SHALL BE THE RESPONSIBILITY OF THE FABRICATOR.
  - PAY DEPTH MEASUREMENT MADE FROM TOP OF GRATE TO OUTLET FLOW ELEVATION. PAYMENT INCLUDES RISER SECTION AND GRATE. PAYMENT FOR CATCH BASIN WILL BE MADE UNDER ITEM NUMBERS:
 

611-12.01,	CATCH BASINS, TYPE 12, 0'-4' DEPTH,	EACH,
611-12.02,	CATCH BASINS, TYPE 12, > 4'-8' DEPTH,	EACH.



SECTION C-C FOR WALL WWR POSITIONING



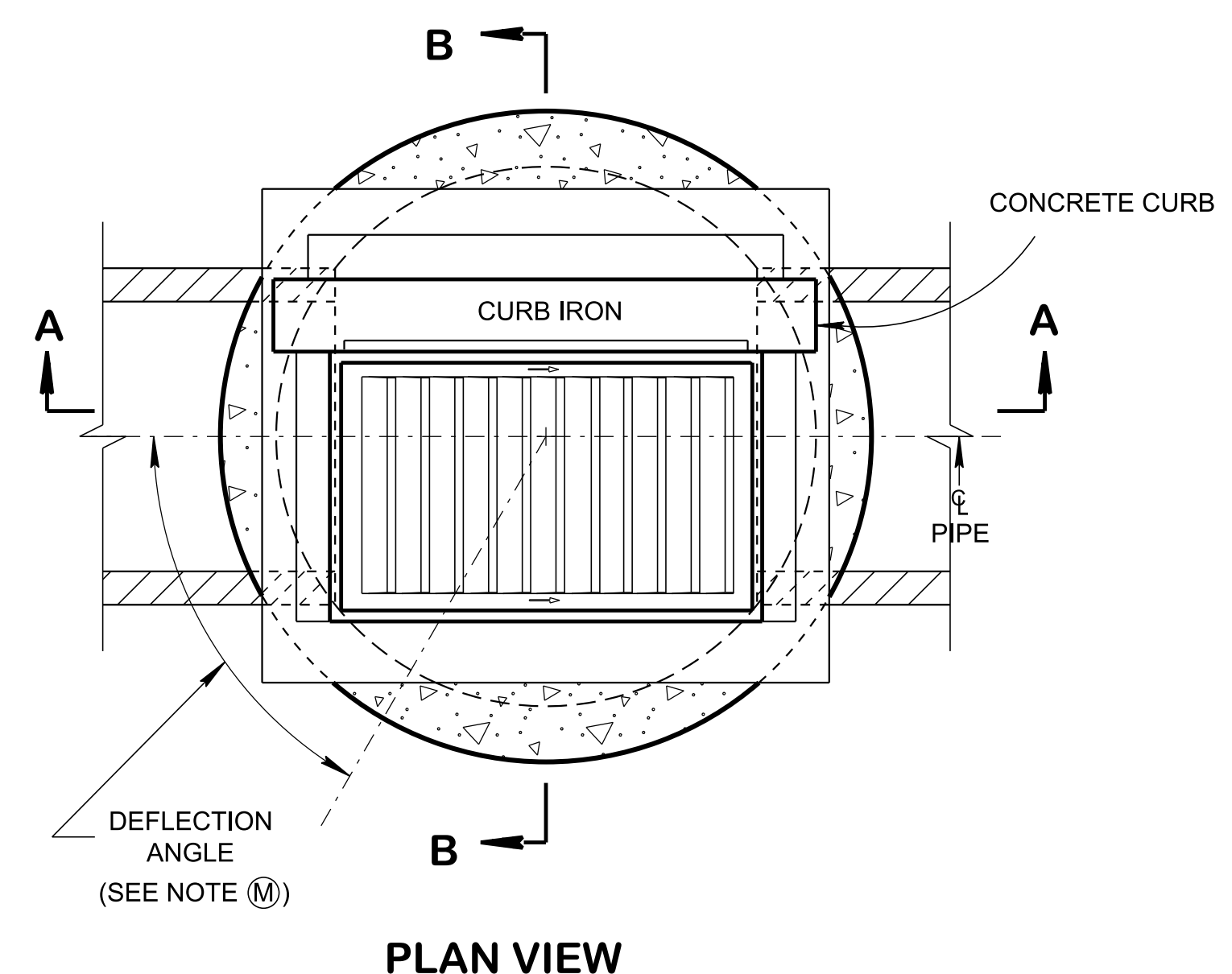
SECTION D-D FOR WALL AND BOTTOM SLAB WWR POSITIONING

SECTION \*-\*  
 SEE THE ADDITIONAL REINFORCEMENT REQUIREMENTS AROUND PIPE OPENINGS ELEVATION VIEWS ON STANDARD DRAWING D-CB-99

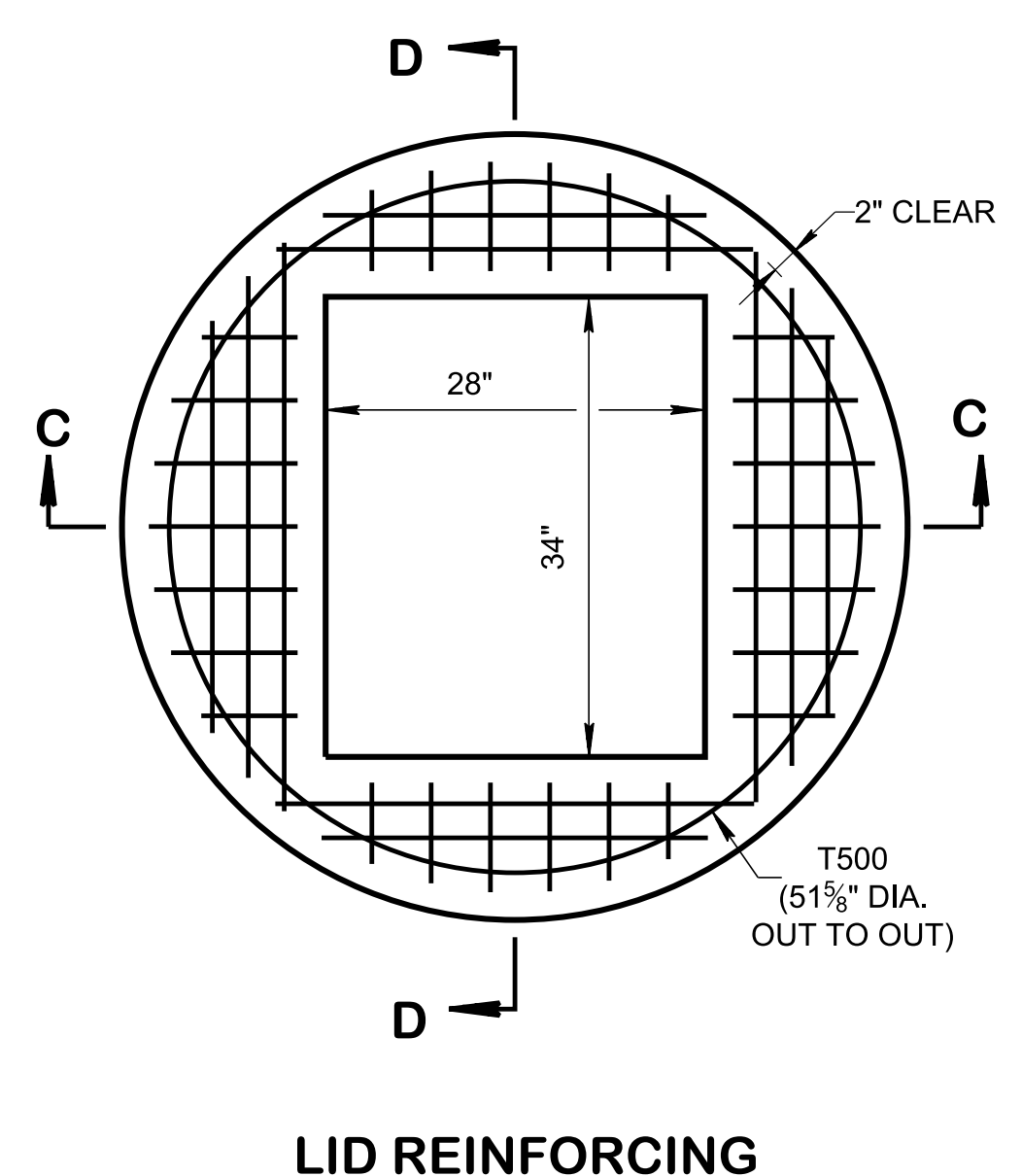
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STATE OF TENNESSEE  
 STANDARD DRAWING  
 DEPARTMENT OF TRANSPORTATION

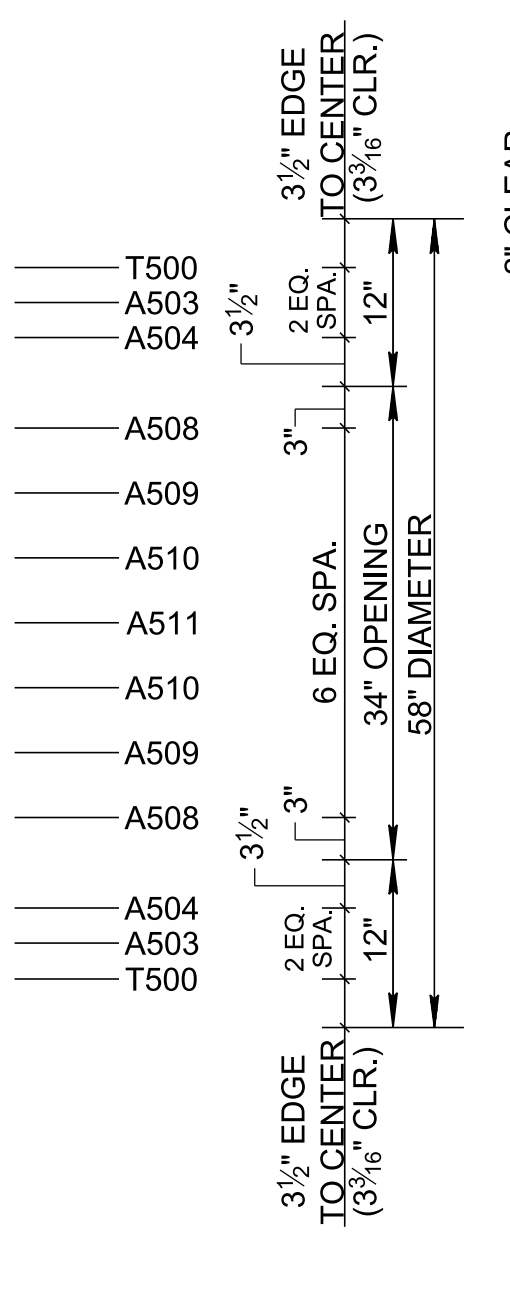
ALTERNATE REINFORCEMENT FOR PRECAST CONCRETE 32"X32" NO. 12LP CATCH BASIN



PLAN VIEW



LID REINFORCING



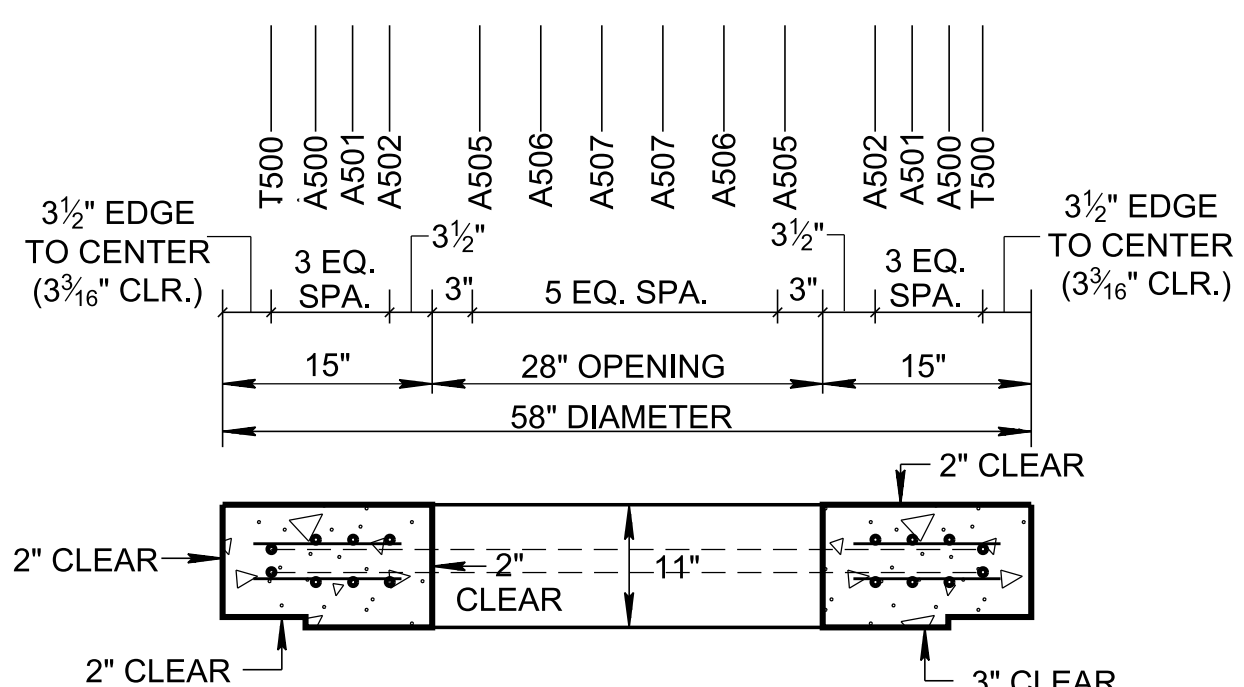
SECTION D-D

**CATCH BASIN MAXIMUM DEPTH NOTE**  
 MAXIMUM DEPTH FOR THIS STRUCTURE IS 20.00'.

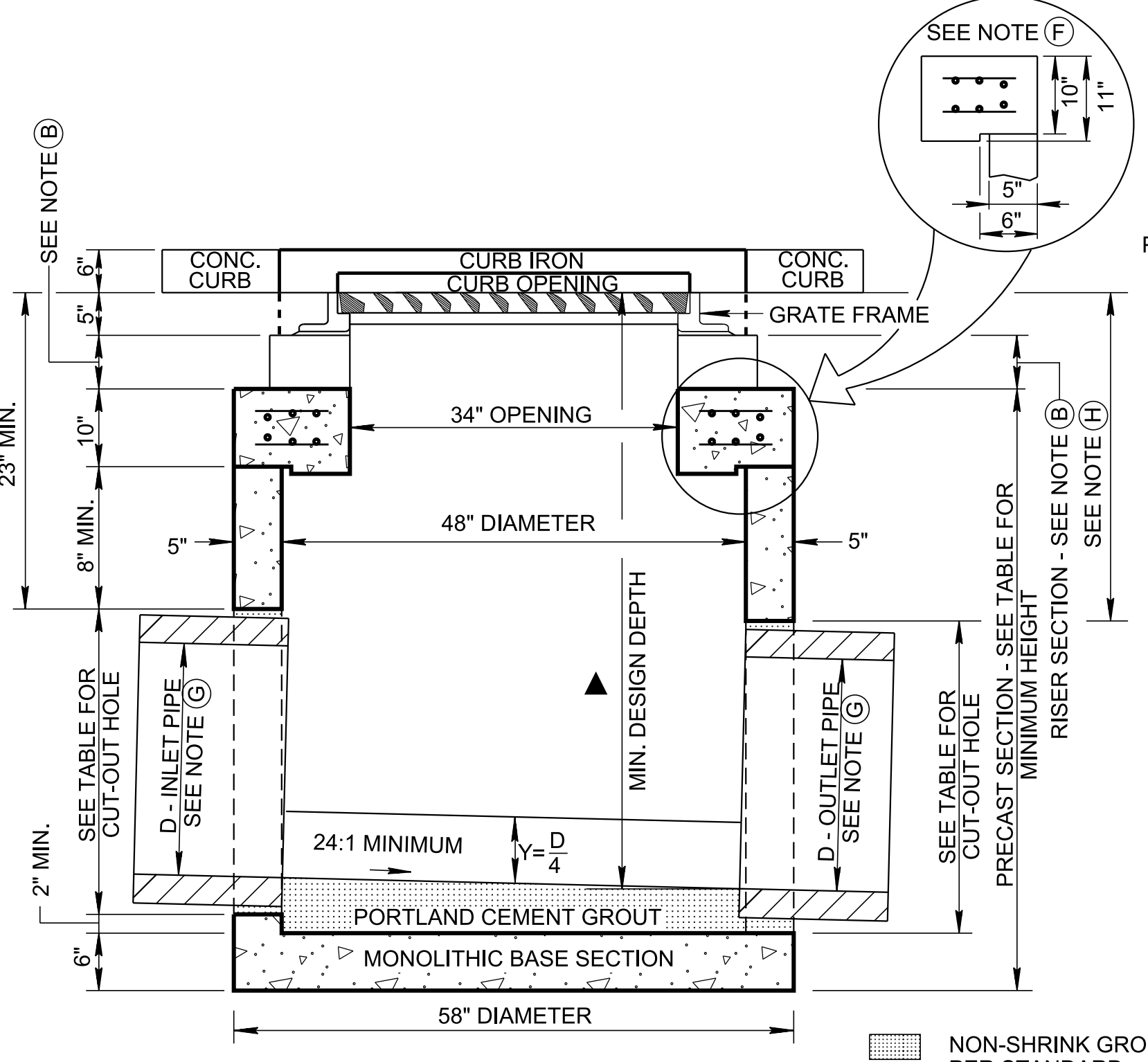
CATCH BASIN DIMENSIONS				
INSIDE DIAMETER (D) OF PIPE (INCHES)	PIPE WALL THICKNESS (INCHES)	DIAMETER OF CUT-OUT HOLES (INCHES)	PRECAST SECTION MIN. HEIGHTS (INCHES)	FOR DESIGN USE ONLY CATCH BASIN MINIMUM DESIGN DEPTH (FEET) ▲
18	2 1/2	25	51	3.89
24	3	32	58	4.43

▲ SEE SECTION A-A FOR MINIMUM DESIGN DEPTH MEASUREMENT.

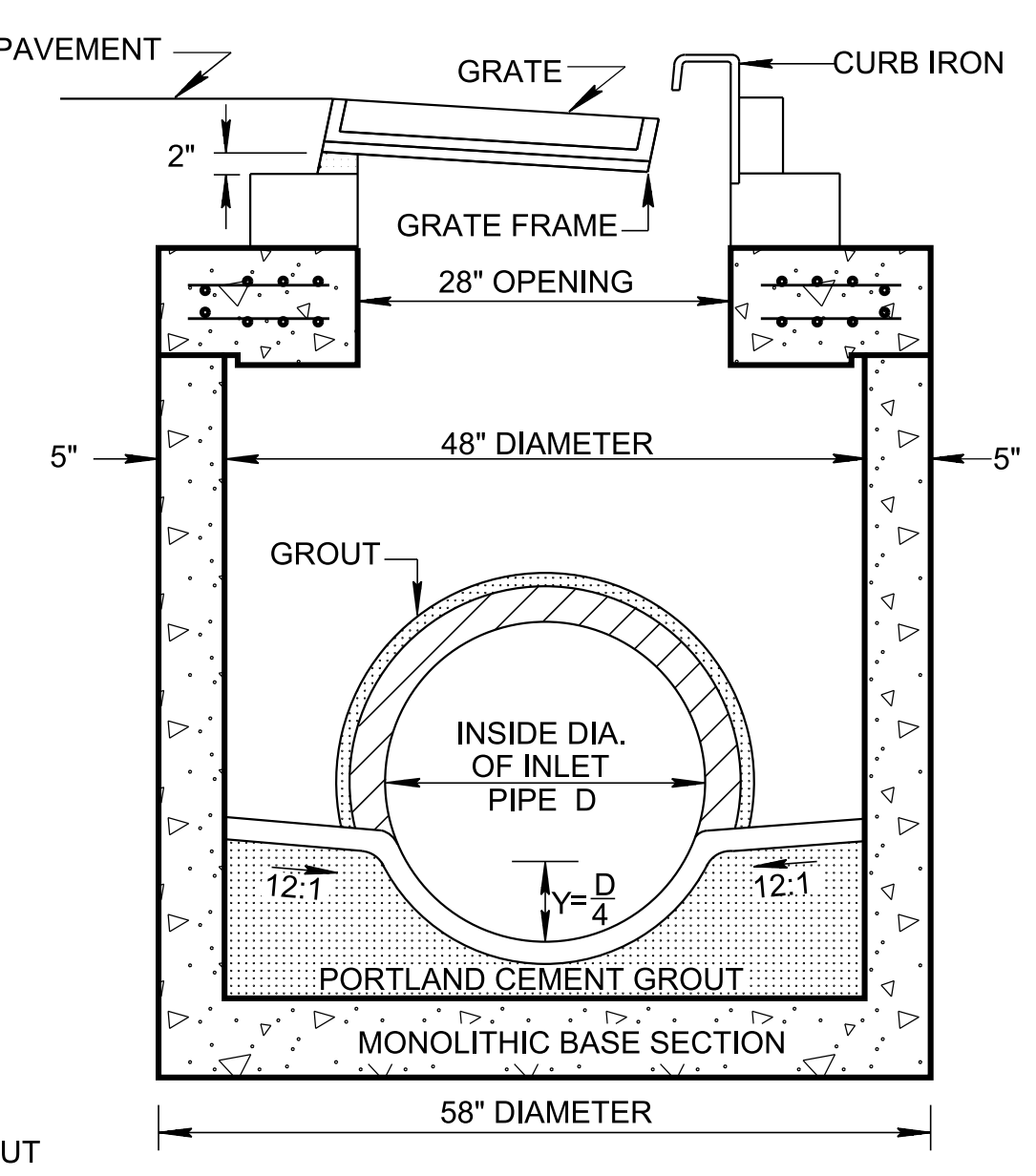
- ① CUT-OUT HOLES BASED ON REINFORCED CONCRETE PIPE WITH WALL TYPE "B".
- ② ALL FLEXIBLE PIPE MATERIALS REQUIRE GASKET. SEE STANDARD DRAWING D-PB-2.
- ③ CUT-OUT HOLES FOR PRECAST STRUCTURES TO BE FORMED IN ORDER TO OBTAIN A SMOOTH EDGED HOLE. SCORED OR ETCHED HOLES WITH REINFORCING STEEL LEFT UNCUT WILL NOT BE PERMITTED.



SECTION C-C



SECTION A-A



SECTION B-B

NON-SHRINK GROUT PER STANDARD SPECIFICATIONS SECTION 921 REQUIRED AROUND PIPE OPENINGS ONLY

**GENERAL NOTES**

- (A) ALL PRECAST ELEMENTS TO MEET ASTM C478 (CURRENT EDITION) AND AASHTO M199 (CURRENT EDITION) UNLESS SUPERSEDED BY THIS DRAWING.  
 CONCRETE:  $f_c = 4,000$  POUNDS PER SQUARE INCH AT 28 DAYS  
 REINFORCING STEEL: ASTM A615,  $F_y = 60,000$  POUNDS PER SQUARE INCH  
 ALL REINFORCING IS TO BE INSTALLED AS DETAILED ON THIS DRAWING.
- (B) THIS DIMENSION MAY VARY FROM A MINIMUM OF 0 INCHES TO A MAXIMUM OF 24 INCHES AS LONG AS 23 INCHES IS SATISFIED. THE CONTRACTOR HAS THE OPTION OF USING BRICK OR STANDARD PRECAST CONCRETE RISER FRAMES. THE USE OF BRICK SHALL BE LIMITED TO 6 INCHES. IF THIS DIMENSION EXCEEDS 6 INCHES, PRECAST CONCRETE RISER FRAMES SHALL BE USED AS SHOWN ON STANDARD DRAWING D-RF-1.
- (C) PRECAST CATCH BASIN UNITS WHICH ARE DAMAGED DURING SHIPMENT OR INSTALLATION WILL BE REJECTED. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REPLACE DAMAGED CATCH BASIN UNITS AT THEIR OWN EXPENSE.
- (D) APPROPRIATE SIZING AND LOCATION OF LIFTING DEVICES SHALL BE THE RESPONSIBILITY OF THE FABRICATOR.
- (E) THE CONTRACTOR IS TO PATCH ALL LIFTING DEVICE HOLES WITH GROUT AND PLACE A MINIMUM OF ONE (1) INCH OF COVER OVER THE HARDWARE OF THESE DEVICES ON BOTH TOP AND BOTTOM SURFACES.
- (F) ALTERNATIVE JOINT DETAILS MAY BE ACCEPTABLE. SEE STANDARD DRAWING D-CB-99R FOR ADDITIONAL DETAILS.
- (G) SEE ROADWAY PLANS DRAINAGE TABULATION FOR PIPE INLET AND OUTLET ELEVATIONS. IF NEEDED, INVERT ELEVATIONS MAY BE ADJUSTED AS DIRECTED BY THE ENGINEER IN ORDER TO ACCOMMODATE INLET AND OUTLET PIPES.
- (H) FOR CASES WHERE THE OUTLET PIPE DIAMETER IS LARGER THAN THE INLET PIPE DIAMETER, A MINIMUM 23 INCH DEPTH SHALL BE MAINTAINED ABOVE THE OUTLET PIPE.
- (I) SEE STANDARD DRAWING D-CBB-12A FOR DETAILS REGARDING CAST IRON GRATES, FRAMES AND CURB INLETS.
- (J) SEE STANDARD DRAWING D-CB-12RB FOR DETAILS REGARDING 60" AND LARGER CIRCULAR NO. 12 CATCH BASIN (FOR USE WITH 6" VERTICAL CURB).
- (K) PAY DEPTH MEASUREMENT MADE FROM TOP OF GRATE TO OUTLET FLOW ELEVATION. PAYMENT INCLUDES RISER SECTION AND GRATE. PAYMENT FOR CATCH BASIN WILL BE MADE UNDER ITEM NUMBERS:  
 611-12.01, CATCH BASINS, TYPE 12, 0'-4' DEPTH, EACH, (THROUGH)  
 611-12.05, CATCH BASINS, TYPE 12, > 16'-20' DEPTH, EACH.
- (L) SEE STANDARD DRAWING D-CB-99RA FOR BILL OF STEEL FOR CATCH BASIN LIDS.
- (M) CONNECTION OF 24" PIPES WILL BE LIMITED TO 60 DEGREE DEFLECTION ANGLE.

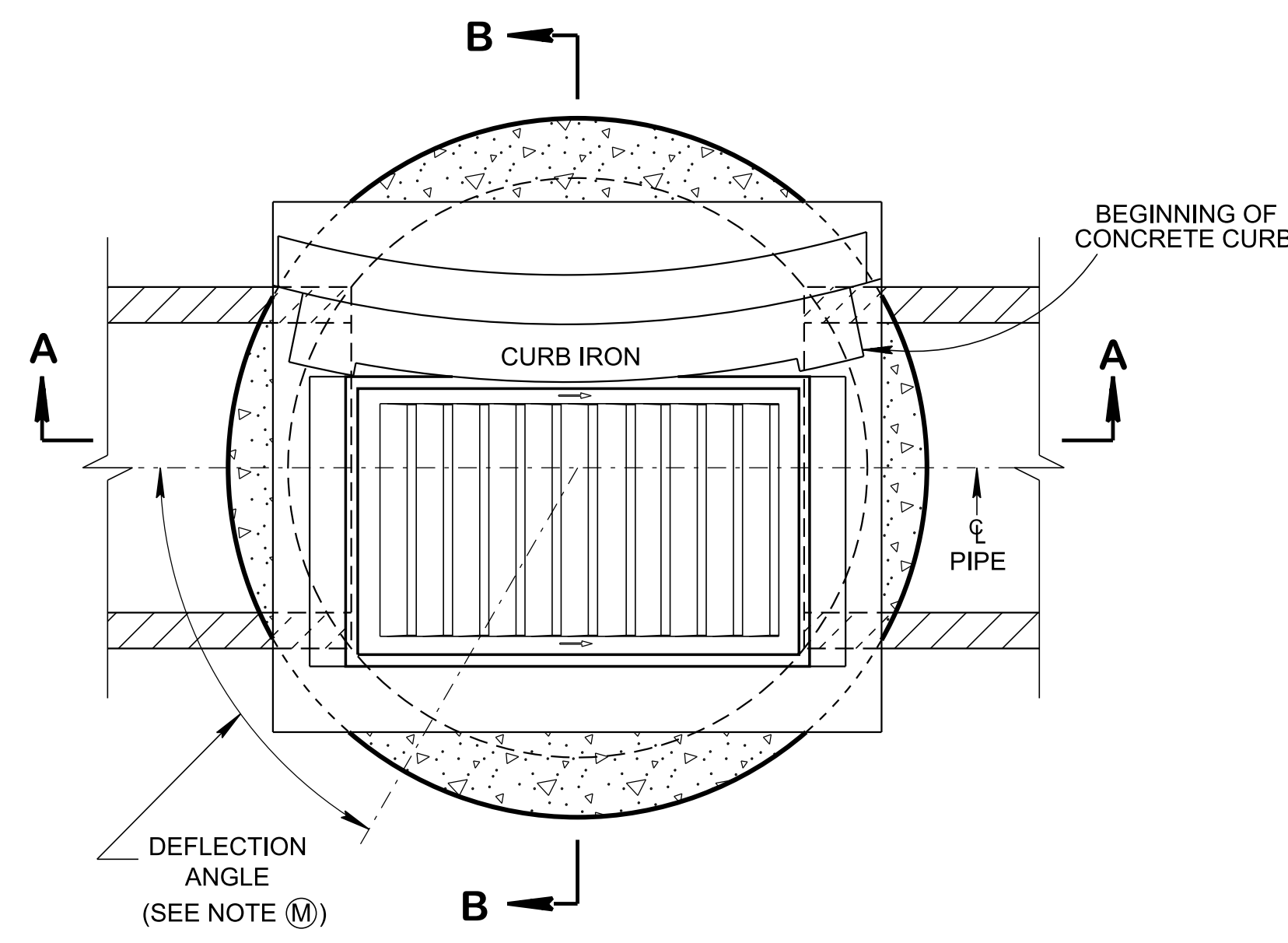
- REV. 12-18-95: CHANGED BASE THICKNESS AND VERTICAL DEPTH REQUIREMENTS. ADDED HANDLING AND CUT-OUT HOLE NOTES.
- REV. 12-18-96: REMOVED 0.5" PREMOULDED FIBER EXPANSION JOINT FROM SECTION "B-B". REMOVED OLD GENERAL NOTE (E). CHANGED LABEL OF LAST FOUR GENERAL NOTES.
- REV. 4-15-97: CHANGED CATCH BASIN DIMENSION TABLE.
- REV. 1-19-99: CHANGED MINIMUM DEPTH TABLE AND DRAWING IN GENERAL TO REFLECT REDUCTION IN INVERT DROP ACROSS CATCH BASIN.
- REV. 12-18-99: MODIFIED CATCH BASIN DIMENSION TABLE.
- REV. 5-27-01: CHANGED PAY ITEMS IN GENERAL NOTE (I). ADDED CATCH BASIN MAXIMUM DEPTH NOTE.
- REV. 8-01-12: REVISED CATCH BASIN LID FOR COMPLIANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 4TH EDITION WITH INTERIMS. REVISED REINFORCING, GENERAL NOTES AND ADDITIONAL MISC. DRAFTING EDITS.
- REV. 9-24-12: MODIFIED TOP SLAB AND MINIMUM DEPTH.
- REV. 3-11-14: ELIMINATED STIRRUPS.
- REV. 05-15-18: REVISED CATCH BASIN MINIMUM DESIGN DEPTH VALUES. CORRECTED STANDARD SPECIFICATIONS SECTION NUMBER TO 921 FOR NON-SHRINK GROUT. ADDED DIMENSION IN SECTION VIEW A-A FOR NOTE (E). CORRECTED REBAR PLACEMENT IN LIDS. ADDED DIMENSION IN SECTION VIEW A-A FOR MINIMUM DESIGN DEPTH. CHANGED TO "VERTICAL CURB" FROM "NONMOUNTABLE CURB". ADJUSTED BOX SECTION MINIMUM HEIGHTS.
- REV. 02-20-2020: REDREW SHEET.
- REV. 01-28-2022: DEFLECTION ANGLE NOTE ON PLAN VIEW, AND GENERAL NOTES (L) AND (M) WERE ADDED.

APPROVED BY FHWA (ALL OTHERS APPROVED BY TDOT)

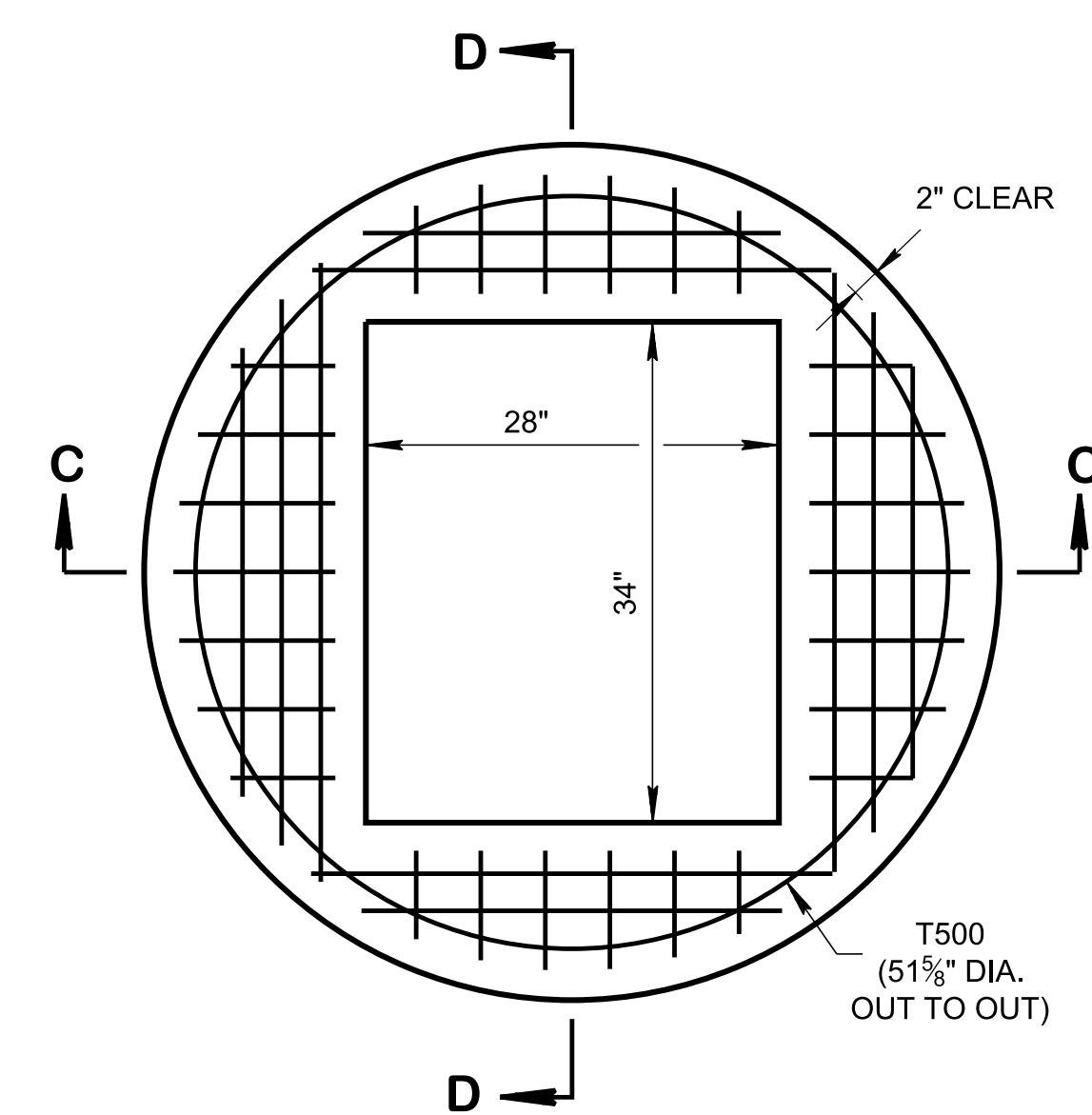
STATE OF TENNESSEE  
 STANDARD DRAWING  
 DEPARTMENT OF TRANSPORTATION

STANDARD PRECAST  
 48" CIRCULAR NO.12  
 CATCH BASIN  
 FOR USE WITH 6"  
 VERTICAL CURB

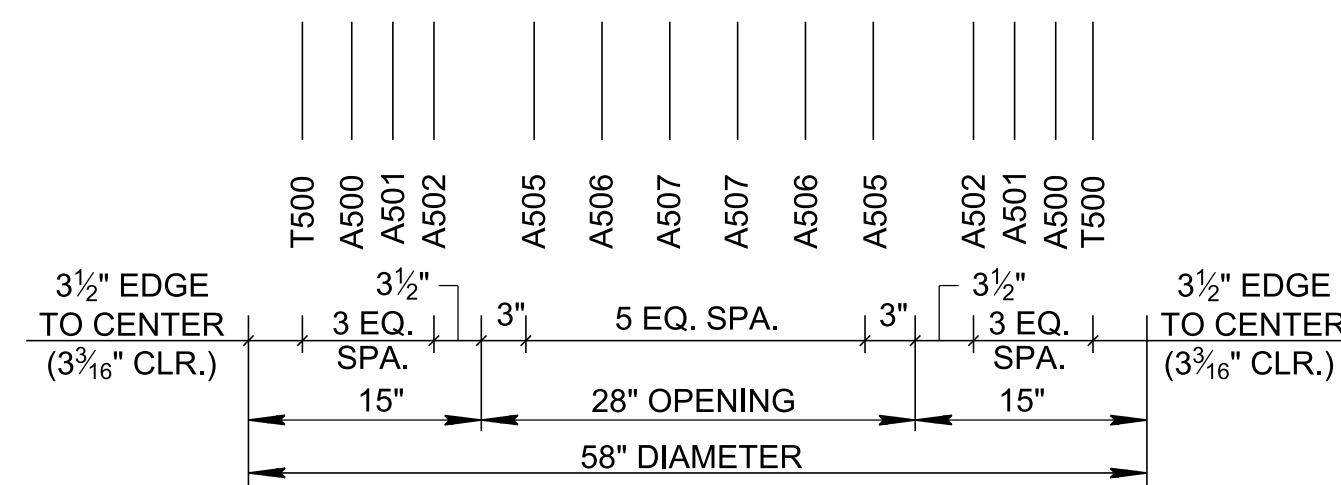
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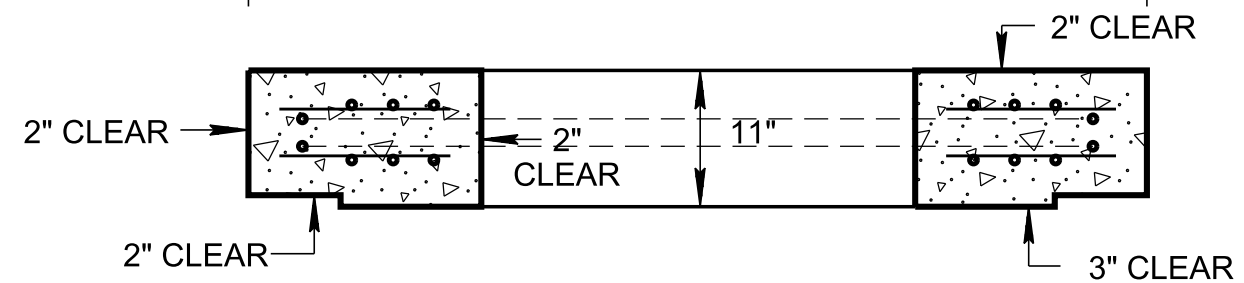
**PLAN VIEW**



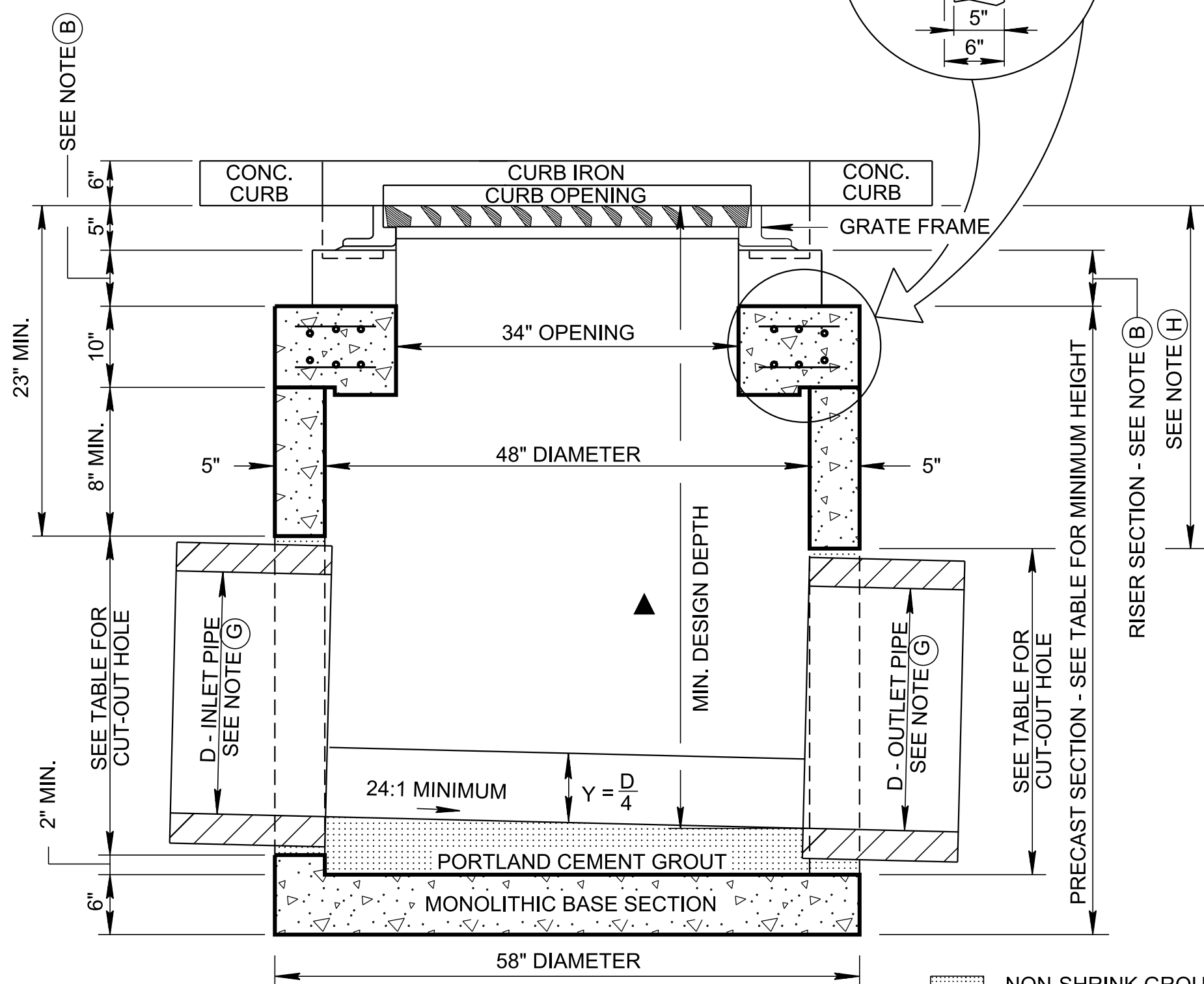
**LID REINFORCING**



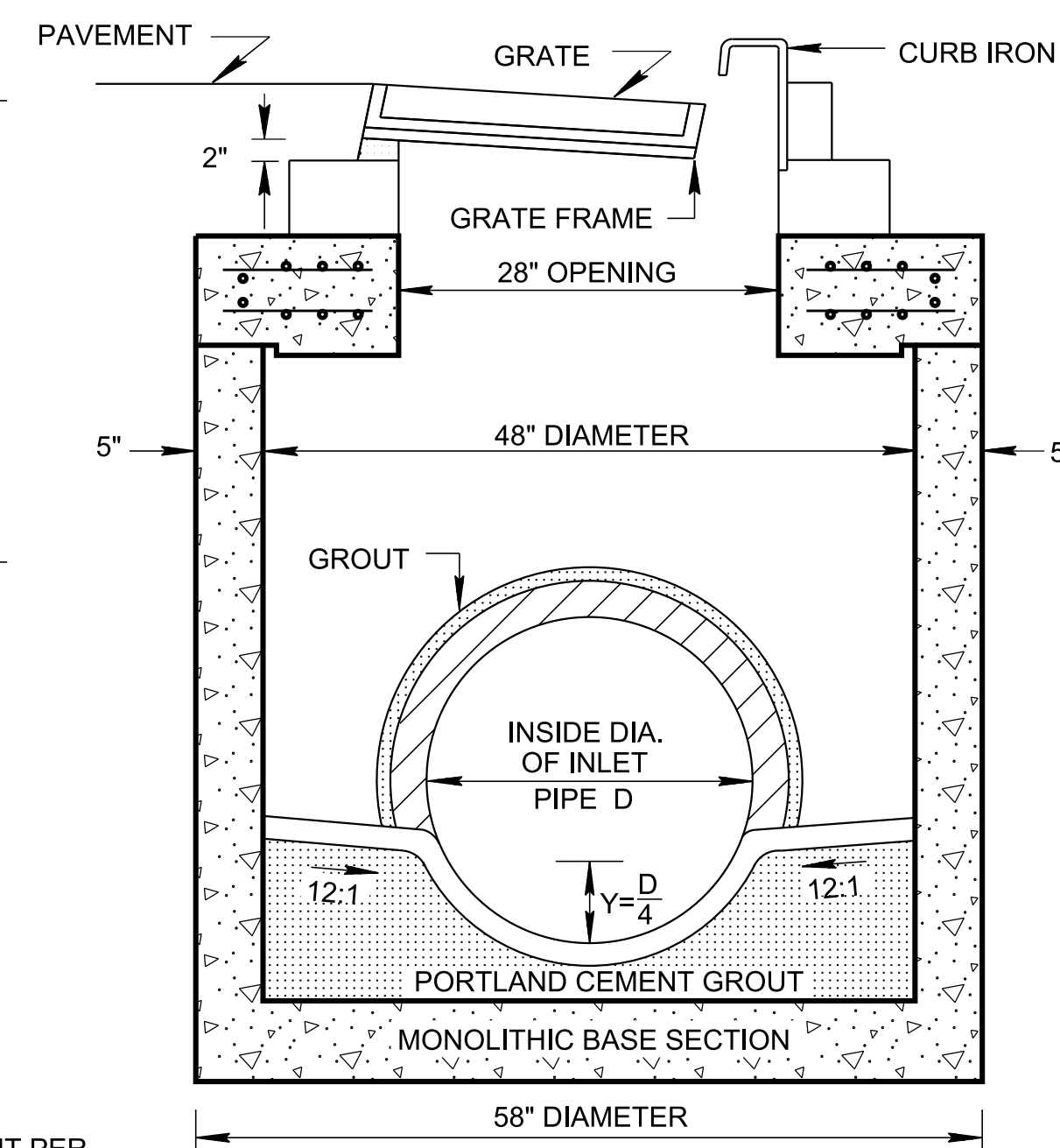
**SECTION C-C**



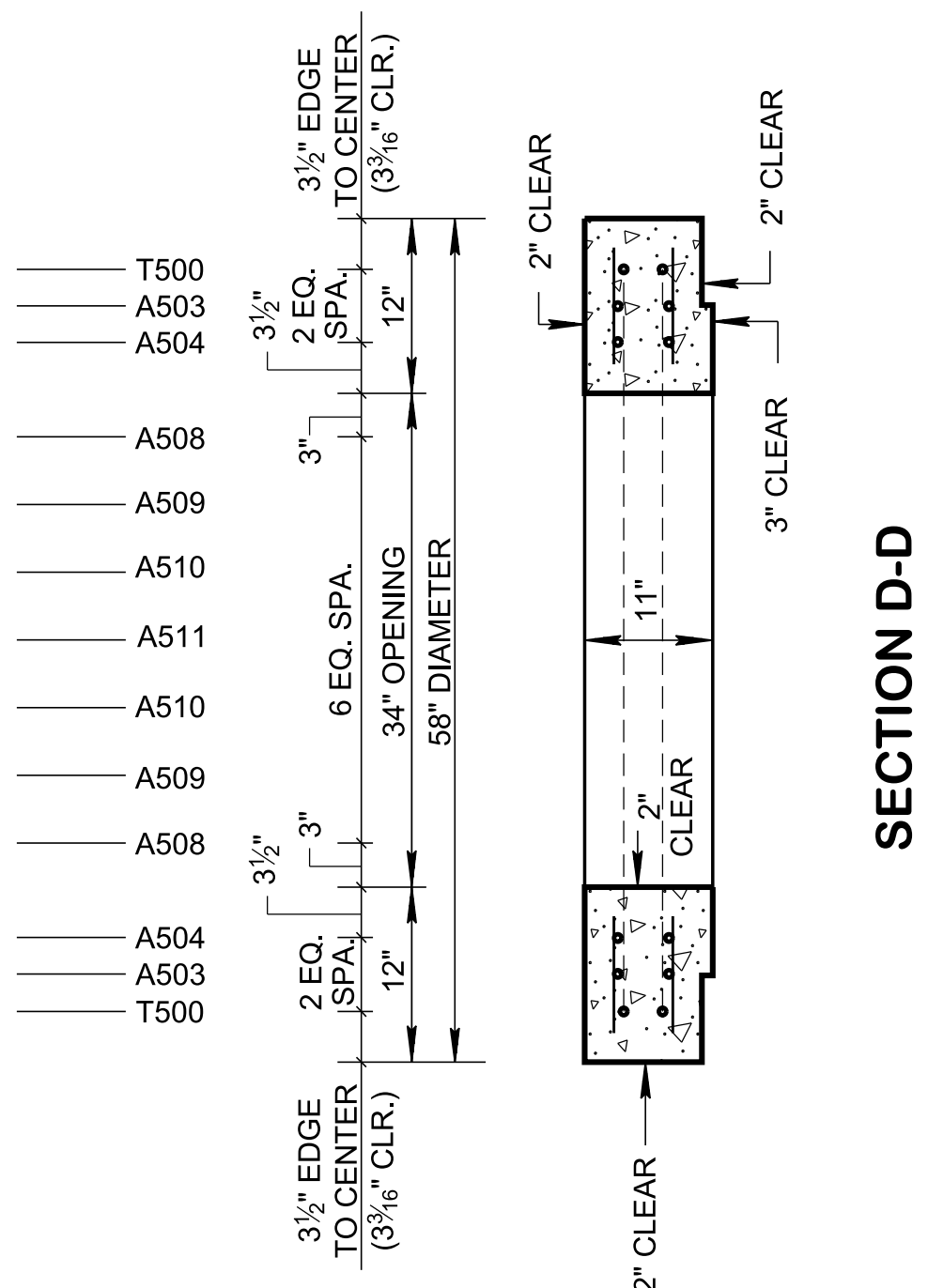
**SECTION D-D**



**SECTION A-A**



**SECTION B-B**



**CATCH BASIN MAXIMUM DEPTH NOTE**  
MAXIMUM DEPTH FOR THIS STRUCTURE IS 20.00'.

**SPECIAL NOTE**  
TO BE USED ON RADIUS LESS THAN 25 FEET. FOR RADIUS 25 FEET AND GREATER USE TYPE 12 CATCH BASIN.

CATCH BASIN DIMENSIONS				FOR DESIGN USE ONLY
INSIDE DIAMETER (D) OF PIPE (INCHES)	PIPE WALL THICKNESS (INCHES)	DIAMETER OF CUT-OUT HOLES (INCHES)	PRECAST SECTION MIN. HEIGHTS (INCHES)	CATCH BASIN MINIMUM DESIGN DEPTH (FEET) ▲
18	2½	25	51	3.89
24	3	32	58	4.43

- ▲ SEE SECTION A-A FOR MINIMUM DESIGN DEPTH MEASUREMENT.
- ① CUT-OUT HOLES BASED ON REINFORCED CONCRETE PIPE WITH WALL TYPE "B".
- ② ALL FLEXIBLE PIPE MATERIALS REQUIRE GASKET. SEE STANDARD DRAWING D-PB-2.
- ③ CUT-OUT HOLES FOR PRECAST STRUCTURES TO BE FORMED IN ORDER TO OBTAIN A SMOOTH EDGED HOLE. SCORED OR ETCHED HOLES WITH REINFORCING STEEL LEFT UN CUT WILL NOT BE PERMITTED.

**GENERAL NOTES**

(A) ALL PRECAST ELEMENTS TO MEET ASTM C478 (CURRENT EDITION) AND AASHTO M199 (CURRENT EDITION) UNLESS SUPERSEDED BY THIS DRAWING.  
CONCRETE:  $f_c = 4,000$  POUNDS PER SQUARE INCH AT 28 DAYS  
REINFORCING STEEL: ASTM A615,  $F_y = 60,000$  POUNDS PER SQUARE INCH  
ALL REINFORCING IS TO BE INSTALLED AS DETAILED ON THIS DRAWING.

(B) THIS DIMENSION MAY VARY FROM A MINIMUM OF 0 INCHES TO A MAXIMUM OF 24 INCHES AS LONG AS 23 INCHES IS SATISFIED. THE CONTRACTOR HAS THE OPTION OF USING BRICK OR STANDARD PRECAST CONCRETE RISER FRAMES. THE USE OF BRICK SHALL BE LIMITED TO 6 INCHES. IF THIS DIMENSION EXCEEDS 6 INCHES, PRECAST CONCRETE RISER FRAMES SHALL BE USED AS SHOWN ON STANDARD DRAWING D-RF-1.

(C) PRECAST CATCH BASIN UNITS WHICH ARE DAMAGED DURING SHIPMENT OR INSTALLATION WILL BE REJECTED. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REPLACE DAMAGED CATCH BASIN UNITS AT THEIR OWN EXPENSE.

(D) APPROPRIATE SIZING AND LOCATION OF LIFTING DEVICES SHALL BE THE RESPONSIBILITY OF THE FABRICATOR.

(E) THE CONTRACTOR IS TO PATCH ALL LIFTING DEVICE HOLES WITH GROUT AND PLACE A MINIMUM OF ONE (1) INCH OF COVER OVER THE HARDWARE OF THESE DEVICES ON BOTH TOP AND BOTTOM SURFACES.

(F) ALTERNATIVE JOINT DETAILS MAY BE ACCEPTABLE. SEE STANDARD DRAWING D-CB-99R FOR ADDITIONAL DETAILS.

(G) SEE ROADWAY PLANS DRAINAGE TABULATION FOR PIPE INLET AND OUTLET ELEVATIONS. IF NEEDED, INVERT ELEVATIONS MAY BE ADJUSTED AS DIRECTED BY THE ENGINEER IN ORDER TO ACCOMMODATE INLET AND OUTLET PIPES.

(H) FOR CASES WHERE THE OUTLET PIPE DIAMETER IS LARGER THAN THE INLET PIPE DIAMETER, A MINIMUM 23 INCH DEPTH SHALL BE MAINTAINED ABOVE THE OUTLET PIPE.

(I) SEE STANDARD DRAWING D-CBB-13 FOR DETAILS REGARDING CAST IRON GRATES, FRAMES AND CURB INLETS.

(J) SEE STANDARD DRAWING D-CB-13RB FOR DETAILS REGARDING 60" AND LARGER CIRCULAR NO. 13 CATCH BASIN (FOR USE WITH 6" VERTICAL CURB).

(K) PAY DEPTH MEASUREMENT MADE FROM TOP OF GRATE TO OUTLET FLOW ELEVATION. PAYMENT INCLUDES RISER SECTION AND GRATE. PAYMENT FOR CATCH BASIN WILL BE MADE UNDER ITEM NUMBERS:  
611-13.01, CATCH BASINS, TYPE 13, 0'-4' DEPTH, EACH, (THROUGH)  
611-13.05, CATCH BASINS, TYPE 13, > 16'-20' DEPTH, EACH.

(L) SEE STANDARD DRAWING D-CB-99RA FOR BILL OF STEEL FOR CATCH BASIN LIDS.

(M) CONNECTION OF 24" PIPES WILL BE LIMITED TO 60 DEGREE DEFLECTION ANGLE.

REV. 3-20-00: ADDED SPECIAL NOTE RESTRICTING USE OF NO. 13 CATCH BASINS TO RADIUS LESS THAN 25 FEET.

REV. 5-27-01: CHANGED PAY ITEMS IN GENERAL NOTE (I). ADDED CATCH BASIN MAXIMUM DEPTH NOTE.

REV. 8-01-12: REVISED CATCH BASIN LID FOR COMPLIANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 4TH EDITION WITH INTERIMS. REVISED REINFORCING, GENERAL NOTES AND ADDITIONAL MISC. DRAFTING EDITS.

REV. 9-24-12: MODIFIED TOP SLAB AND MINIMUM DEPTH.

REV. 3-11-14: ELIMINATED STIRRUPS.

REV. 05-15-18: REVISED CATCH BASIN MINIMUM DESIGN DEPTH VALUES. CORRECTED STANDARD SPECIFICATIONS SECTION NUMBER TO 921 FOR NON-SHRINK GROUT. ADDED DIMENSION IN SECTION VIEW A-A FOR NOTE (E). CORRECTED REBAR PLACEMENT IN LIDS. ADDED DIMENSION IN SECTION VIEW A-A FOR MINIMUM DESIGN DEPTH. CHANGED TO "VERTICAL CURB" FROM "NONMOUNTABLE CURB". ADJUSTED BOX SECTION MINIMUM HEIGHTS.

REV. 02-20-2020: REDREW SHEET.

REV. 01-28-2022: DEFLECTION ANGLE NOTE ON PLAN VIEW, AND GENERAL NOTES (L) AND (M) WERE ADDED.

APPROVED BY FHWA (ALL OTHERS APPROVED BY TDOT)

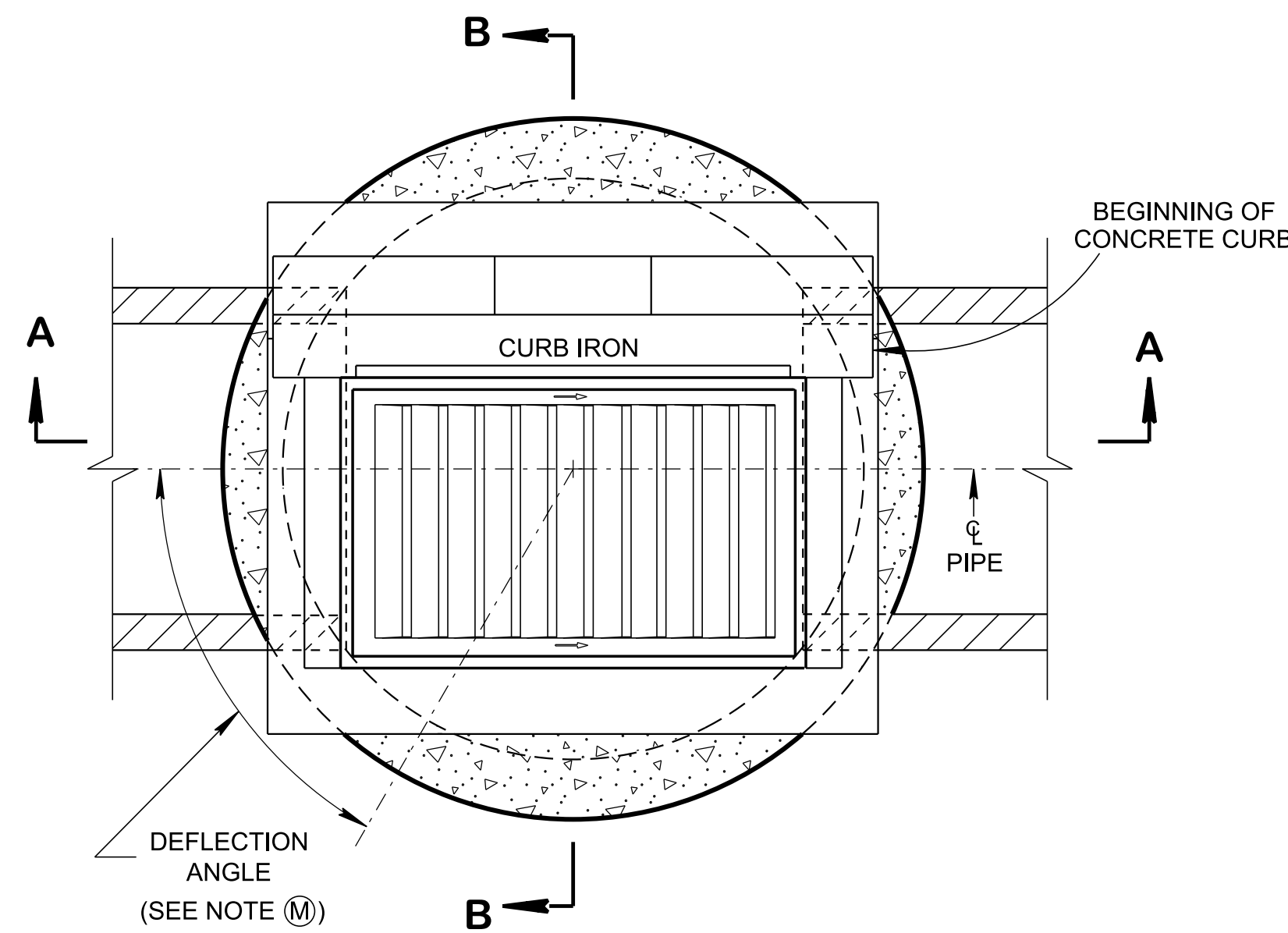
STATE OF TENNESSEE  
STANDARD DRAWING  
DEPARTMENT OF TRANSPORTATION

**STANDARD PRECAST  
48" CIRCULAR  
NO. 13 CATCH BASIN  
FOR USE WITH 6"  
VERTICAL CURB**

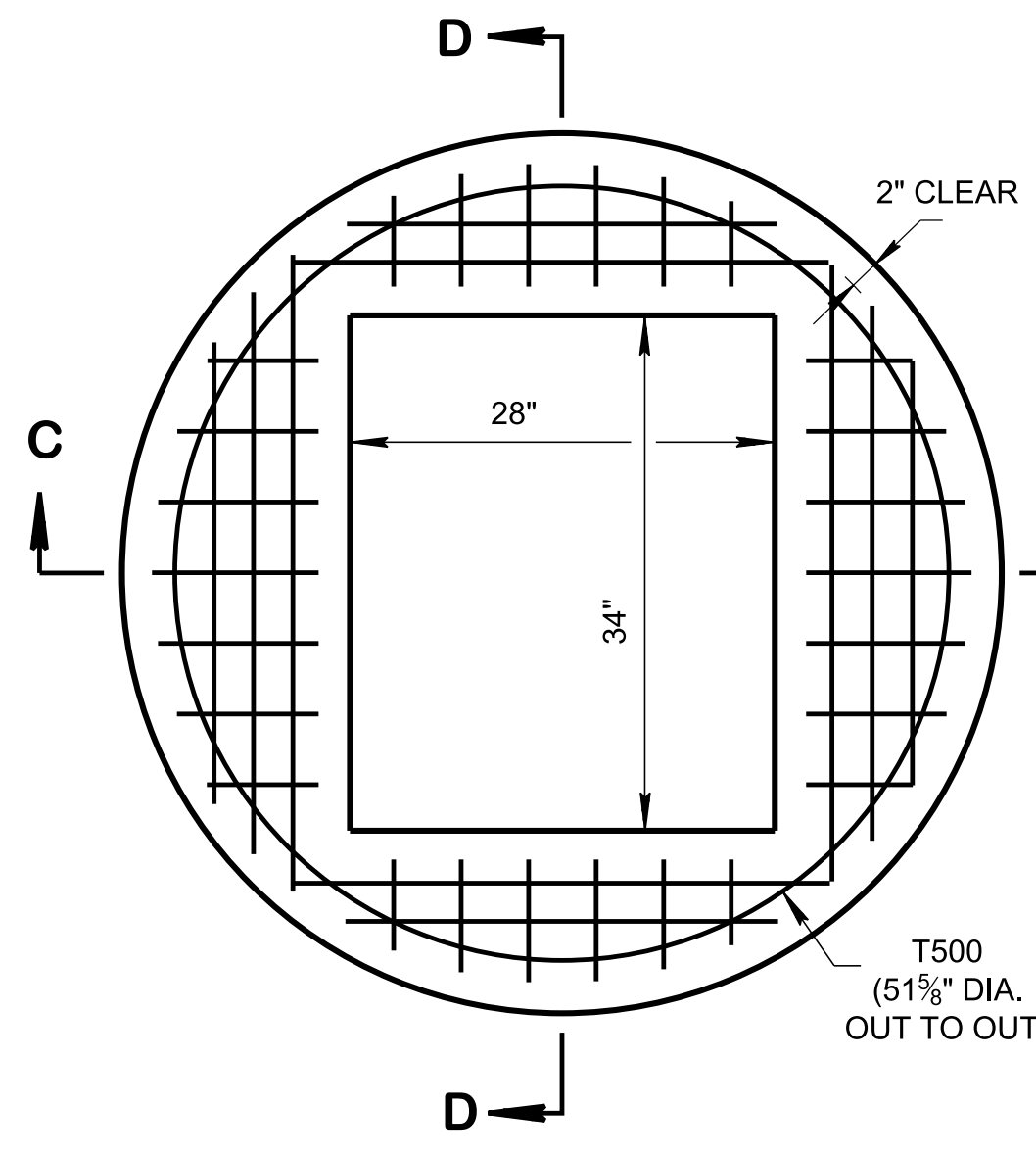
01-19-2000 D-CB-13RA

NOT TO SCALE

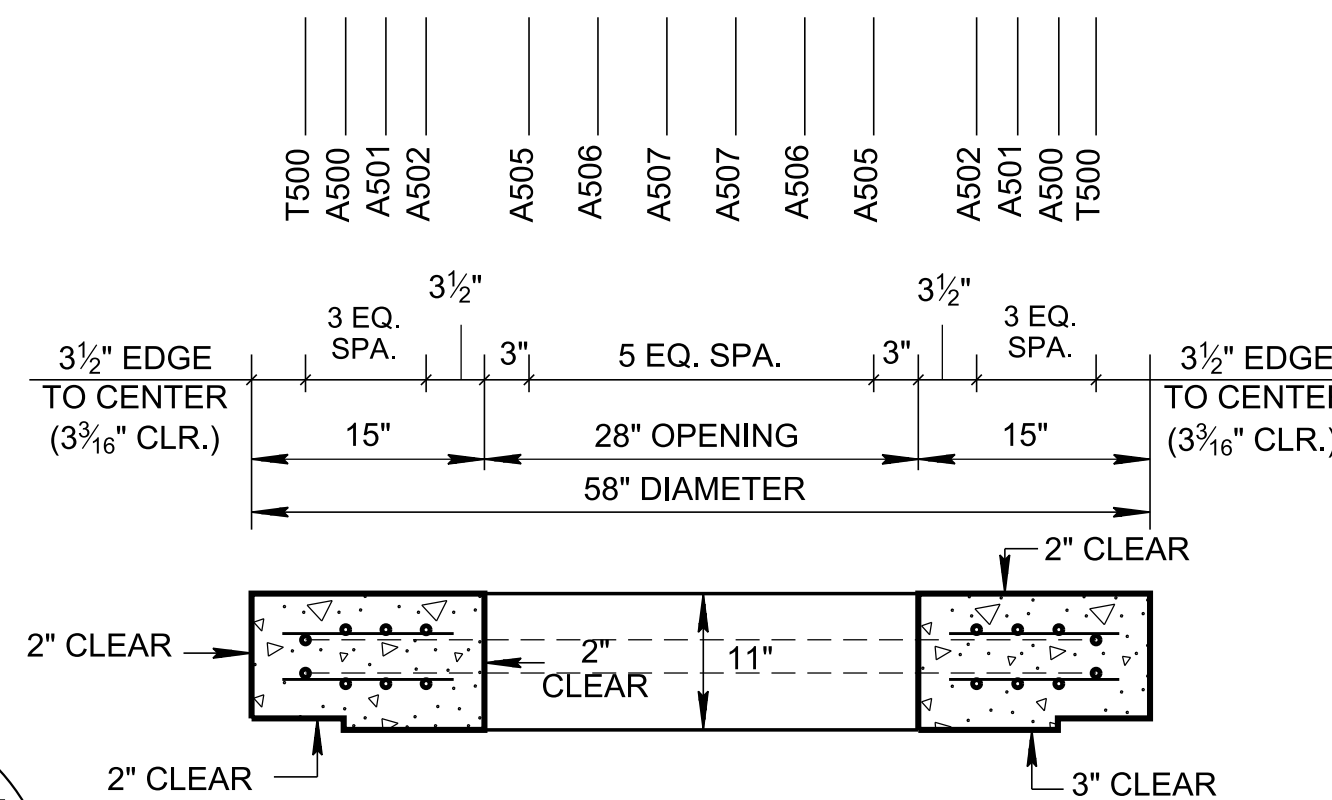




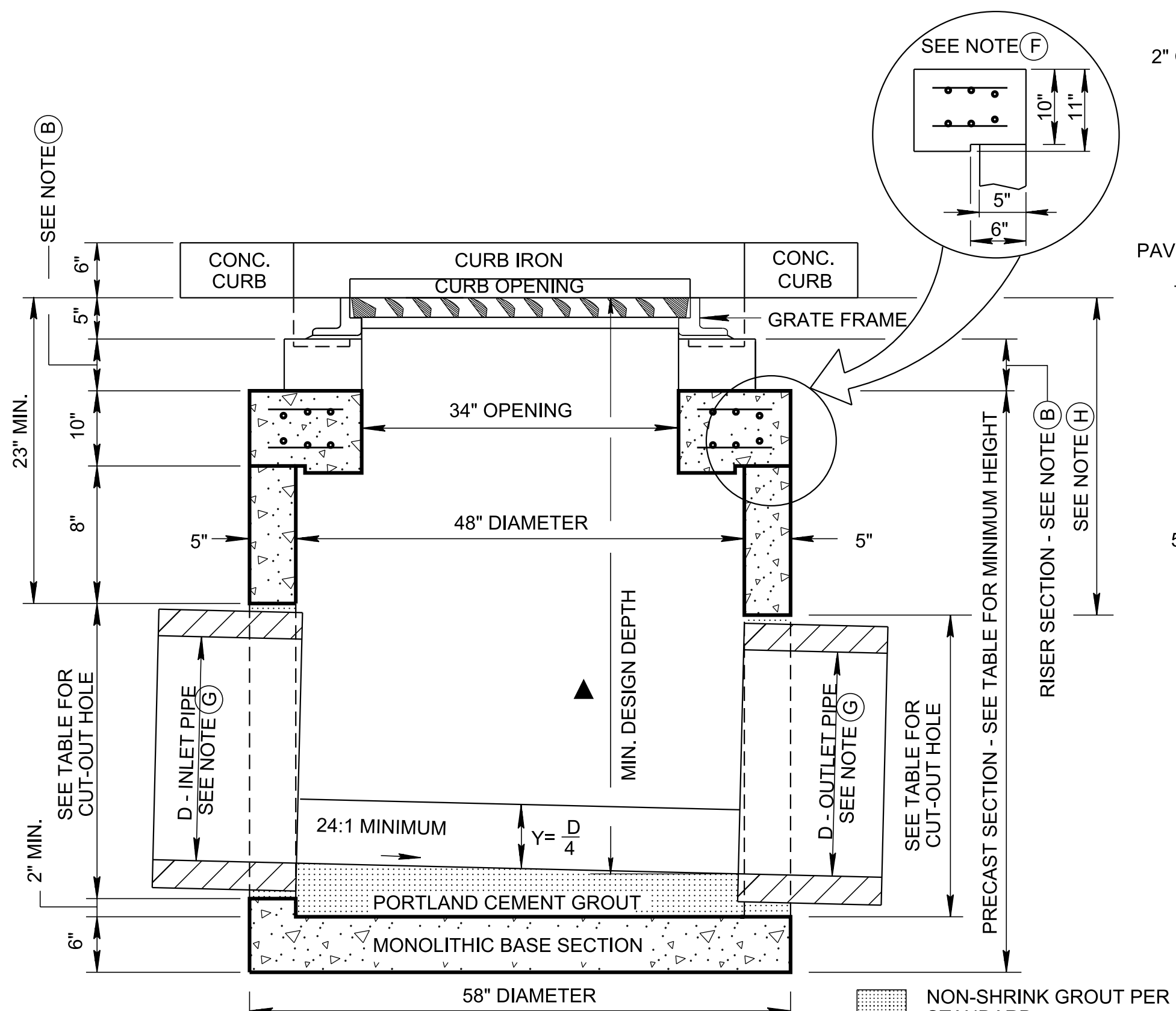
PLAN VIEW



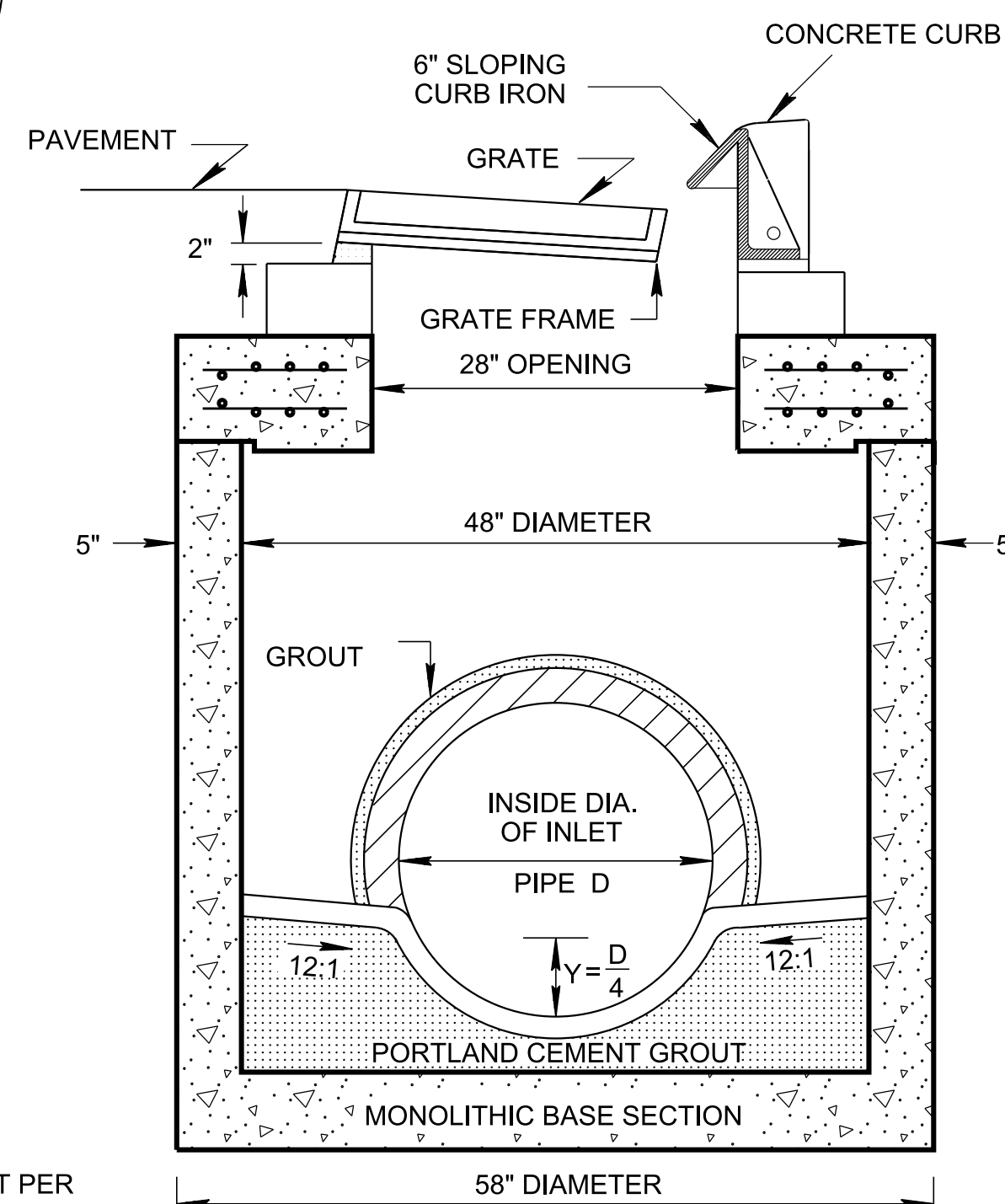
LID REINFORCING



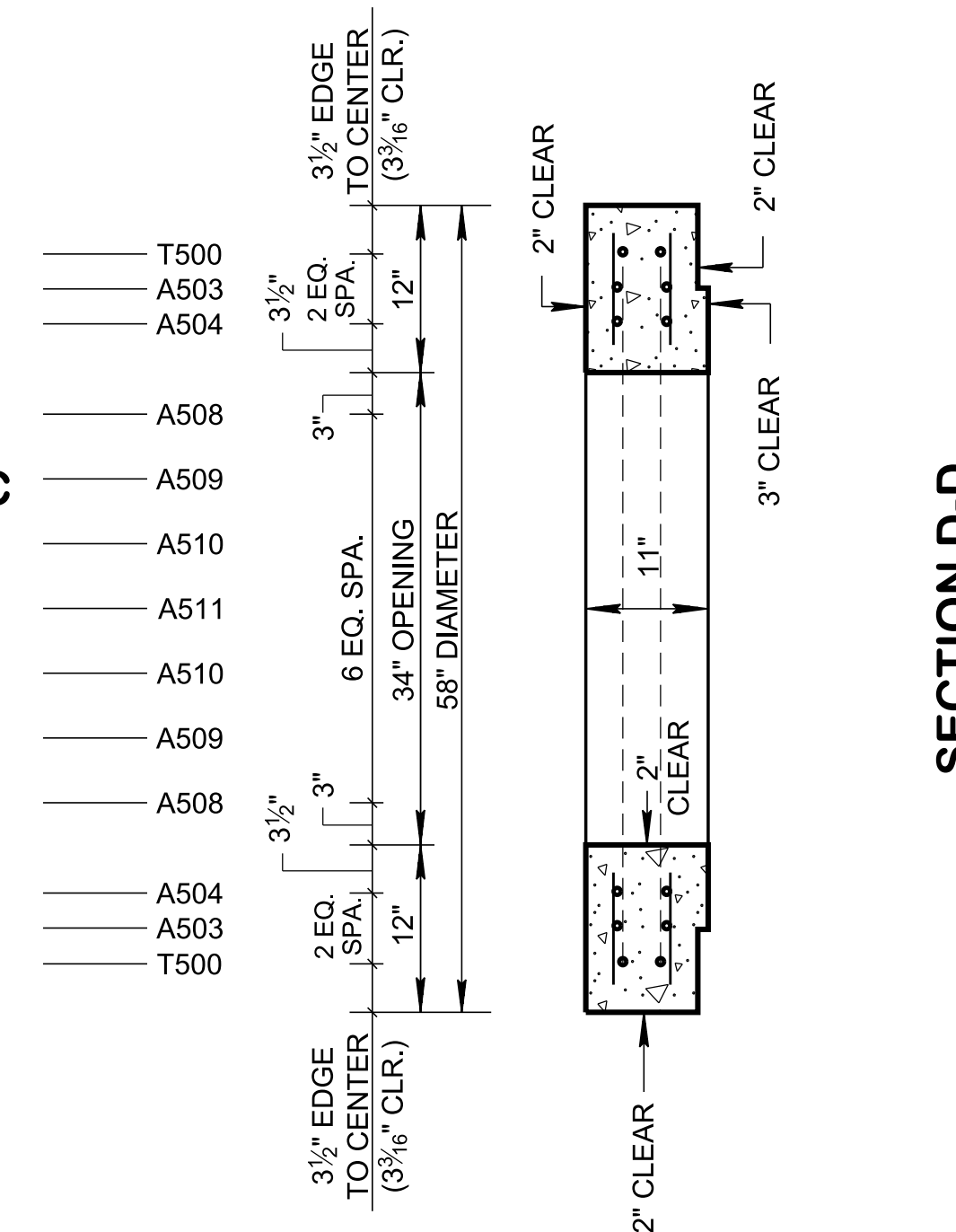
SECTION C-C



SECTION A-A



SECTION B-B



SECTION D-D

**CATCH BASIN MAXIMUM DEPTH NOTE**  
MAXIMUM DEPTH FOR THIS STRUCTURE IS 20.00'.

CATCH BASIN DIMENSIONS				FOR DESIGN USE ONLY CATCH BASIN MINIMUM DESIGN DEPTH (FEET) ▲
INSIDE DIAMETER (D) OF PIPE (INCHES)	PIPE WALL THICKNESS (INCHES)	DIAMETER OF CUT-OUT HOLES (INCHES)	PRECAST SECTION MIN. HEIGHTS (INCHES)	
18	2 1/2	25	51	3.89
24	3	32	58	4.43

▲ SEE SECTION A-A FOR MINIMUM DESIGN DEPTH MEASUREMENT.

- ① CUT-OUT HOLES BASED ON REINFORCED CONCRETE PIPE WITH WALL TYPE "B".
- ② ALL FLEXIBLE PIPE MATERIALS REQUIRE GASKET. SEE STANDARD DRAWING D-PB-2.
- ③ CUT-OUT HOLES FOR PRECAST STRUCTURES TO BE FORMED IN ORDER TO OBTAIN A SMOOTH EDGED HOLE. SCORED OR ETCHED HOLES WITH REINFORCING STEEL LEFT UN CUT WILL NOT BE PERMITTED.

**GENERAL NOTES**

- (A) ALL PRECAST ELEMENTS TO MEET ASTM C478 (CURRENT EDITION) AND AASHTO M199 (CURRENT EDITION) UNLESS SUPERSEDED BY THIS DRAWING.  
CONCRETE:  $f'_c = 4,000$  POUNDS PER SQUARE INCH AT 28 DAYS  
REINFORCING STEEL: ASTM A615,  $F_y = 60,000$  POUNDS PER SQUARE INCH  
ALL REINFORCING IS TO BE INSTALLED AS DETAILED ON THIS DRAWING.
- (B) THIS DIMENSION MAY VARY FROM A MINIMUM OF 0 INCHES TO A MAXIMUM OF 24 INCHES AS LONG AS 23 INCHES IS SATISFIED. THE CONTRACTOR HAS THE OPTION OF USING BRICK OR STANDARD PRECAST CONCRETE RISER FRAMES. THE USE OF BRICK SHALL BE LIMITED TO 6 INCHES. IF THIS DIMENSION EXCEEDS 6 INCHES, PRECAST CONCRETE RISER FRAMES SHALL BE USED AS SHOWN ON STANDARD DRAWING D-RF-1.
- (C) PRECAST CATCH BASIN UNITS WHICH ARE DAMAGED DURING SHIPMENT OR INSTALLATION WILL BE REJECTED. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REPLACE DAMAGED CATCH BASIN UNITS AT THEIR OWN EXPENSE.
- (D) APPROPRIATE SIZING AND LOCATION OF LIFTING DEVICES SHALL BE THE RESPONSIBILITY OF THE FABRICATOR.
- (E) THE CONTRACTOR IS TO PATCH ALL LIFTING DEVICE HOLES WITH GROUT AND PLACE A MINIMUM OF ONE (1) INCH OF COVER OVER THE HARDWARE OF THESE DEVICES ON BOTH TOP AND BOTTOM SURFACES.
- (F) ALTERNATIVE JOINT DETAILS MAY BE ACCEPTABLE. SEE STANDARD DRAWING D-CB-99R FOR ADDITIONAL DETAILS.
- (G) SEE ROADWAY PLANS DRAINAGE TABULATION FOR PIPE INLET AND OUTLET ELEVATIONS. IF NEEDED, INVERT ELEVATIONS MAY BE ADJUSTED AS DIRECTED BY THE ENGINEER IN ORDER TO ACCOMMODATE INLET AND OUTLET PIPES.
- (H) FOR CASES WHERE THE OUTLET PIPE DIAMETER IS LARGER THAN THE INLET PIPE DIAMETER, A MINIMUM 23 INCH DEPTH SHALL BE MAINTAINED ABOVE THE OUTLET PIPE.
- (I) SEE STANDARD DRAWING D-CBB-12B FOR DETAILS REGARDING CAST IRON GRATES, FRAMES AND CURB INLETS.
- (J) SEE STANDARD DRAWING D-CB-25RB FOR DETAILS REGARDING 60" AND LARGER CIRCULAR NO. 25 CATCH BASIN (FOR USE WITH 6" SLOPING CURB).
- (K) PAY DEPTH MEASUREMENT MADE FROM TOP OF GRATE TO OUTLET FLOW ELEVATION. PAYMENT INCLUDES RISER SECTION AND GRATE. PAYMENT FOR CATCH BASIN WILL BE MADE UNDER ITEM NUMBERS:  
611-25.01, CATCH BASINS, TYPE 25, 0'-4' DEPTH, EACH, (THROUGH)  
611-25.05, CATCH BASINS, TYPE 25, > 16'-20' DEPTH, EACH.
- (L) SEE STANDARD DRAWING D-CB-99RA FOR BILL OF STEEL FOR CATCH BASIN LIDS.
- (M) CONNECTION OF 24" PIPES WILL BE LIMITED TO 60 DEGREE DEFLECTION ANGLE.

REV. 12-18-95: CHANGED DRAWING NO. FROM D-CB-12RC TO D-CB-25RA. CHANGED BASE THICKNESS AND VERTICAL DEPTH REQUIREMENTS. ADDED HANDLING AND CUT-OUT HOLE NOTES.

REV. 2-14-96: CHANGED SHEET NAME.

REV. 12-18-96: REMOVED 0.5" PREMOLED FIBER EXPANSION JOINT FROM SECTION "B-B". REMOVED OLD GENERAL NOTE (F) CHANGED LABEL OF LAST FOUR GENERAL NOTES.

REV. 4-15-97: CHANGED CATCH BASIN DIMENSION TABLE.

REV. 1-19-99: CHANGED MINIMUM DEPTH TABLE AND DRAWING IN GENERAL TO REFLECT REDUCTION IN INVERT DROP ACROSS CATCH BASIN.

REV. 12-18-99: MODIFIED CATCH BASIN DIMENSION TABLE.

REV. 5-27-01: CHANGED PAY ITEMS IN GENERAL NOTE (I). ADDED CATCH BASIN MAXIMUM DEPTH NOTE.

REV. 8-01-12: REVISED CATCH BASIN LID FOR COMPLIANCE WITH AASHTO RFD BRIDGE DESIGN SPECIFICATIONS, 4TH EDITION WITH INTERIMS. REVISED REINFORCING, GENERAL NOTES AND ADDITIONAL MISC. DRAFTING EDITS.

REV. 9-24-12: MODIFIED TOP SLAB AND MINIMUM DEPTH.

REV. 3-11-14: ELIMINATED STIRRUPS.

REV. 1-27-16: CORRECTED GENERAL NOTE (J).

REV. 05-15-18: REVISED CATCH BASIN MINIMUM DESIGN DEPTH VALUES. CORRECTED STANDARD SPECIFICATIONS SECTION NUMBER TO 921 FOR NON-SHRINK GROUT. ADDED DIMENSION IN SECTION VIEW A-A FOR NOTE (B). ADDED DIMENSION IN SECTION VIEW A-A FOR MINIMUM DESIGN DEPTH. CHANGED "MOUNTABLE CURB" TO "SLOPING CURB". ADJUSTED BOX SECTION MINIMUM HEIGHTS.

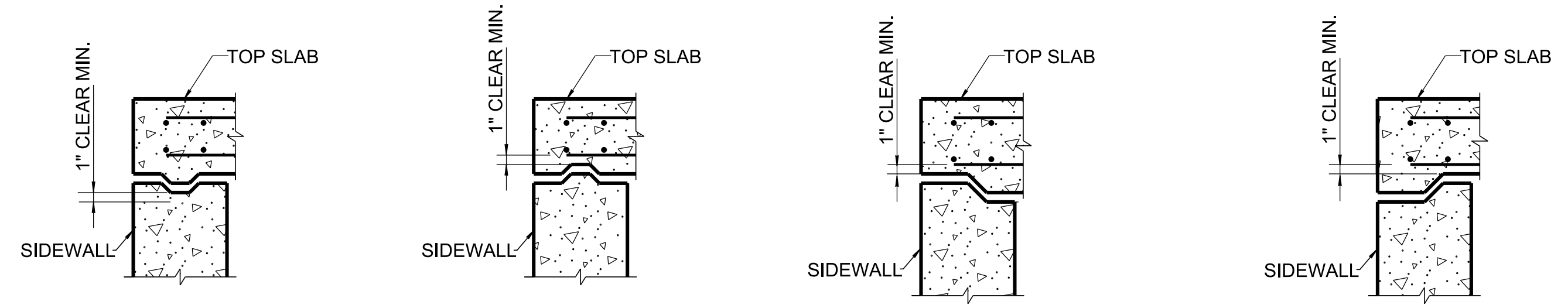
REV. 02-20-2020: REDREW SHEET.

REV. 01-28-2022: DEFLECTION ANGLE NOTE ON PLAN VIEW, AND GENERAL NOTES (L) AND (M) WERE ADDED.

APPROVED BY FHWA (ALL OTHERS APPROVED BY TDOT)

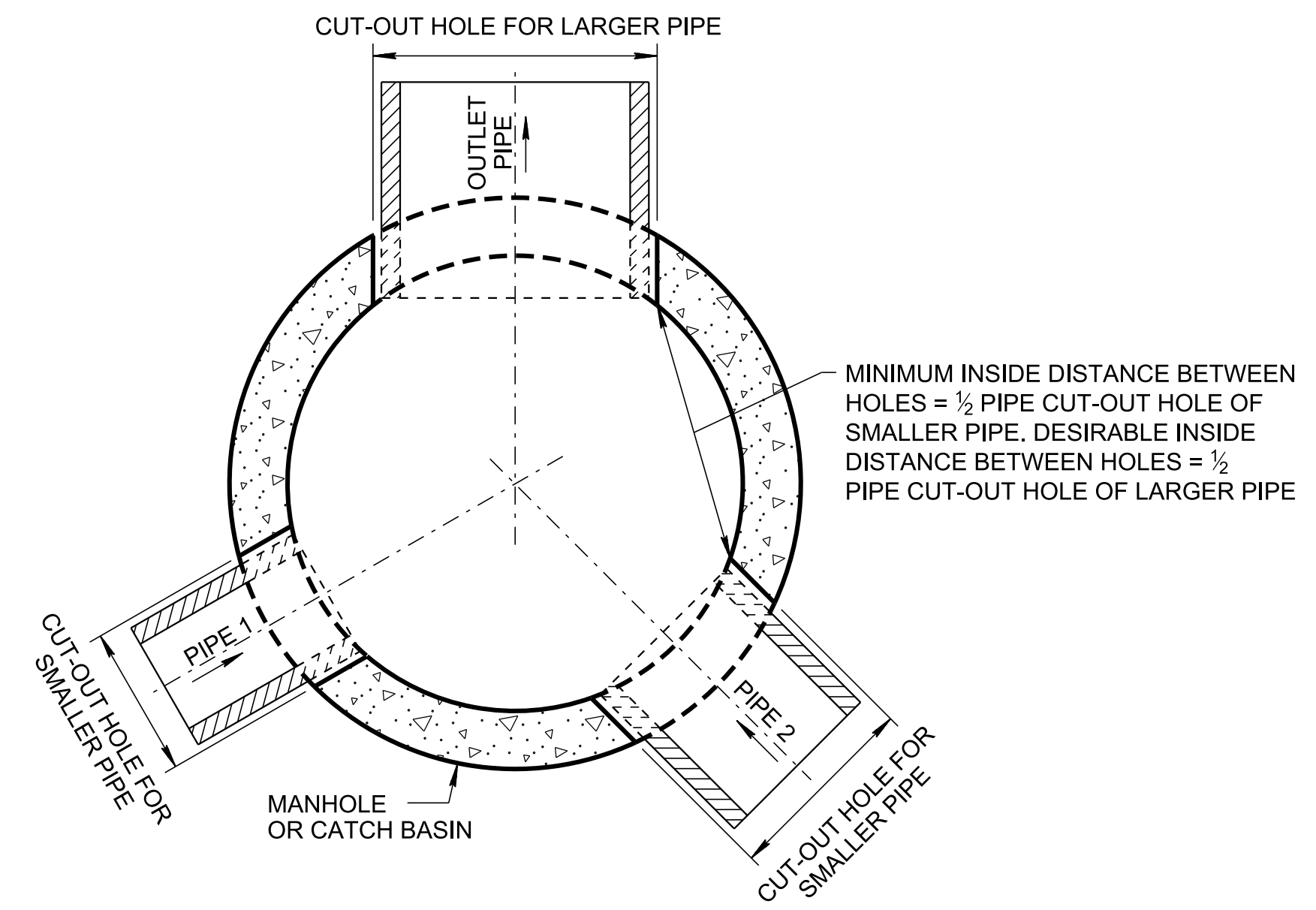
STATE OF TENNESSEE  
STANDARD DRAWING  
DEPARTMENT OF TRANSPORTATION

STANDARD PRECAST  
48" CIRCULAR NO. 25  
CATCH BASIN  
(FOR USE WITH 6" SLOPING CURB)



**ALTERNATE JOINT DETAILS**

NOTE: WHEN ALTERNATE JOINT DETAIL IS PROVIDED MINIMUM CLEAR DIMENSIONS AND INTERIOR SLAB THICKNESS SHOWN ON STANDARDS SHALL BE MAINTAINED.



**MULTIPLE PIPE CONNECTIONS TO A ROUND STRUCTURE**

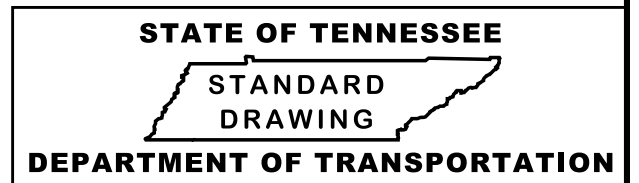
NOTE: WHEN ALTERNATE JOINT DETAIL IS PROVIDED MINIMUM CLEAR DIMENSIONS AND INTERIOR SLAB THICKNESS SHOWN ON STANDARDS SHALL BE MAINTAINED.

SUGGESTED SIZE OF WELDED WIRE REINFORCEMENT (WWR) FOR USE IN WALLS				
INSIDE DIA. OF CATCH BASIN DIA. (INCHES)	WALL THICKNESS W (INCHES)	AREA STEEL REQ'D (SQ. IN./FT.)	WWR OPTION A	WWR OPTION B
48	5	0.12	WWR 3x8-W3xW1.8	WWR 3x12-W3xW2.1
60	6	0.15	WWR 2x8-W2.5xW2.5	WWR 3x12-W3xW2.1 (2 LAYERS)
72	7	0.18	WWR 3x6-W4.5xW2.1	WWR 3x12-W3xW2.1 (2 LAYERS)
84	8	0.21	WWR 2x6-W3.5xW2.1	WWR 3x12-W3xW2.1 (2 LAYERS)
96	9	0.24	WWR 2x8-W4xW2.1	WWR 3x12-W3xW2.1 (2 LAYERS)
108	10	0.30	WWR 2x6-W5xW2.5	
120	11	0.36	WWR 2x8-W6xW3	

WWR AxB-WCxWD  
 A = SPACING OF HORIZONTAL WIRES, IN.  
 B = SPACING OF VERTICAL WIRES, IN.  
 C = HORIZONTAL WIRE SIZE  
 D = VERTICAL WIRE SIZE

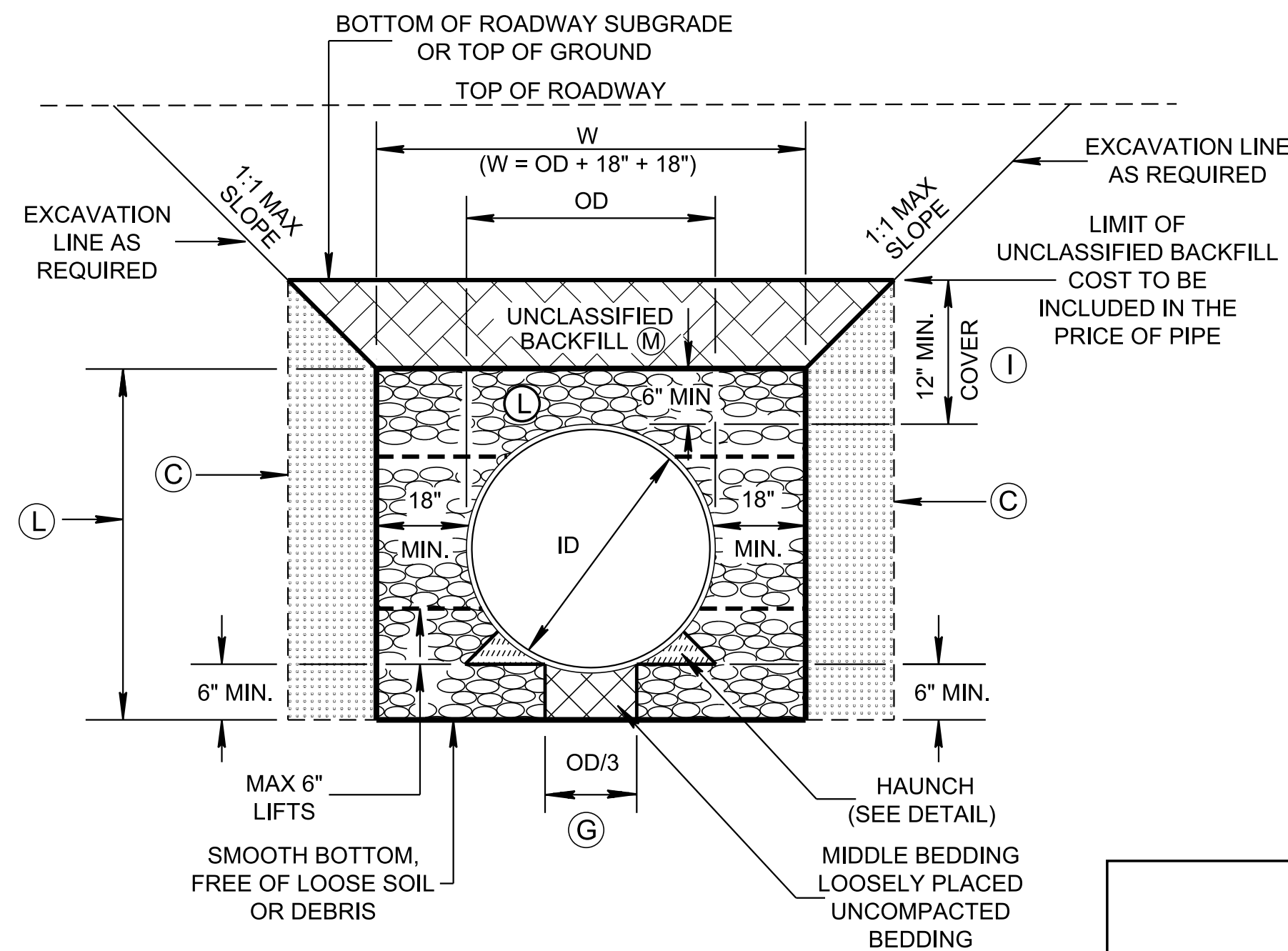
**GENERAL NOTES**

- (A) DRAWING TO BE USED FOR ALL CIRCULAR PRECAST CATCH BASINS AND MANHOLES.
- (B) WELDED WIRE REINFORCEMENT (WWR) SHALL BE PLACED AS DESCRIBED IN ASTM C478 LATEST EDITION. WWR TABLE IS PROVIDED FOR REFERENCE ONLY. OTHER WWR SIZES AND/OR GRID SPACING MAY BE UTILIZED TO OBTAIN THE REQUIRED AREA OF STEEL REINFORCEMENT. A MAXIMUM OF TWO LAYERS MAY BE UTILIZED. WWR SHALL NOT BE UTILIZED IN TOP SLABS.
- (C) SEE D-CB-99RA FOR BILL OF STEEL FOR LID REINFORCEMENT.
- (D) CUT-OUT HOLES MAY BE PREFORMED OR CORE DRILLED.



**MISCELLANEOUS DETAILS FOR ROUND STRUCTURES**

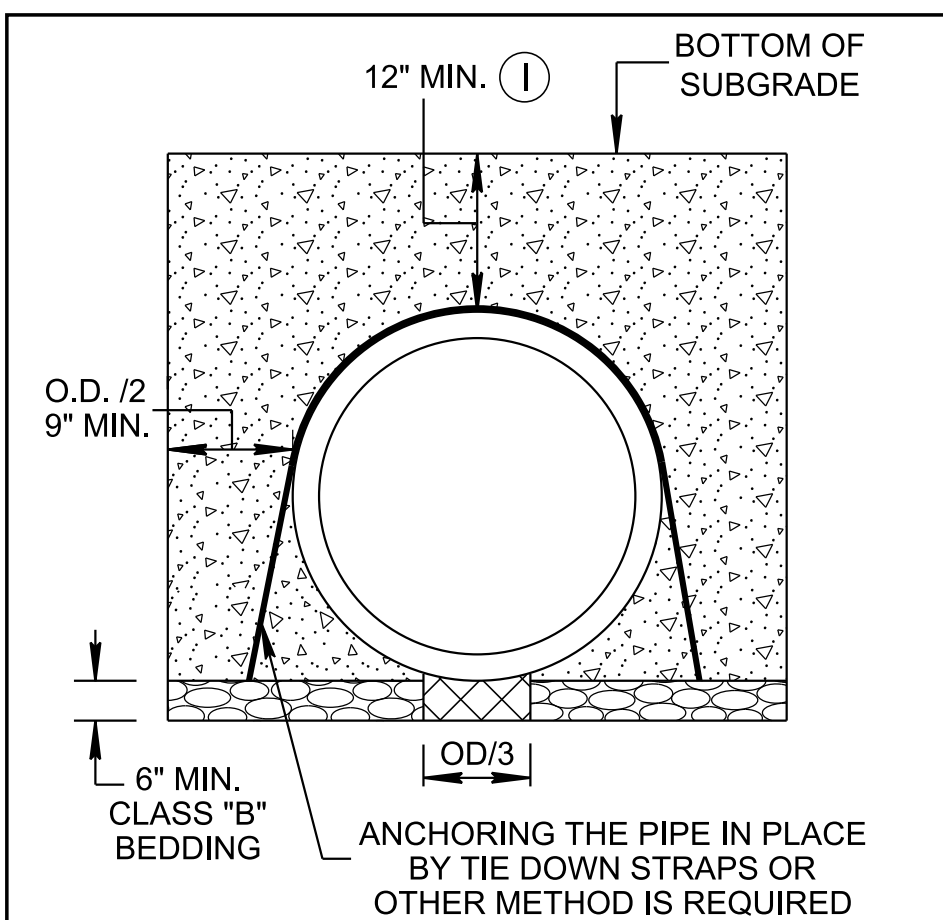
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**STANDARD TRENCH INSTALLATION**

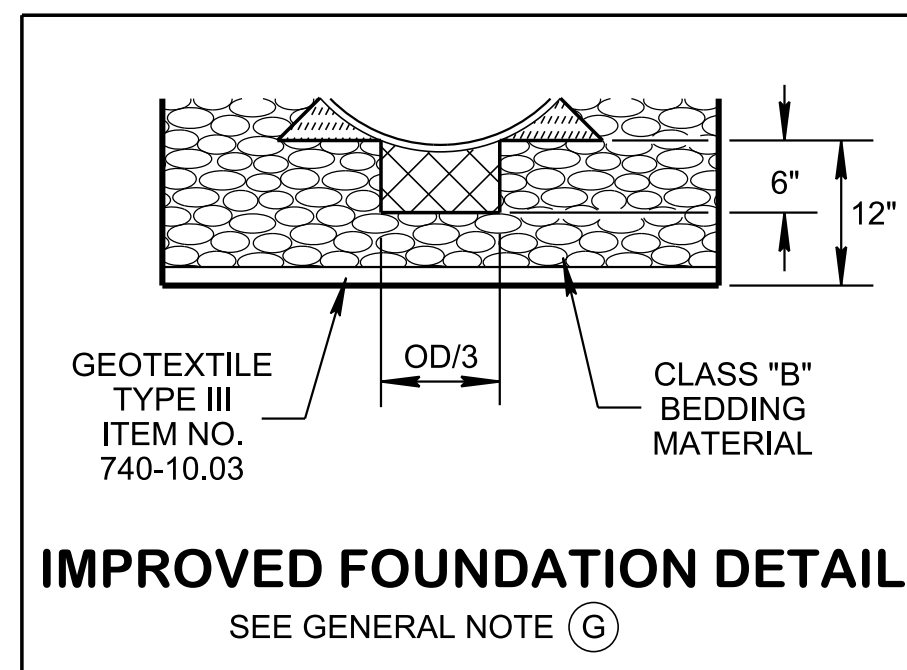
(PIPE CULVERT INSTALLATION DETAIL)

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



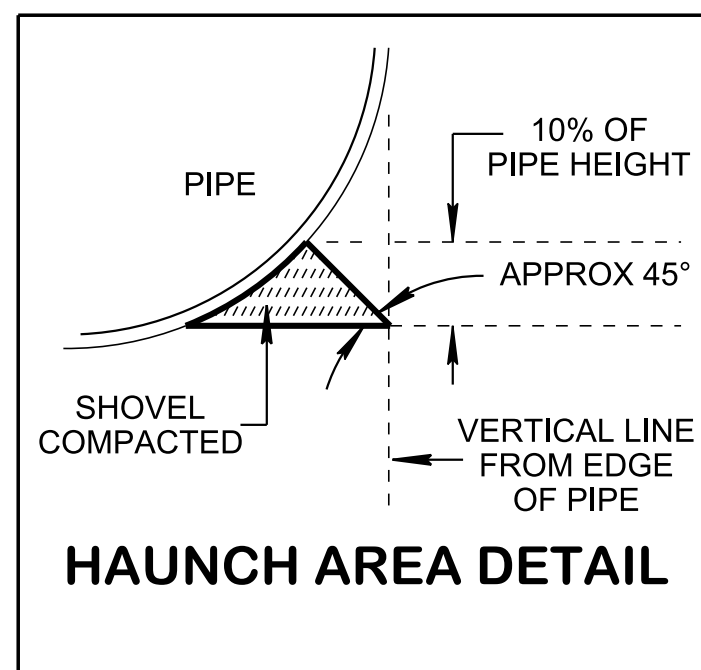
**ALTERNATE BACKFILL DETAIL  
USING EXCAVATABLE  
FLOWABLE FILL (EFF)**

SEE GENERAL NOTE (G)



**IMPROVED FOUNDATION DETAIL**

SEE GENERAL NOTE (G)



**HAUNCH AREA DETAIL**

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

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

**LEGEND**

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

**GENERAL NOTES**

- PIPE MATERIALS:**
- (A) FLEXIBLE PIPE MATERIALS ARE HDPE, PVC, CMP, SRTRP, AND PP.
- ALL HIGH DENSITY POLYETHYLENE (HDPE) PIPE USED FOR CULVERT AND STORM DRAIN APPLICATIONS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M294, TYPE S, CURRENT EDITION ALL HDPE PIPE DELIVERED AND USED SHALL BE A PARTICIPANT IN NTPEP. MAX. PIPE DIA. FOR HDPE PIPE IS 60".
- POLY VINYL CHLORIDE (PVC) PROFILE WALL DRAINAGE PIPE SHALL MEET AASHTO DESIGNATION M-304. THE MAXIMUM PIPE DIAMETER FOR PVC PIPE IS 36".
- STEEL REINFORCED THERMOPLASTIC RIBBED PIPE (SRTRP) SHALL MEET AASHTO DESIGNATION M335, THE MAXIMUM PIPE DIAMETER FOR THE PIPE IS 60".
- CORRUGATED METAL PIPE (CMP) SHALL BE ALUMINIZED COATED CORRUGATED METAL PIPE AND SHALL MEET AASHTO M274, MAXIMUM DIA IS 72".
- POLYPROPYLENE PIPE (PP) SHALL MEET AASHTO DESIGNATION M-330, THE MAXIMUM PIPE DIAMETER IS 60".
- INSTALLATIONS REQUIREMENTS:**
- (B) FOR EMBANKMENT AREAS OR WHERE TRENCH CONDITIONS DO NOT EXIST, AN INDUCED TRENCH SHALL BE CONSTRUCTED. SEE STD. DWG. NO. D-PB-3.
- (C) FOR TRENCHES WITH IN SITU SOIL WALLS, ANY PORTION OF THE WALL SHALL BE AT LEAST AS FIRM AS THE MAJORITY OF THE SUBGRADE. SOIL NOT MEETING THIS REQUIREMENT SHALL BE REMOVED AND REPLACED.
- (D) FOR ADDITIONAL INSTALLATION INFORMATION SEE AASHTO SECTION 30 OR ASTM D2321. ALL PIPES SHALL BE ASSEMBLED AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS. PIPE SHALL BE PLACED IN THE BED STARTING AT THE DOWNSTREAM END.
- (E) ONLY AS MUCH TRENCH AS CAN BE SAFELY MAINTAINED SHALL BE OPENED. ALL TRENCHES SHALL BE BACKFILLED AND COMPACTED TO THE MINIMUM COVER DEPTH OF 12" ABOVE THE PIPE AS SOON AS PRACTICABLE, BUT NOT LATER THAN THE END OF EACH WORKING DAY IN ACCORDANCE WITH THE COMPACTION REQUIREMENTS.
- (F) **JOINT REQUIREMENTS:**
- CMP JOINING SYSTEM SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M36. HDPE, PP, SRTRP, AND PVC PIPE SHALL BE JOINED IN ACCORDANCE WITH ASTM D3212 AND MEET THE PERFORMANCE REQUIREMENT FOR SOIL-TIGHTNESS, UNLESS WATER-TIGHTNESS IS SPECIFIED. FOR A CONTINUOUS LINE OF PIPE, THE CONNECTIONS BETWEEN PIPE SECTIONS WILL BE FREE FROM IRREGULARITIES ALONG THE FLOW LINE. JOINTS BETWEEN PLASTIC FLEXIBLE PIPE AND STRUCTURE SHALL HAVE A GASKET MEETING ATM F2510. FOR CMP PIPE TO STRUCTURE CONNECTIONS OR PLASTIC PIPE AT A SKEW GREATER THAN 15°, WHERE A GASKET WILL NOT WORK, NON-SHRINK GROUT APPLIED IN TWO STAGES SHALL BE USED.
- (G) ONLY WHERE THE TRENCH FOUNDATION IS FOUND UNACCEPTABLE OR LOCATION WHERE THE WATER TABLE IS FOUND HIGH:
- (1) IMPROVED FOUNDATION OR EXCAVATABLE FLOWABLE FILL (EFF) MAY BE USED AT ENGINEER'S INSTRUCTION AND THE COST WILL BE INCLUDED IN THE UNIT PRICE OF THE PIPE.
  - (2) FIELD ENGINEER SHALL REVIEW SITE CONDITIONS INCLUDING THE POSSIBLE EFFECTS OF WATER TABLE TO CONFIRM TYPICAL BEDDING AS SHOWN IS ADEQUATE TO PROVIDE STRUCTURAL SUPPORT OR FOUNDATION IMPROVEMENT IS REQUIRED.
- (H) MINIMUM SPACING BETWEEN MULTIPLE PIPES ARE:
- 36" PIPES AND SMALLER: EQUAL TO THE OUTSIDE DIAMETER OF THE LARGEST PIPE.
- PIPES LARGER THAN 36": EQUAL TO HALF THE OUTSIDE DIAMETER OF THE LARGEST PIPE.
- (I) FOR MINIMUM COVER DEPTHS FOR CONSTRUCTION LOADS SEE D-PB-3.
- (J) MAXIMUM ALLOWABLE FILL HEIGHTS ARE AS DEFINED IN THE DRAINAGE MANUAL SECTION 6, APPENDIX, TABLE 6A-1.
- BEDDING AND BACKFILL REQUIREMENTS:**
- (K) PLACE 6 INCHES MINIMUM OF CLASS B BEDDING MATERIAL, ALONG WITH SUFFICIENT ADDITIONAL CLASS "B" BEDDING MATERIAL ACCURATELY SHAPED AS SHOWN IN HAUNCH AREA DETAIL.
- (L) CLASS "B" BEDDING MATERIAL MEETING THE REQUIREMENTS OF CONSTRUCTION SPECIFICATION SUBSECTION 204.04 SHALL BE PLACED IN LIFTS AND UP TO 6 INCHES ABOVE THE TOP OF PIPE. A MINIMUM COMPACTION LEVEL OF 90% OF THE STANDARD PROCTOR DENSITY PER AASHTO T99 SHALL BE ACHIEVED BY USE OF VIBRATORY PLATE.
- (M) UNCLASSIFIED BACKFILL SHALL BE PLACED AND COMPACTED IN LAYERS NOT EXCEEDING A 8 INCH LOOSE LIFT THICKNESS STARTING FROM THE CLASS B BEDDING, 6 INCHES ABOVE THE TOP OF PIPE, TO AN ELEVATION NOT LESS THAN ONE FOOT ABOVE THE TOP OF THE PIPE.
- (N) **END TREATMENTS:**
- (1) ALL CROSS DRAINS (PERPENDICULAR) PLACED UNDER A MAINLINE ROADWAY, REQUIRE TYPE U ENDWALLS CONFORMING TO THE ROADWAY FILL SLOPE AS SHOWN ON STANDARD DRAWINGS D-PE-15A THROUGH D-PE-48A FOR END WALL GEOMETRY AND D-PE-99 FOR GRATE DETAILS. ALL CULVERT ENDWALLS LOCATED WITHIN THE CLEAR ZONE (S-CZ-1) REQUIRE A SAFETY GRATE (18" OR 24" PIPE ENDWALLS MAY OMIT THE STEEL GRATE). ALL CROSS DRAIN CULVERTS LARGER THAN 48" MUST BE PROTECTED BY A GUARDRAIL OR ENDWALL OR MUST BE PLACED OUTSIDE THE CLEAR ZONE. CROSS DRAIN ENDWALLS PLACED OUTSIDE THE CLEAR ZONE MAY USE TYPE A (D-PE-1), TYPE B (D-PE-9 THRU 9F), OR STRAIGHT HEADWALL (D-PE-4) IN LIEU OF TYPE U OR IF THE PIPE END WALL IS PROTECTED BY A GUARDRAIL.
  - (2) ALL SIDE DRAINS (PARALLEL) PLACED UNDER A SIDE ROAD, DRIVEWAY, OR FIELD ENTRANCE, ETC. THAT INTERSECT A MAINLINE ROADWAY, REQUIRE SAFETY ENDWALLS AS SHOWN ON THE D-SEW- SERIES STANDARD DRAWINGS WITH SAFETY GRATE (D-SEW-1A) WITH A MAXIMUM 6:1 TAPER IF THE CULVERT ENDWALLS ARE LOCATED INSIDE THE CLEAR ZONE (S-CZ-1).
  - (3) ALL MEDIAN CROSSOVER SIDE DRAINS (LONGITUDINAL) PLACED UNDER MEDIAN OPENINGS REQUIRE SAFETY ENDWALLS AS SHOWN ON D-SEW- 12D STANDARD DRAWING WITH SAFETY GRATE (D-SEW-1A) WITH MAXIMUM 12:1 TAPER IF THE CULVERT ENDWALLS ARE LOCATED INSIDE THE CLEAR ZONE (S-CZ-1).
- (O) **INSPECTION REQUIREMENTS:**
- ALL PIPES SHALL UNDERGO INSPECTION ACCORDING TO SECTION 607.09 OF THE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION OR PER SECTION 30 OF AASHTO STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES CURRENT EDITION.
- (P) **PAYMENT:**
- EXCAVATION FOR PIPE WILL NOT BE MEASURED AND PAID FOR DIRECTLY AND ANY SOIL NOT MEETING REQUIREMENT FOR TRENCHES SHALL BE REMOVED AND REPLACED. ALL COST OF THIS WORK WILL BE INCLUDED IN THE COST OF THE PROPOSED PIPE CULVERT. SEE TABLE A FOR PIPE CULVERT ITEM NUMBERS.
- PAYMENT FOR CLASS "B" BEDDING MATERIAL, UNCLASSIFIED BACKFILL TO THE LIMIT LINE, AND/OR IF REQUIRED EXCAVATABLE FLOWABLE FILL, TIE DOWN STRAPS AND BEDDING MATERIAL WILL BE INCLUDED IN THE UNIT PRICE OF THE PIPE.
- GEOTEXTILE TYPE III TO BE USED ONLY IF IMPROVED FOUNDATION IS REQUIRED, AND WILL BE PAID UNDER ITEM NO.
- 740-10.03 GEOTEXTILE (TYPE III)(EROSION CONTROL) PER S.Y.

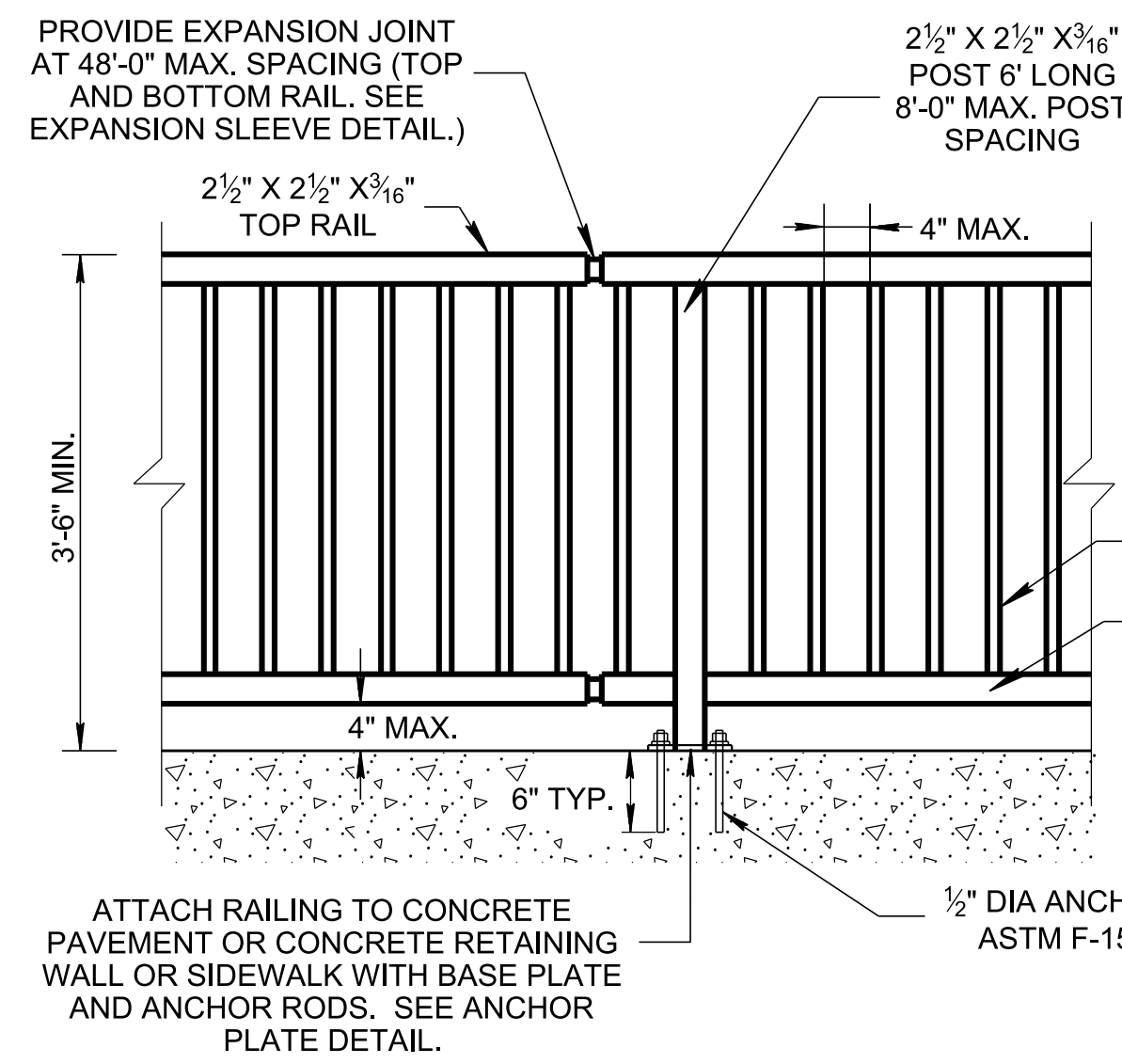
- REV. 7-12-07: REVISED GENERAL NOTE (I)
- REV. 6-1-09: REVISED GENERAL NOTE (I) AND TITLE NAME. ADDED GENERAL NOTE (I)
- REV. 2-1-12: REVISED DRAWING NAME ADDED EFF DETAIL. REVISED GENERAL NOTES AND TABLE. ADDED MINIMUM COVER TABLE.
- REV. 8-21-12: REVISED GENERAL NOTES. CHANGED BACKFILL MATERIAL.
- REV. 1-2-13: REVISED TRENCH AND ADDED FILL DETAIL.
- REV. 1-29-14: ADDED PP, RE LETTERED AND REVISED NOTES.
- REV. 06-28-19: REVISED DETAIL FOR STANDARD TRENCH INSTALLATION, AND GENERAL NOTES. REMOVED TABLE A AND RENAMED TABLE B TO A. REVISED TABLE A CONTENT AND LEGEND. REDREW SHEET.
- REV. 11-30-20: REVISED DETAIL FOR STANDARD TRENCH INSTALLATION, TABLE A AND GENERAL NOTES.
- REV. 03-04-21: REVISED TABLE A.
- REV. 01-28-2022: REVISED GENERAL NOTE (F).

APPROVED BY FHWA  
(ALL OTHERS APPROVED BY TDOT)

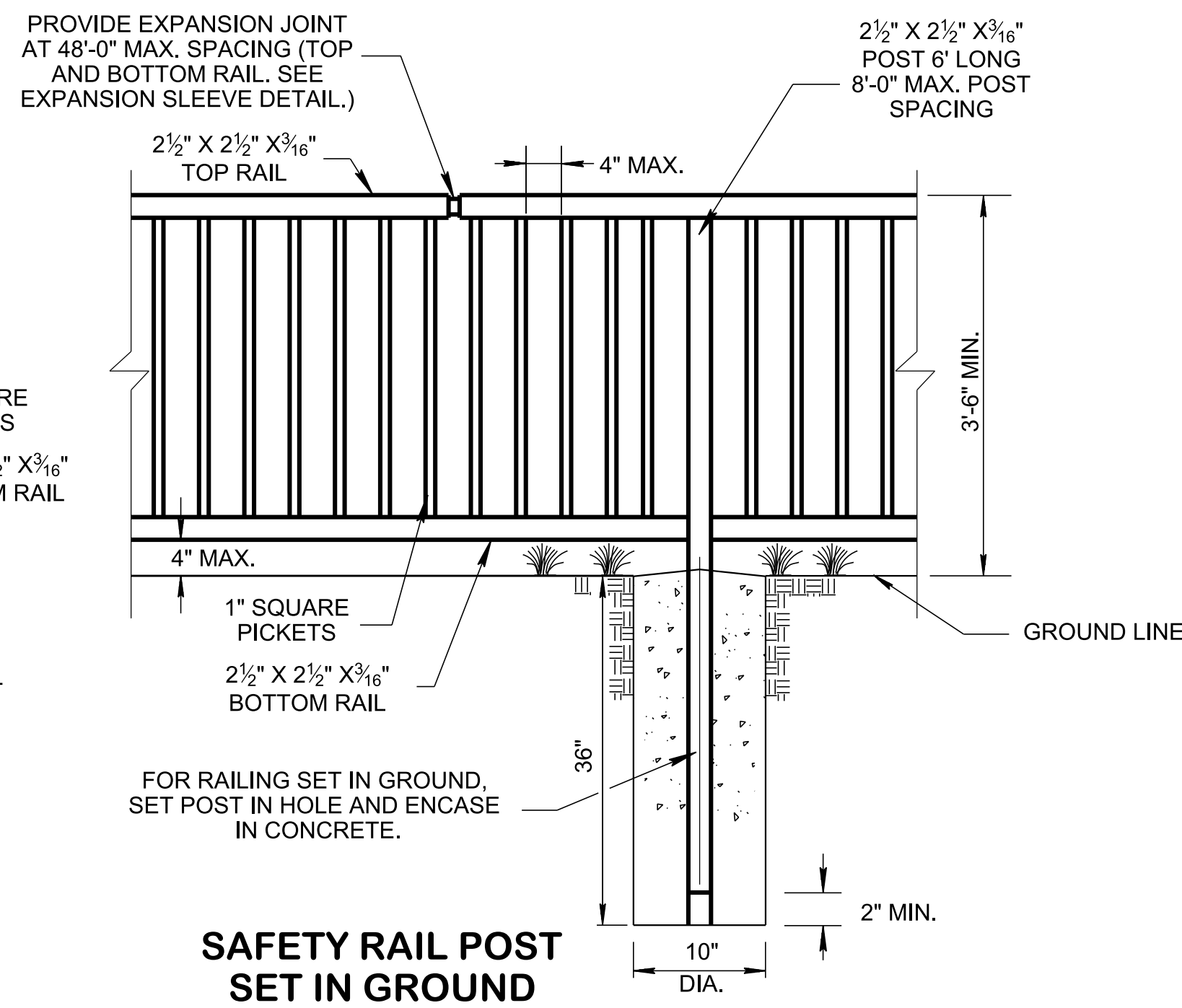
STATE OF TENNESSEE  
STANDARD DRAWING  
DEPARTMENT OF TRANSPORTATION

STANDARD DETAILS  
FOR  
FLEXIBLE PIPE  
INSTALLATION

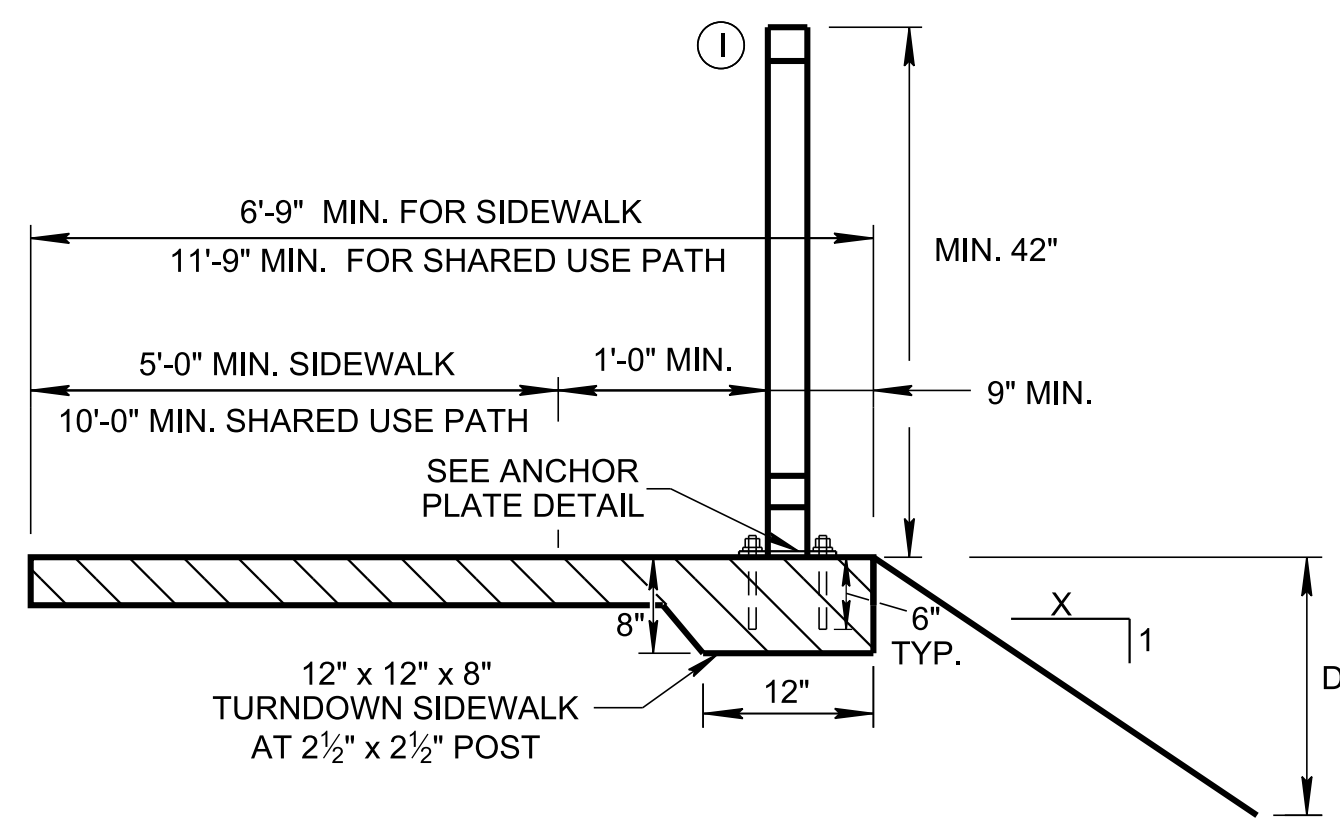
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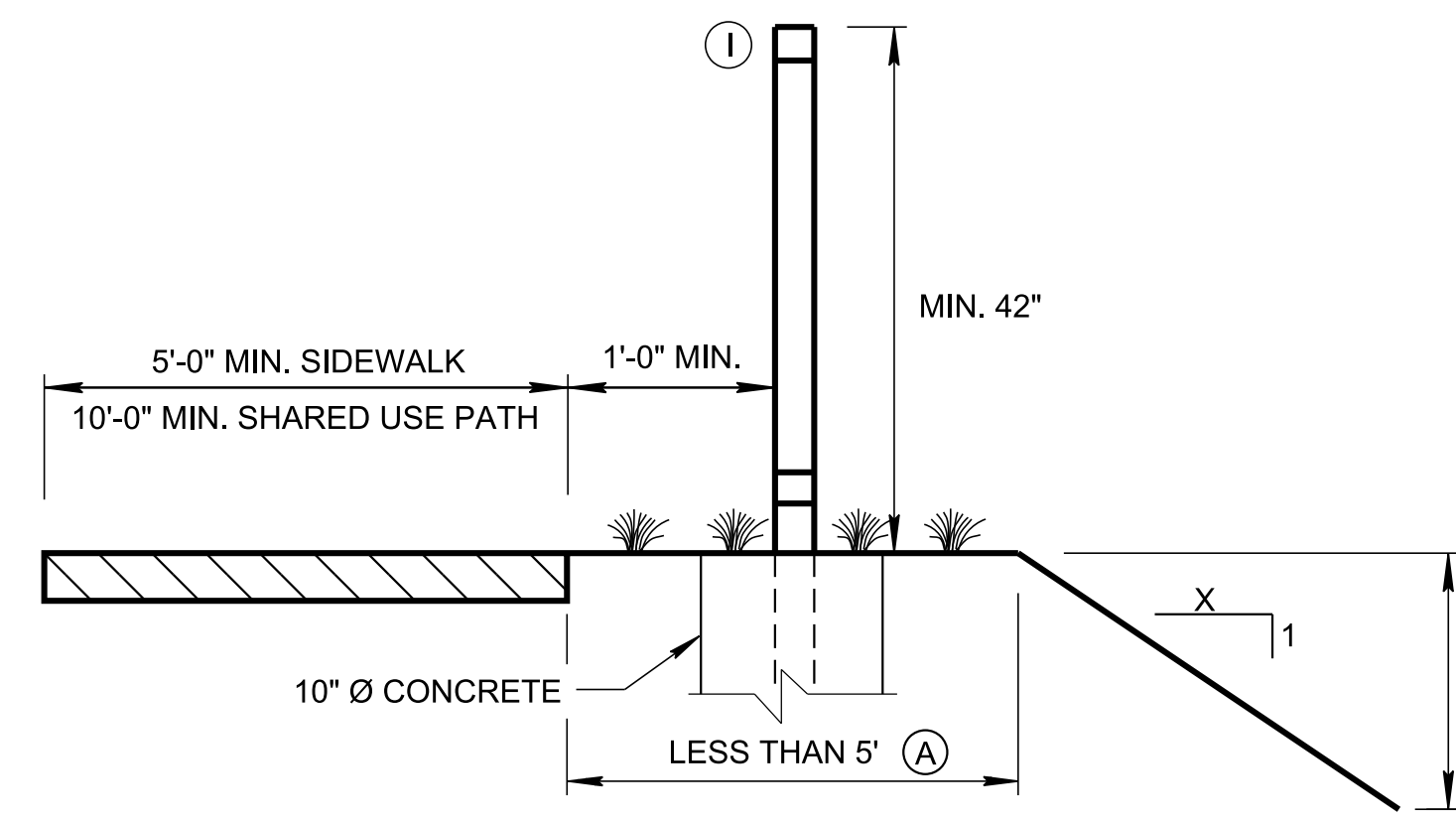
**SAFETY RAIL POST BOLTED TO CONCRETE**



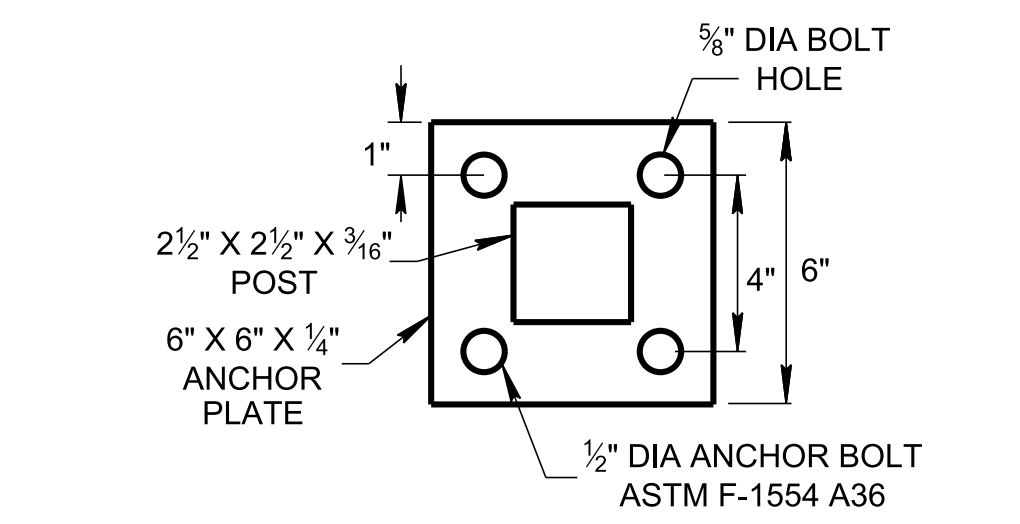
**SAFETY RAIL POST SET IN GROUND**



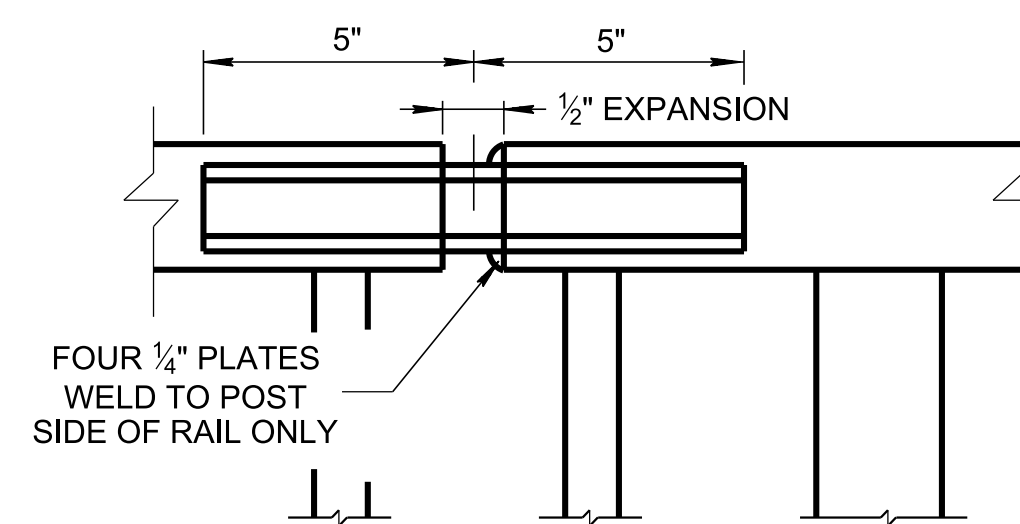
**SECTION VIEW FOR POST SET IN SIDEWALK**



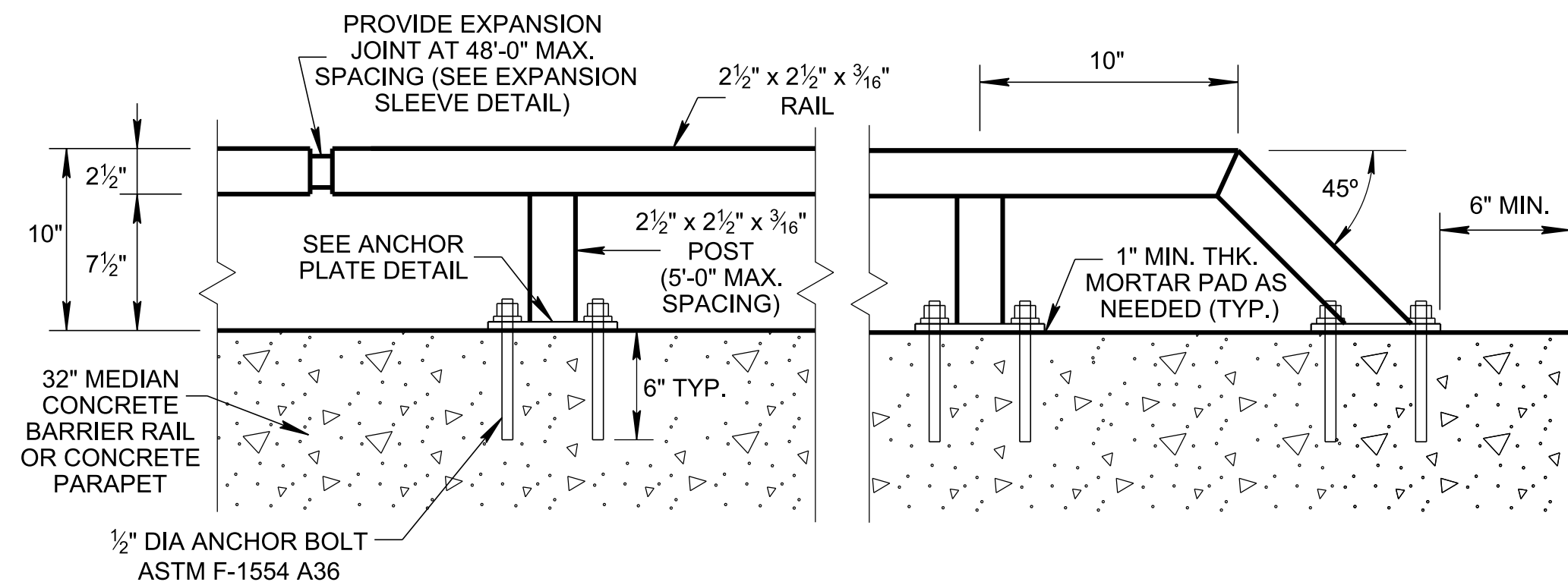
**SECTION VIEW FOR POST SET IN GROUND**



**ANCHOR PLATE DETAIL**

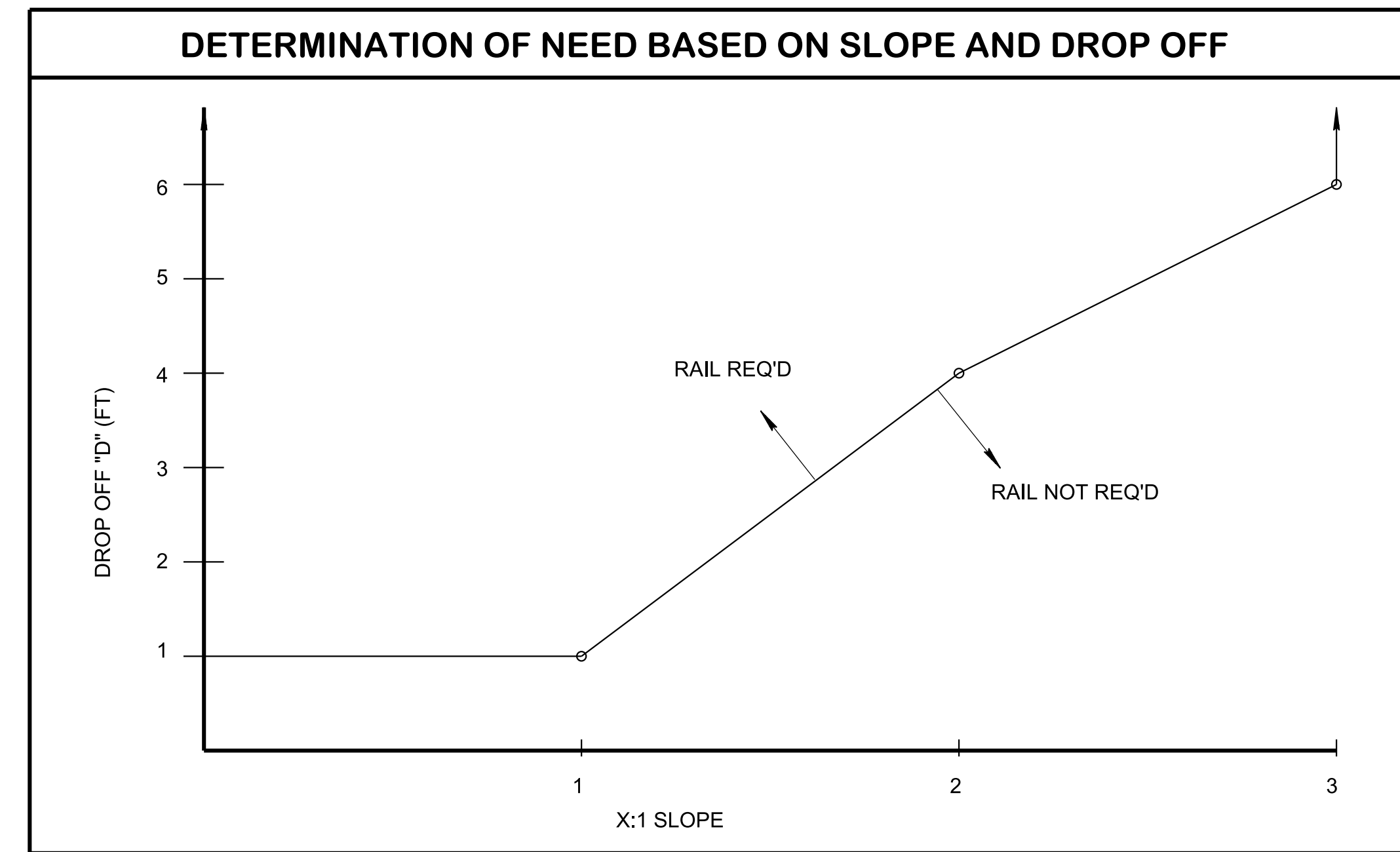


**EXPANSION SLEEVE DETAIL**



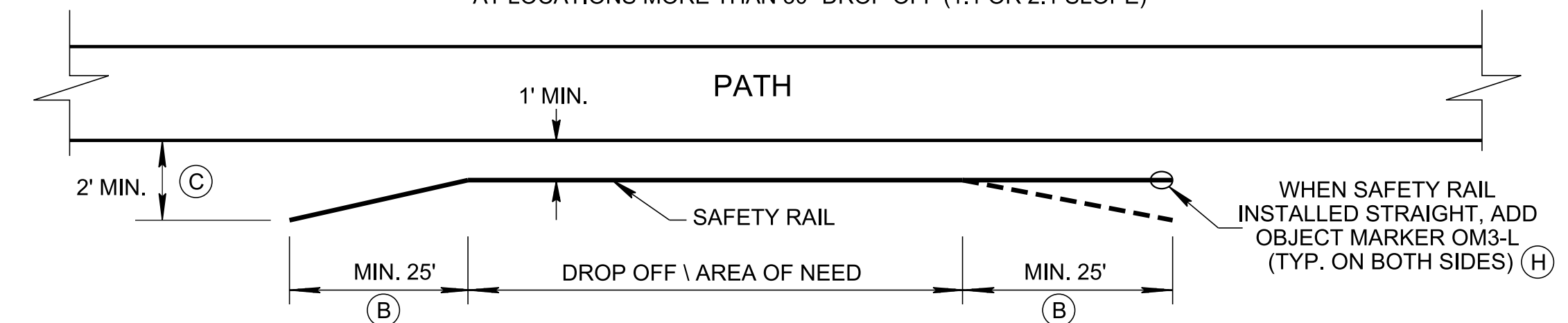
**BIKE PEDESTRIAN RAIL INSTALLATION ON 32" CONCRETE MEDIAN BARRIER OR CONCRETE BRIDGE PARAPET RAIL**

(TO PROVIDE MIN 42" HIGH, INSTALL 10" BIKE/ PED. SAFETY RAIL ON 32" MEDIAN CONCRETE BARRIER RAIL OR ON CONCRETE PARAPET SEE STD. DWG. MM-BPR-2 AND MM-BPR-3)

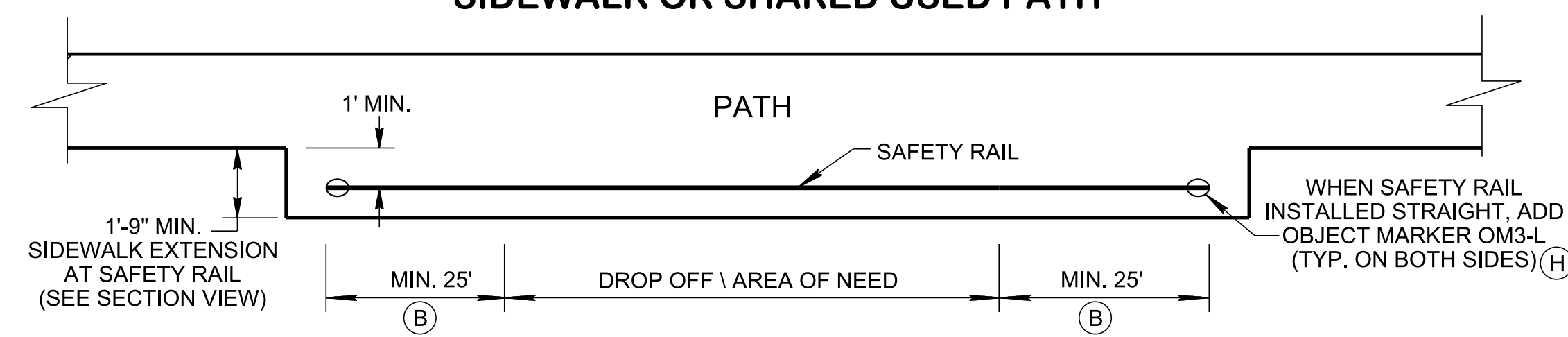


**FIGURE 1**

BASED ON AASHTO BIKE GUIDE (CONSIDER PEDESTRIAN SAFETY RAIL AT LOCATIONS MORE THAN 30" DROP OFF (1:1 OR 2:1 SLOPE))



**TYPICAL PLAN VIEW SIDEWALK OR SHARED USED PATH**



**TYPICAL PLAN VIEW FOR SIDEWALK OR SHARED USED PATH EXTENSION AT SAFETY RAIL**

**GENERAL NOTES**

- (A) TO DETERMINE IF SAFETY RAIL IS REQUIRED, REFER TO FIGURE 1. WHEN SHARED USE PATH OR SIDEWALK EDGE DROP OFF IS WITHIN 5', INFORMATION IS PROVIDED FOR GUIDANCE ONLY, SOME SITES MAY REQUIRE A RAIL PER ENGINEERING JUDGEMENT. IF SIDEWALK IS ALONG A ROADWAY, SEE STANDARD DRAWING S-PL-6 FOR SAFETY HARDWARE PLACEMENT.
- (B) SAFETY RAIL SHALL BEGIN 25' BEFORE AND EXTEND 25' BEYOND AREA OF NEED.
- (C) SAFETY RAIL ENDS SHALL BE FLARED TO BEYOND 2' OF THE EDGE OF THE PATH OR MARKED WITH OBJECT MARKERS.
- (D) STEEL (INCLUDING ANCHOR BOLTS) SHALL CONFORM TO ASTM A36. WELD ALL COMPONENTS USE 3/16" FILLET WELDS. GRIND WELDS AND CONNECTIONS AS REQUIRED TO PROVIDE A SMOOTH SURFACE, FREE OF BURRS.
- (E) FIELD PAINT SAFETY RAIL AFTER INSTALLATION AS SPECIFIED IN THE CONTRACT DOCUMENTS.
- (F) DETAIL SHOWN IS FOR TOP RAIL. EXPANSION JOINT FOR BOTTOM RAIL IS SIMILAR.
- (G) SYSTEM REPLACEMENTS MAY BE ALLOWED PROVIDING THAT THE HEIGHT AND SPACING LIMITATIONS SHOWN ON THIS DRAWING ARE MET.
- (H) ALL COST ASSOCIATED WITH THE SAFETY RAIL, FURNISHING, INSTALLING AND PAINTING ALONG WITH THE OBJECT MARKERS WILL BE INCLUDES IN ITEM NO. 604-01.20, BOX TUBE SAFETY RAIL, PER LINEAR FOOT.
- (I) STANDARD RIGHT-OF-WAY CHAIN LINK FENCE, 4' HEIGHT MAY BE USED AS AN ALTERNATIVE TO THE BOX TUBE SAFETY RAIL. SEE STANDARD DRAWING S-F-10B FOR CHAIN LINK FENCE DETAILS. ALL COST OF THE OBJECT MARKERS WILL BE INCLUDES IN ITEM NO. 707-01.01. CHAIN LINK FENCE IS TO BE PAID FOR UNDER ITEM NUMBERS:
 

707-01.01	CHAIN-LINK FENCE (4-FOOT)	PER L.F.
707-01.02	END & CORNER POST ASSEMBLY(CHAIN-LINK FENCE 4')	PER EACH
707-01.04	GATE - CHAIN-LINK FENCE-4 FOOT (DESCRIPTION)	PER EACH
- (J) COMBINATION BRIDGE SEPARATION BARRIER WITH BICYCLE RAILING HAS BEEN EVALUATED BY THE MIDWEST ROADSIDE SAFETY FACILITY AND MEET MASH TL-2 STANDARDS. THE EVALUATION HAS BEEN DOCUMENTED IN REPORT NUMBER TRP-03-408-20.

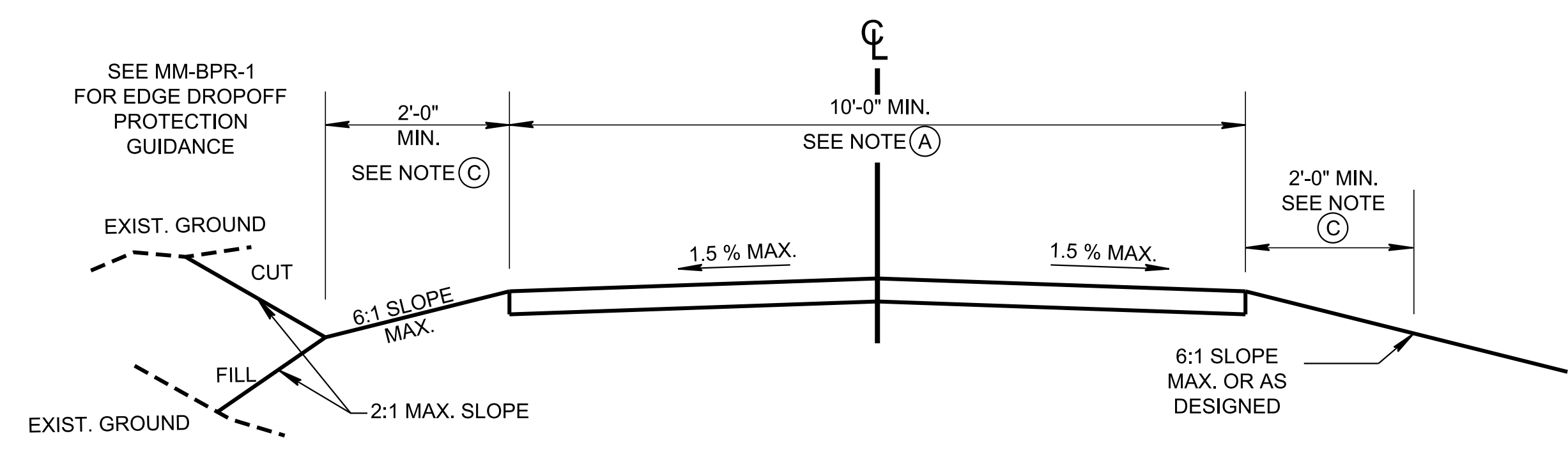
REV. 10-16-20: REVISED ANCHOR BOLTS SIZE. UPDATED GENERAL NOTE (D)  
 REV. 01-28-2022: ADDED SECTION VIEW FOR POST SET IN SIDEWALK, TYPICAL PLAN VIEW FOR SIDEWALK EXTENSION AT SAFETY RAIL, AND SAFETY RAIL INSTALLATION ON BIKE/PED 32" CONCRETE MEDIAN BARRIER RAIL OR PARAPET DRAWINGS. REMOVED ALTERNATE PLAN VIEW AND ALTERNATE INSTALLATION DRAWINGS. GENERAL NOTE (I) WAS ADDED. ADDED NOTE UNDER FIGURE 1.

(Replaced Std Dwg S-BPR-1)

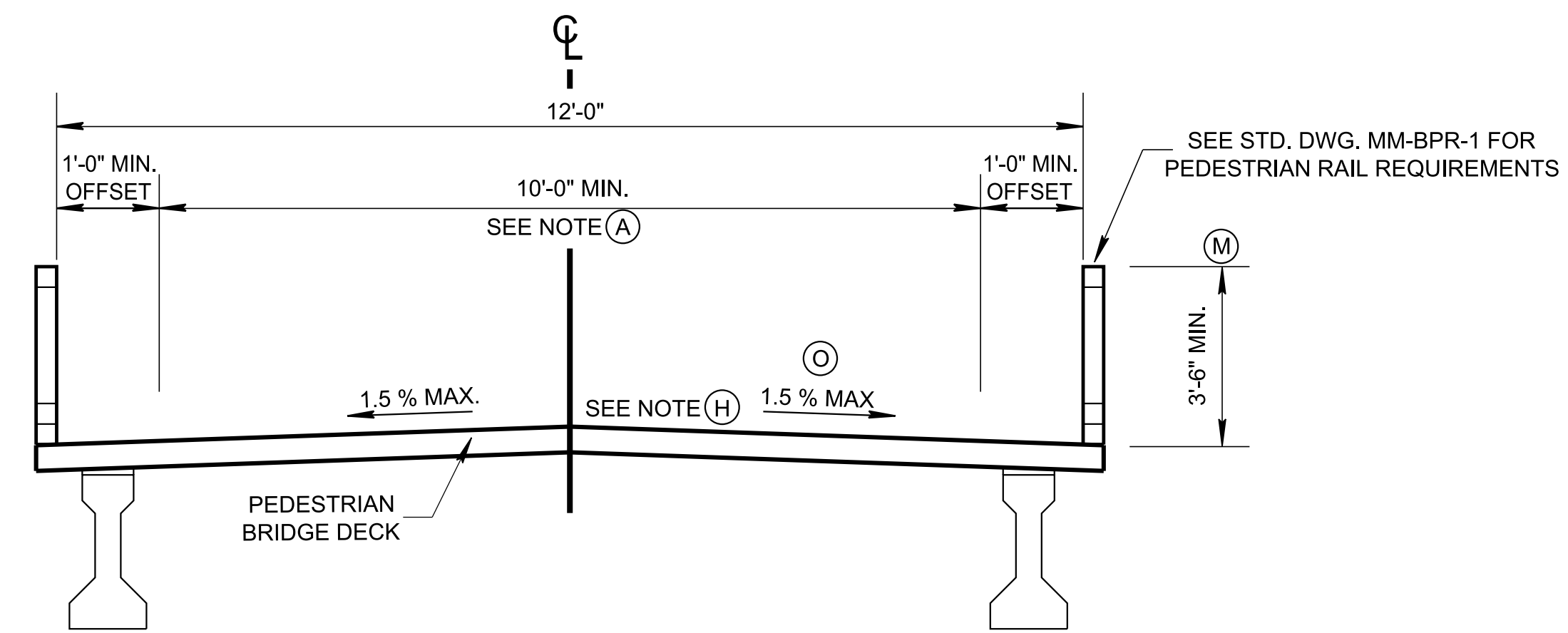
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 STANDARD DRAWING  
 DEPARTMENT OF TRANSPORTATION

BIKE AND PEDESTRIAN SAFETY RAIL

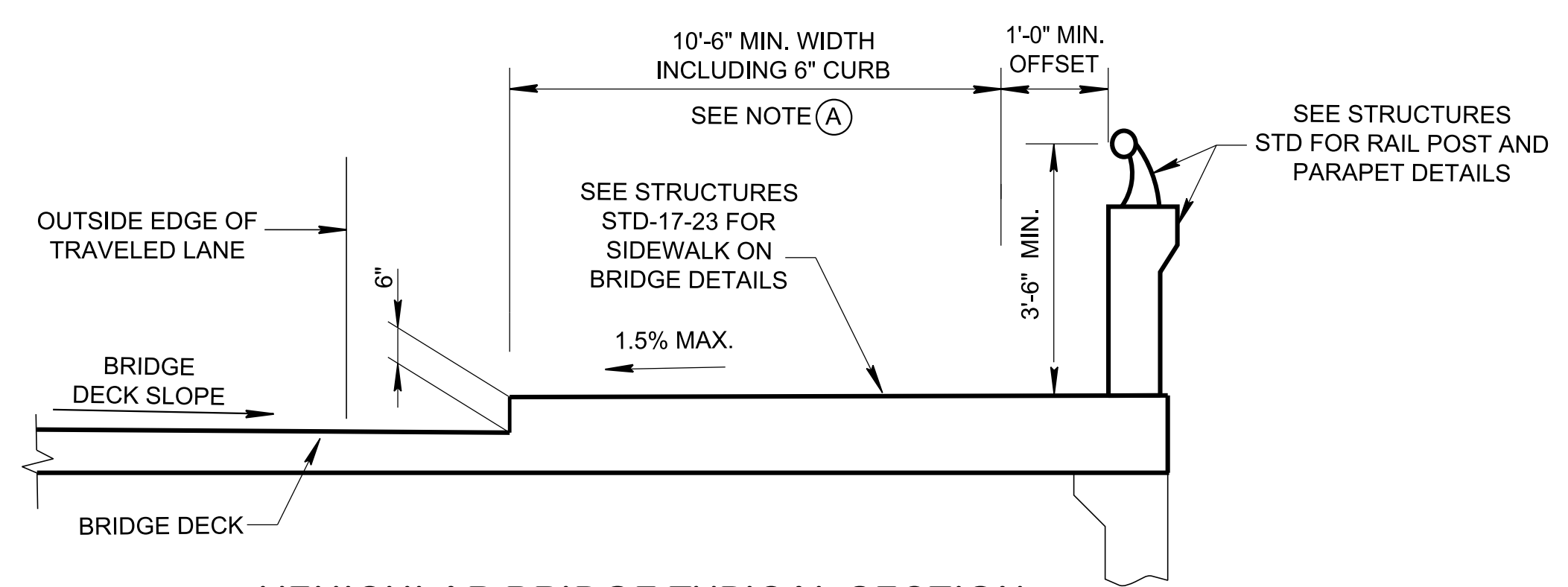
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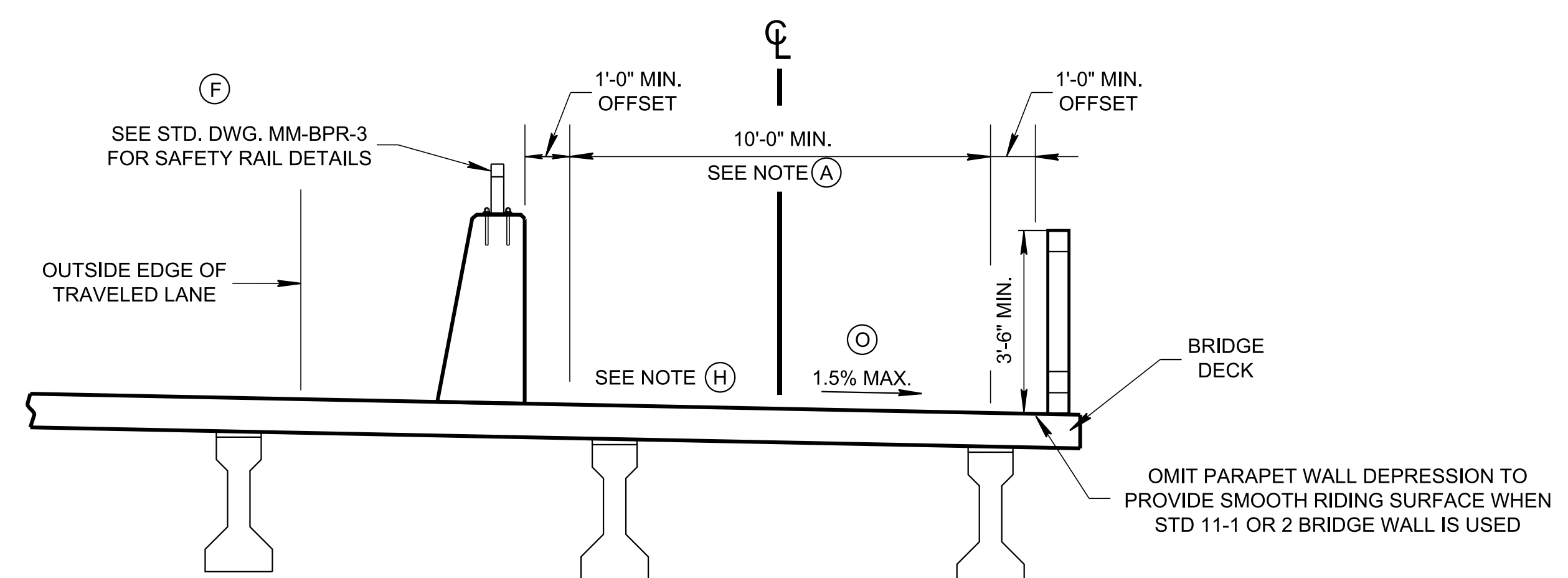
**TYPICAL SECTION FOR TWO-WAY SHARED USE PATH**



**PEDESTRIAN BRIDGE TYPICAL SECTION FOR TWO-WAY SHARED USE PATH (N)**



**VEHICULAR BRIDGE TYPICAL SECTION WITH SIDEWALK OR SHARED USE PATH (SEE NOTE (P))**



**VEHICULAR BRIDGE TYPICAL SECTION FOR SHARED USE PATH ON HIGH-SPEED FACILITY (V ≥ 45 MPH)**

**GEOMETRIC DESIGN CRITERIA**

- 18 MPH BICYCLE DESIGN SPEED
- PEDESTRIAN DENSITY ≥ 200 PED/HUR
- HORIZONTAL CURVE 60' MIN. RADIUS
- VERTICAL GRADE 5% MAX.
- MINIMUM PAVED PATH WIDTH 10' WITH MAX. 6:1 SLOPE, 2' WIDE, CLEAR OF OBSTRUCTIONS
- MAXIMUM CROSS SLOPE 1.5%

WHEN IMMEDIATELY ADJACENT TO ROADWAY WITHIN EXISTING RIGHT OF WAY SHARED USE PATH MAY FOLLOW ROADWAY GEOMETRIC DESIGN

**REFERENCED STANDARD DRAWINGS**

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

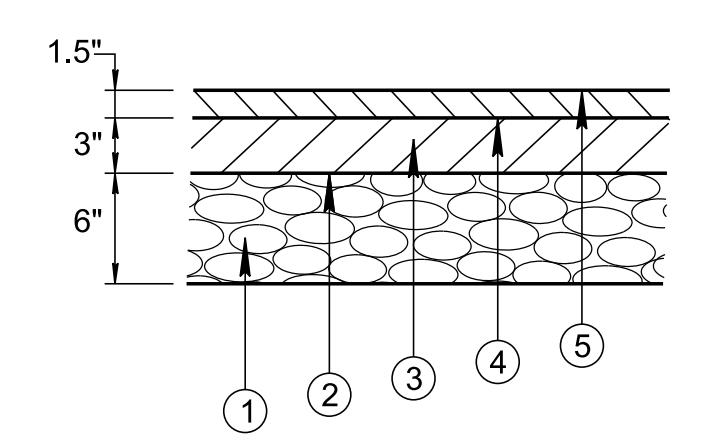
REV. 06-28-19: REVISED ALL DETAILS TO SHOW 1.5% MAX. GRADE. ADJUSTED WORDING IN GENERAL NOTES (D) AND (L).

REV. 06-15-21: REMOVED TYPICAL SECTION FOR TWO-WAY SHARED USE PATH ADJACENT TO HIGH SPEED HIGHWAY AND MOVED IT TO MM-TS-2. REVISED RAILINGS ON BRIDGE TYPICAL SECTION FOR SHARED USE PATH. ADDED NOTE (O). REVISED GEOMETRIC DESIGN CRITERIA NOTES.

REV. 01-28-2022: ADDED VEHICULAR BRIDGE TYPICAL SECTION WHEN SIDEWALK PRESENT DRAWING. GENERAL NOTE (P) WAS ADDED. REVISED BRIDGE TYPICAL SECTION TITLES.

**TYPICAL PAVEMENT DETAILS**

- 1 303-01 MINERAL AGGREGATE, TYPE A BASE, GRADING D, 6 INCHES
- 2 PRIME COAT  
402-01 BITUMINOUS MATERIAL FOR PRIME COAT (PC) AT 0.30 - 0.35 GAL./S.Y.  
402-02 AGGREGATE FOR COVER MATERIAL (PC) AT 8 - 12 LBS/S.Y.
- 3 BITUMINOUS BINDER AT 3 INCHES THICK (APPROX. 339 LBS/S.Y.)  
307-01.08 ASPHALT CONCRETE MIX (PG64-22) (BPMB-HM) GRADING B-M2
- 4 TACK COAT  
403-01 BITUMINOUS MATERIAL FOR TACK COAT (TC) AT 0.05 - 0.10 GAL./S.Y.
- 5 BITUMINOUS SURFACING (SHOULDERS) AT 1.5 INCHES THICK (APPROX. 154.5 LBS/S.Y.)  
411-01.07 ACS MIX (PG64-22) GRADING E SHOULDER

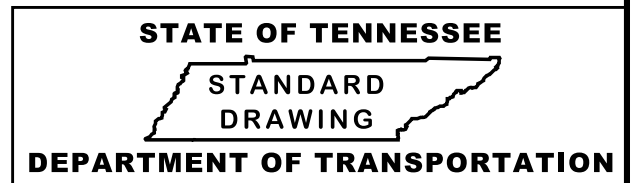


TYPICAL PAVEMENT DETAILS ARE PROVIDED FOR GUIDANCE. PAVEMENT DESIGN SHOULD CONSIDER OCCASIONAL MAINTENANCE AND EMERGENCY VEHICLES OR ALTERNATIVE MATERIAL OTHER THAN ASPHALT MAY BE USED AND SHOWN ON THE PLANS.

**GENERAL NOTES**

- (A) UNDER CERTAIN CONDITIONS IT MAY BE NECESSARY OR DESIRABLE TO USE ALTERNATIVE PATH WIDTHS. TDOT STANDARDS ARE BASED ON 200 - 300 USERS PER HOUR, A LEVEL OF SERVICE (LOS) OF "C". REFER TO THE HIGHWAY CAPACITY MANUAL, 6TH EDITION FOR MORE INFORMATION.
- (B) THE MINIMUM WIDTH OF A ONE DIRECTIONAL SHARED USE PATH IS 6 FEET AND TWO DIRECTIONAL IS 10 FEET.
- (C) 2 FEET ON A 6:1 SLOPE IS DESIRABLE TO PROVIDE LATERAL OFFSET FROM TREES, POLES, WALLS, FENCES, GUARDRAILS, OR OTHER LATERAL OBSTRUCTIONS. WHERE THE PATH IS ADJACENT TO CANALS, DITCHES OR SLOPES STEEPER THAN 3:1, A WIDER SEPARATION SHOULD BE CONSIDERED.
- (D) THE MINIMUM VERTICAL CLEARANCE TO OBSTRUCTIONS SHALL BE 10 FEET TO PERMIT PASSAGE OF MAINTENANCE AND EMERGENCY VEHICLES AND TO PROVIDE ADEQUATE VERTICAL SHY DISTANCE.
- (E) A DRAINAGE OR STORM WATER CONVEYANCE SYSTEM DITCH SHOULD BE LOCATED PROPERLY BETWEEN THE SHARED USE PATH AND ROADWAY TO ENSURE THAT WATER DOES NOT FLOW ONTO THE ROADWAY OR SHOULDER. ALSO, DITCH SHOULD BE SUFFICIENT ENOUGH TO REMOVE THE ADDITIONAL RUNOFF.
- (F) WHEN THE DISTANCE BETWEEN THE EDGE OF TRAVEL LANE AND THE SHARED USE PATH IS LESS THAN 12.5 FEET ON A FACILITY WITH POSTED SPEED OF ≥ 45 MILES PER HOUR, A BARRIER RAIL IS REQUIRED. (THIS REDUCED WIDTH SHALL MEET THE REQUIREMENTS FOR OCCASIONAL MAINTENANCE ACTIVITIES.) SEE STD. DWG. MM-BPR-2 FOR DETAILS.
- (G) CLEAR ZONE SHOULD BE MAINTAINED BETWEEN THE ROADWAY AND THE SHARED USE PATH. IF CLEAR ZONE CAN NOT BE ACHIEVED, AN APPROPRIATE BARRIER SHOULD BE CONSIDERED FOR POSTED SPEED MORE THAN 45 MPH.
- (H) ON ALL BRIDGE DECKS, SPECIAL CARE SHALL BE TAKEN TO ENSURE THAT BICYCLE- SAFE EXPANSION JOINTS ARE USED AND DECKING MATERIALS THAT MAY BECOME SLIPPERY WHEN WET ARE AVOIDED.
- (I) SEE STD. DWG. MM-PM SERIES FOR SIGNING AND PAVEMENT MARKINGS.
- (J) THE PURPOSE OF THIS STANDARD IS TO PROVIDE MINIMUM GEOMETRIC AND SAFETY DESIGN STANDARDS DURING THE DEVELOPMENT OF NON-MOTORIZED TRANSPORTATION FACILITIES. ALL FACILITIES SHALL BE DESIGNED FOR ADA ACCESSIBILITY.
- (K) FOR FURTHER INFORMATION, REFER TO AASHTO "GUIDE FOR THE DEVELOPMENT OF BICYCLE FACILITIES" FOR GEOMETRIC DESIGN REQUIREMENTS AND TDOT ROADWAY DESIGN GUIDELINES MULTI-MODAL DESIGN GUIDE SECTION.
- (L) PAVEMENT MARKINGS MAY BE OPTIONAL ON SHARED USE PATHS, HOWEVER, PROPER SIGNAGE MUST BE INSTALLED PER STANDARDS AND THE CURRENT EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).
- (M) BRIDGES THAT CROSS OVER RAILROAD TRACKS MAY NEED SPECIAL FENCING, SEE STANDARD STRUCTURE DRAWINGS.
- (N) FOR INFORMATION TO DETERMINE LOADS AND RESISTANCES FOR WOODEN GREENWAY STRUCTURES SEE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS; SECTION 3, LOADS AND LOAD FACTORS AND SECTION 8, WOOD STRUCTURES.
- (O) EXISTING BRIDGE DECK SLOPES MAY BE GREATER THAN 1.5 %.
- (P) COMBINATION BRIDGE SEPARATION BARRIER WITH RAILING HAS BEEN EVALUATED BY THE MIDWEST ROADSIDE SAFETY FACILITY AND MEET MASH TL-2 STANDARDS. THE EVALUATION HAS BEEN DOCUMENTED IN REPORT NUMBER TRP-03-397-19.

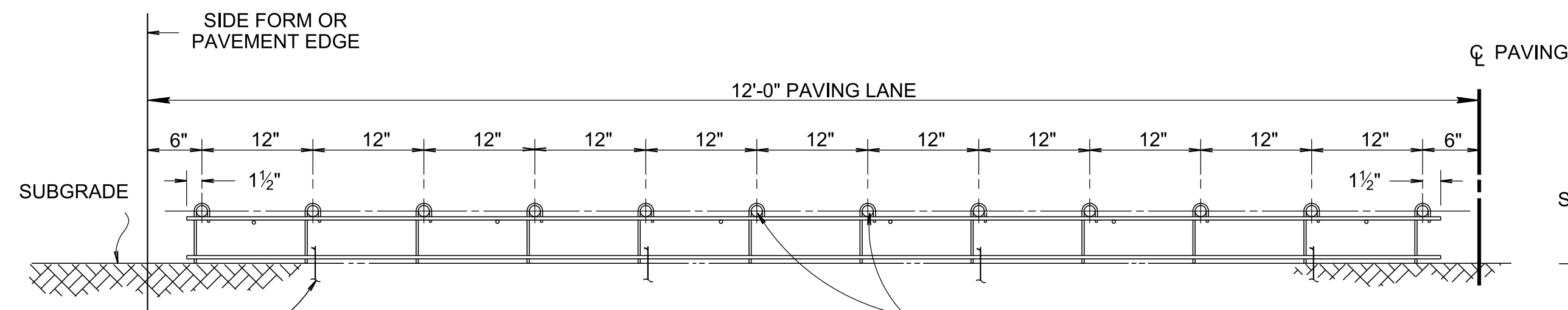
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**SEPARATED SHARED USE PATH TYPICAL SECTIONS**

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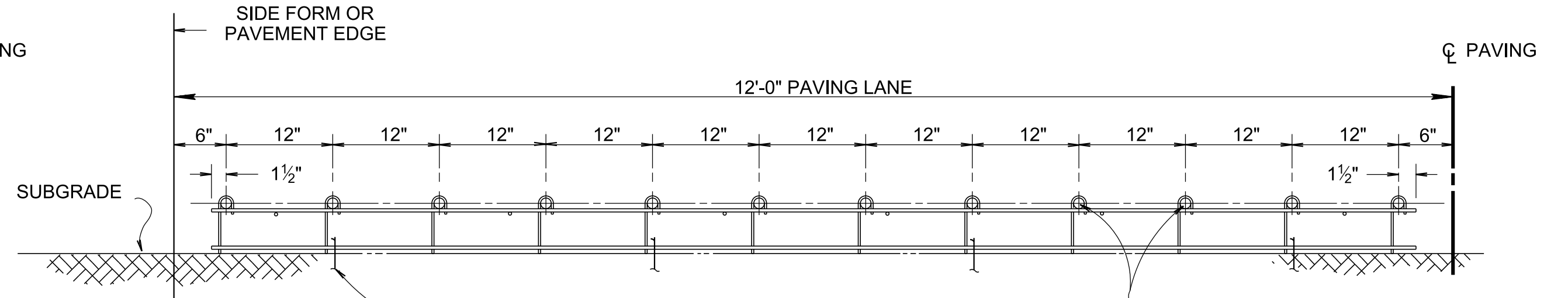
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USE 4-NO. 1/0 GAGE x 12" HOLDDOWN STAKES EACH SIDE, USE STRAP (SEE STRAP DETAIL THIS DRAWING) OR USE SPECIAL STAKE (SEE STAKE DETAIL ON DRAWING NO. RP-J-19) AS NEEDED TO KEEP DOWEL ASSEMBLY FROM SHIFTING.

**SECTION A-A  
(EXPANSION TYPE)**

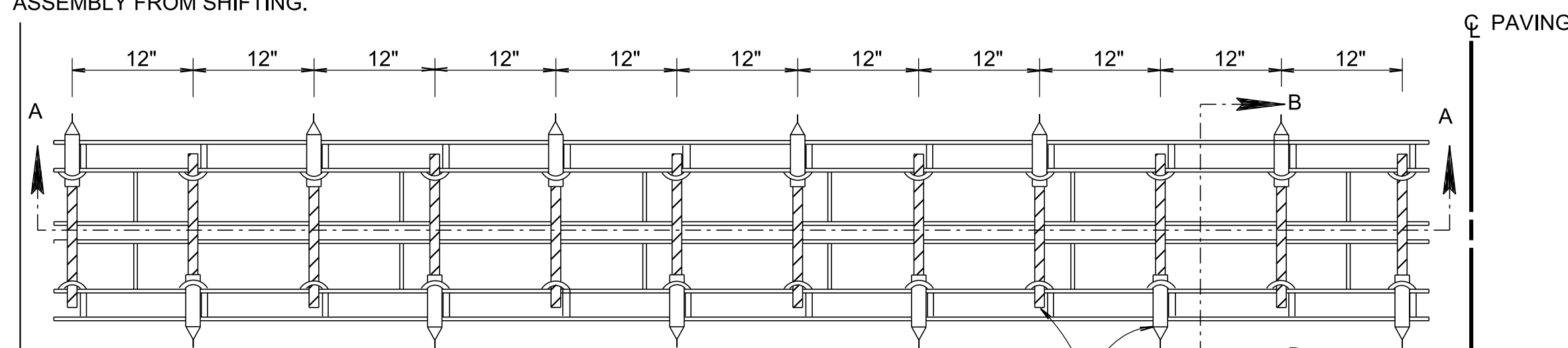
VARIABLE DIAMETER x 18" DOWELS AT 12" C-C (SEE TABLE ON THIS SHEET).



USE 4-NO. 1/0 GAGE x 12" HOLDDOWN STAKES EACH SIDE, USE STRAP (SEE STRAP DETAIL THIS DRAWING) OR USE SPECIAL STAKE (SEE STAKE DETAIL ON DRAWING NO. RP-J-19) AS NEEDED TO KEEP DOWEL ASSEMBLY FROM SHIFTING.

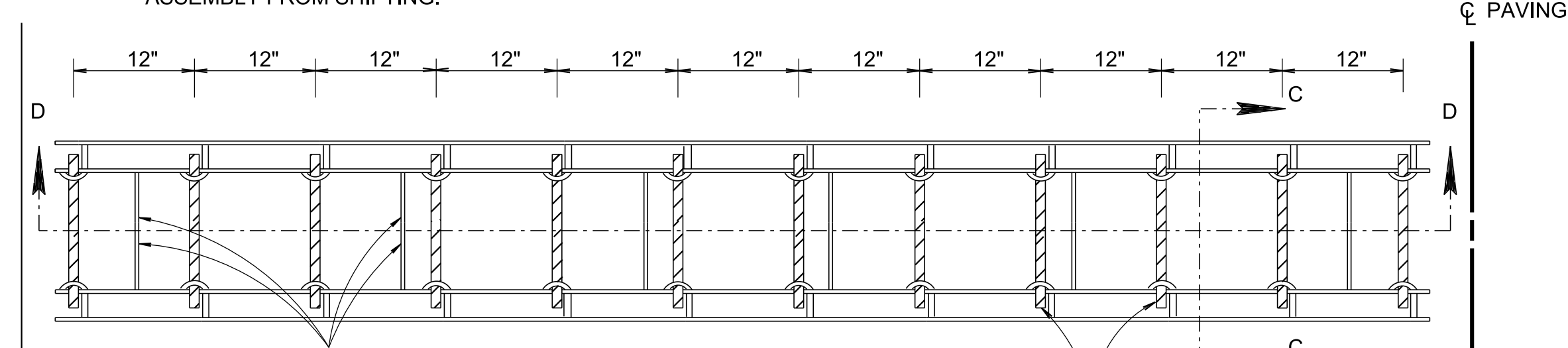
**SECTION D-D  
(CONTRACTION TYPE)**

VARIABLE DIAMETER x 18" DOWELS AT 12" C-C (SEE TABLE ON THIS SHEET).



**PLAN**

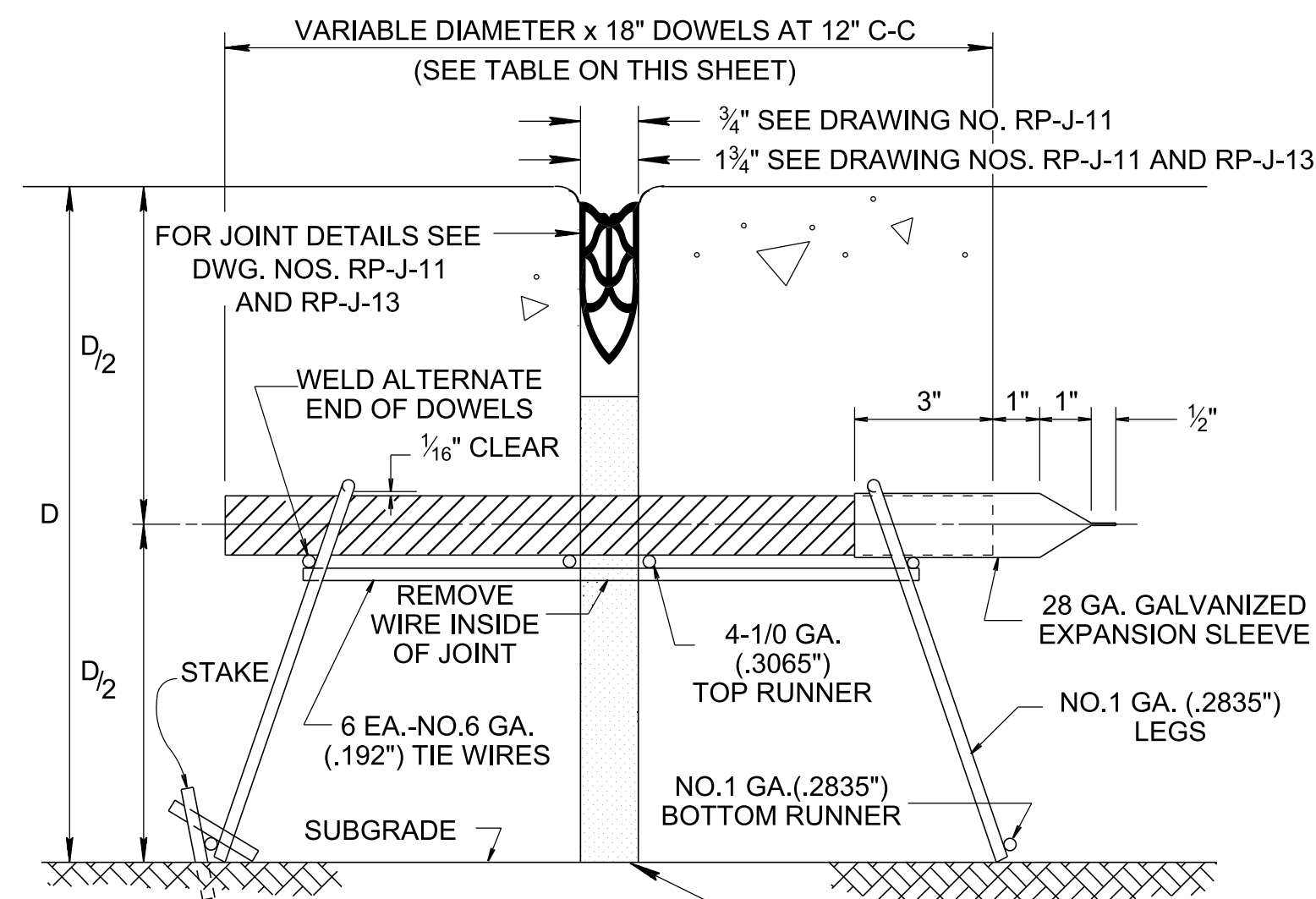
VARIABLE DIAMETER x 18" DOWELS AT 12" C-C (SEE TABLE ON THIS SHEET).



**PLAN**

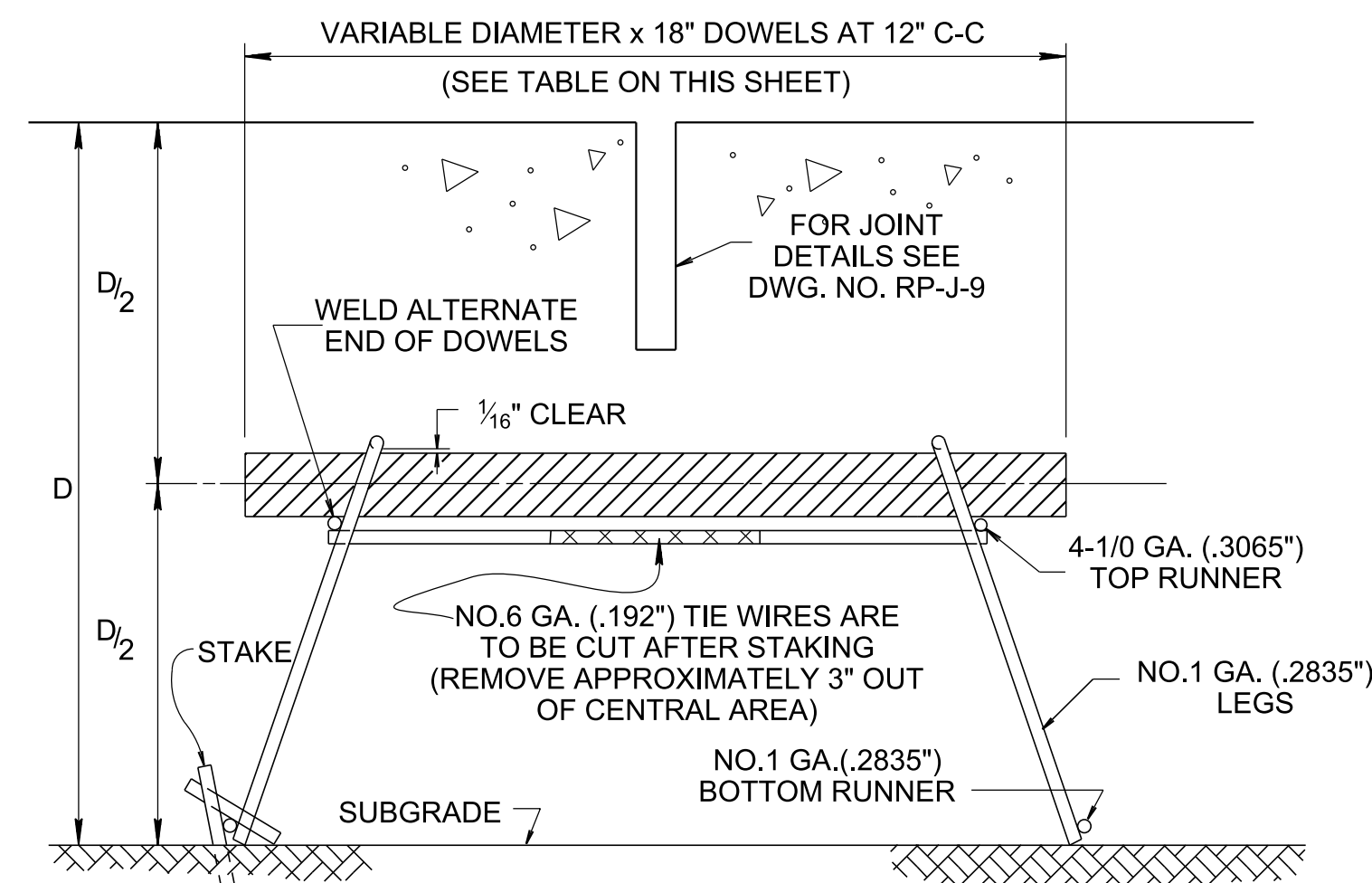
CUT APPROXIMATELY 3" OUT OF CENTRAL AREA OF TIE WIRES AFTER STAKING

VARIABLE DIAMETER x 18" DOWELS AT 12" C-C (SEE TABLE ON THIS SHEET).



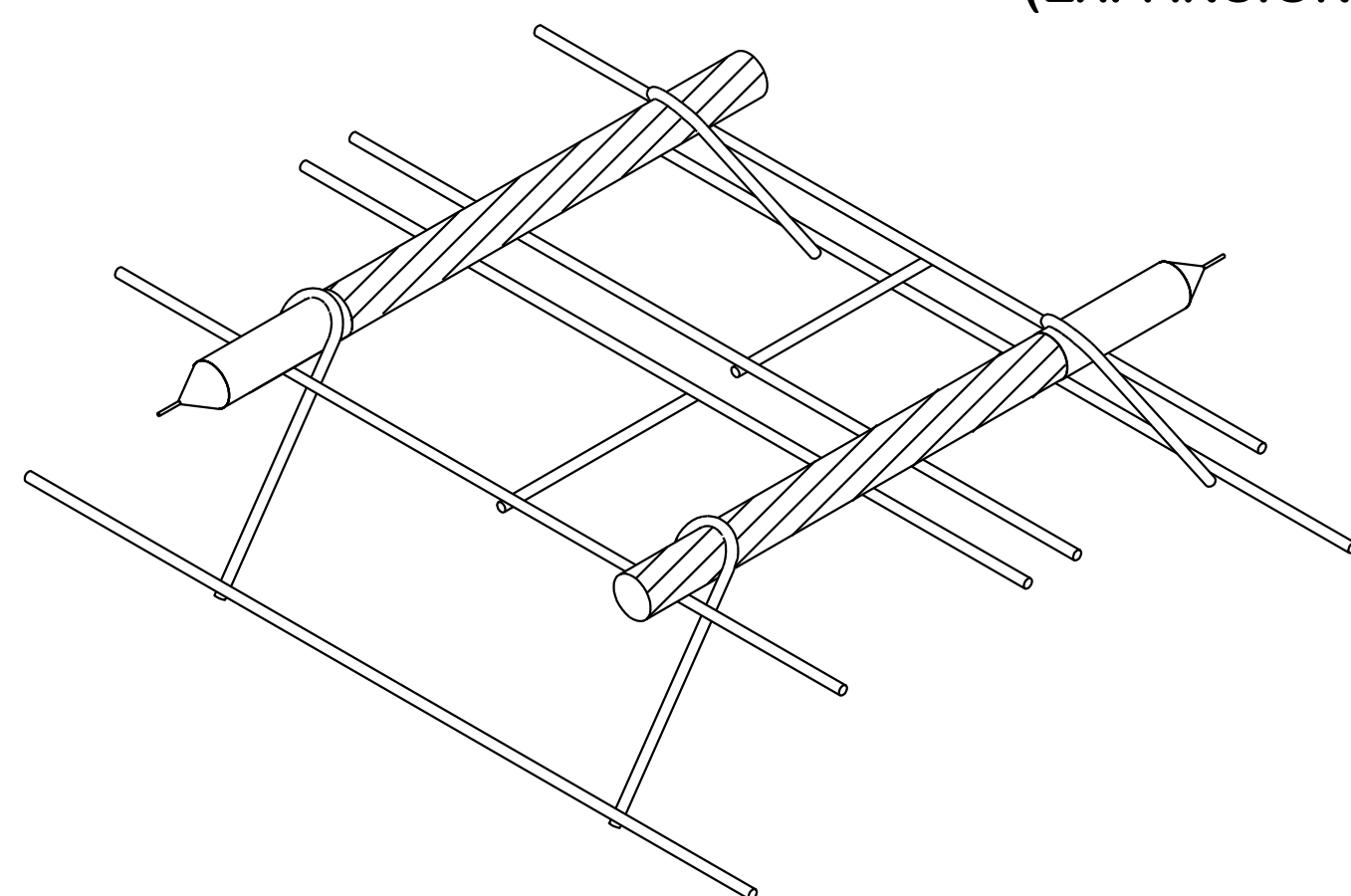
**SECTION B-B  
(EXPANSION TYPE)**

SEE DRAWING NO. RP-J-11 FOR DETAILS

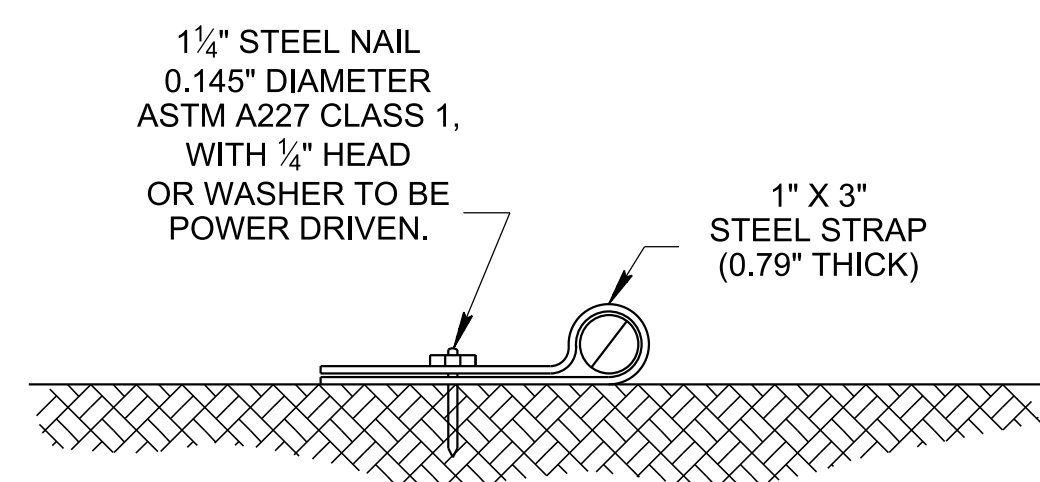


**SECTION C-C  
(CONTRACTION TYPE)**

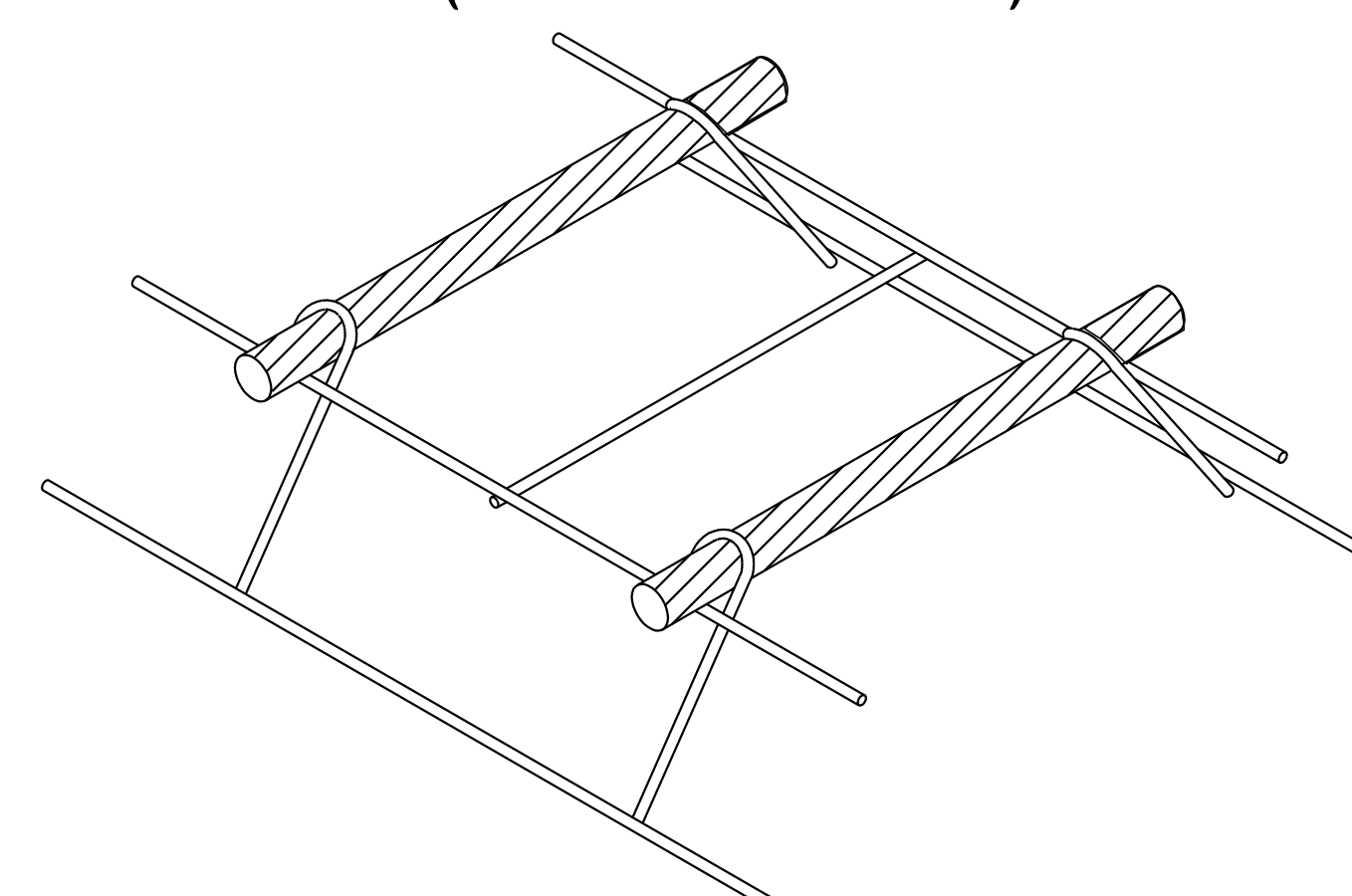
DOWEL BAR SIZE TABLE	
PAVEMENT THICKNESS (INCHES)	BAR DIAMETER (INCHES)
8-10	1/4"
>10	1/2"



**EXPANSION JOINT**



**STRAP DETAIL**



**CONTRACTION JOINT**

**GENERAL NOTES**

- (A) DOWEL ASSEMBLY DEVICES OTHER THAN SHOWN ON DRAWING NOS. RP-J-17, RP-J-18, AND RP-J-19 MAY BE USED FOR SUPPORTING DOWELS AT EXPANSION AND CONTRACTION JOINTS.
- (B) DOWEL ASSEMBLY DEVICES SHALL BE SO CONSTRUCTED AS TO HOLD THE DOWEL BARS FIRMLY IN POSITION PARALLEL TO THE SURFACE AND CENTERLINE OF THE PAVEMENT SLAB DURING THE PLACING OF CONCRETE.
- (C) DOWEL ASSEMBLY DEVICES SHALL BE OF SUCH DESIGN AS TO PERMIT UNRESTRICTED MOVEMENT OF THE PAVEMENT SLAB.
- (D) DOWEL ASSEMBLY DEVICES TO BE USED MUST BE APPROVED BY THE ENGINEER PRIOR TO THEIR USE.
- (E) SEE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, SECTION 501-PORTLAND CEMENT CONCRETE PAVEMENT FOR DOWEL ASSEMBLY DEVICES. ALSO SEE APPLICABLE SPECIAL PROVISIONS.
- (F) DOWEL ASSEMBLY DEVICES ARE TO BE FURNISHED IN SECTIONS WITH SUITABLE LENGTHS FOR VARIOUS WIDTHS OF PAVEMENT.
- (G) ONE OF THE ALTERNATE DOWEL ASSEMBLY DEVICES WILL BE REQUIRED AT EACH EXPANSION JOINT WITH LOAD TRANSFERS, UNLESS A BULKHEAD IS USED. SEE DRAWING NOS. RP-J-17, RP-J-18, AND RP-J-19 FOR ALTERNATE DOWEL BAR AND DOWEL ASSEMBLY DETAILS AND SPECIFICATIONS.
- (H) SEE DRAWING NOS. RP-J-9 AND RP-J-11 FOR ADDITIONAL INFORMATION NOT SHOWN ON THIS SHEET.

- REV. 4-18-90: CHANGE DOWEL BAR LENGTH FROM 15" TO 18". ELIMINATED DOWEL BAR ASSEMBLY DETAILS FOR SKEWED INSTALLATIONS.
- REV. 3-20-91: REDREW AND REORGANIZED SHEET. ADDED DOWEL BAR SIZE TABLE. CHANGED REFERENCE FOR DOWEL BAR SIZE FROM 1 1/4" TO VARIABLE DIAMETER.
- REV. 7-29-93: REMOVED REFERENCE TO THE ORIGINAL MANUFACTURER'S NAME AND CROSS-REFERENCE TO DRAWING NO. RP-J-19. CHANGED GAGE OF BOTTOM WIRE AND VERTICAL SUPPORT WIRE FROM NO. 2 TO NO. 1. CHANGED CUTTING OF TIE WIRE NOTE ON CONTRACTION PLAN VIEW AND SECTION C-C VIEW.
- REV. 12-18-94: CHANGED CROSS-REFERENCE BLOCK AND GENERAL NOTE (A).
- REV. 10-26-00: CHANGED WIDTH AND DEPTH OF SAWED GROOVED CONTRACTION JOINT.
- REV. 10-21-05: DELETED NOTES ABOUT CUTTING OF TIE WIRE AFTER STAKING.
- REV. 2-2-12: CHANGED DOWEL BAR TABLE.
- REV. 05-01-20: REDREW SHEET.
- REV. 01-28-2022: ADDED NOTES ABOUT CUTTING OF TIE WIRE AFTER STAKING ON PLAN AND ON SECTION C-C.

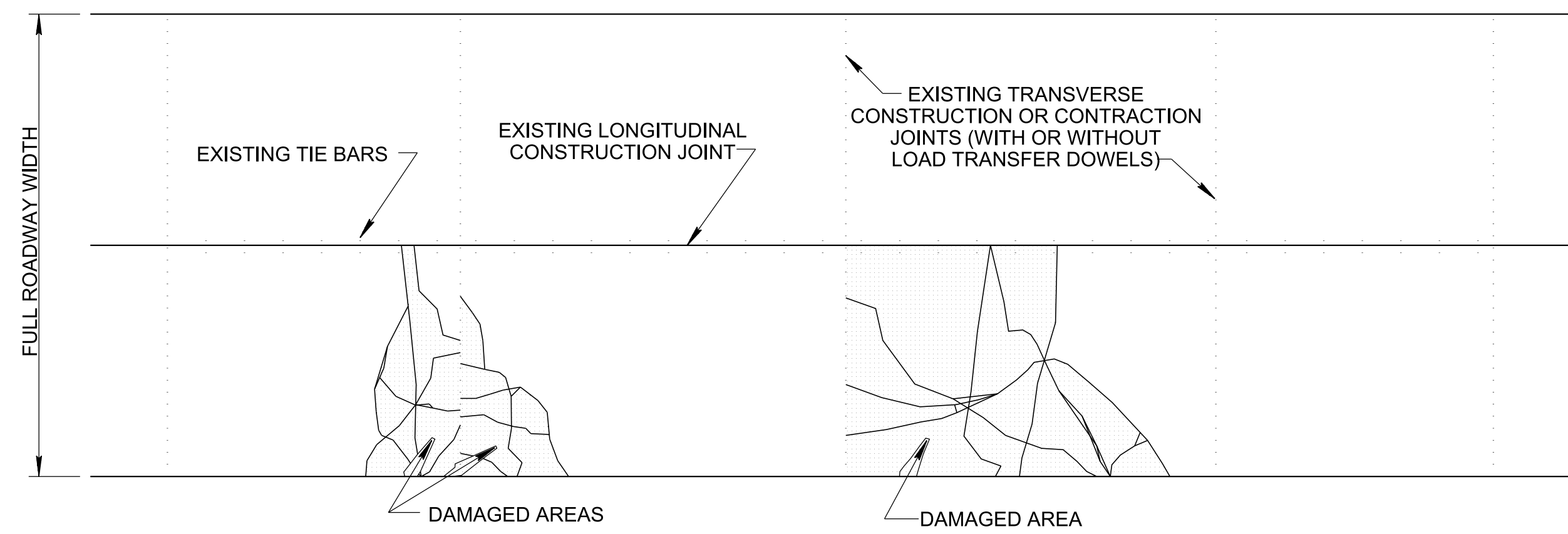
CROSS-REFERENCE DRAWINGS FOR THIS SHEET: RP-J-9, RP-J-11, RP-J-13, RP-J-17, AND RP-J-19.

APPROVED BY FHWA (ALL OTHERS APPROVED BY TDOT)

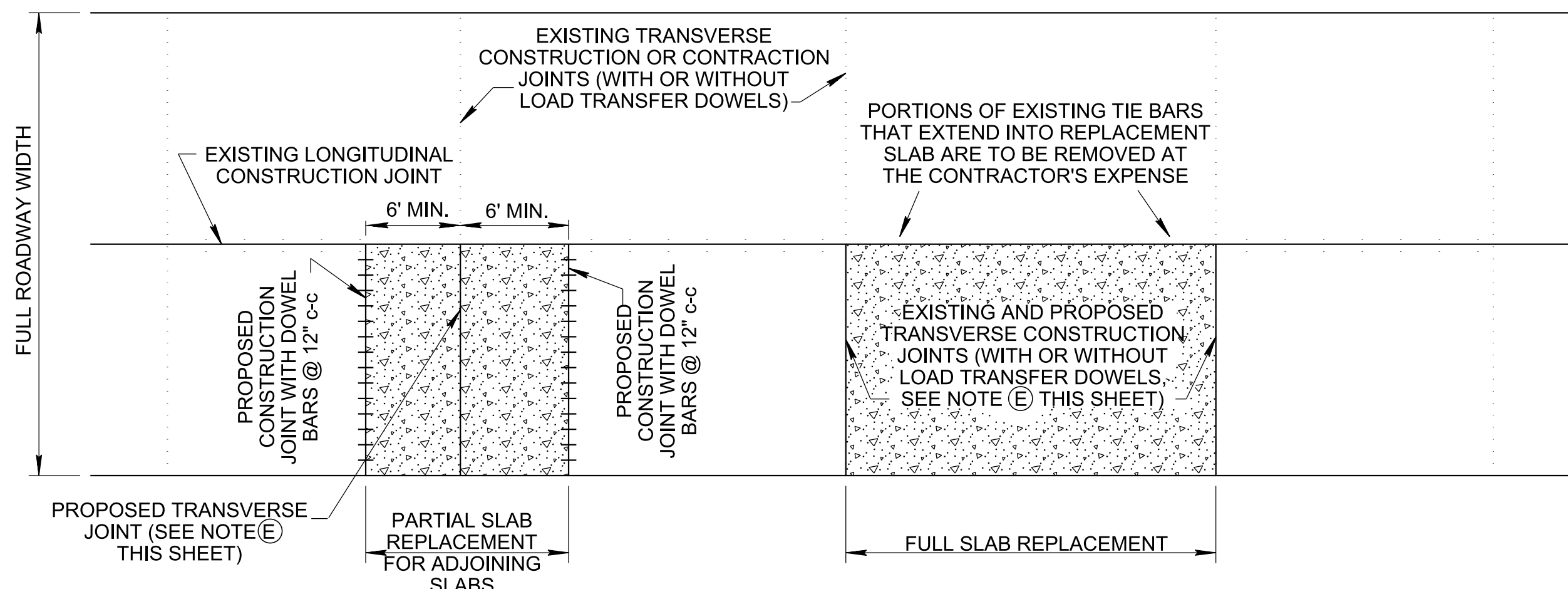
STATE OF TENNESSEE  
STANDARD DRAWING  
DEPARTMENT OF TRANSPORTATION

DOWEL ASSEMBLY DEVICES

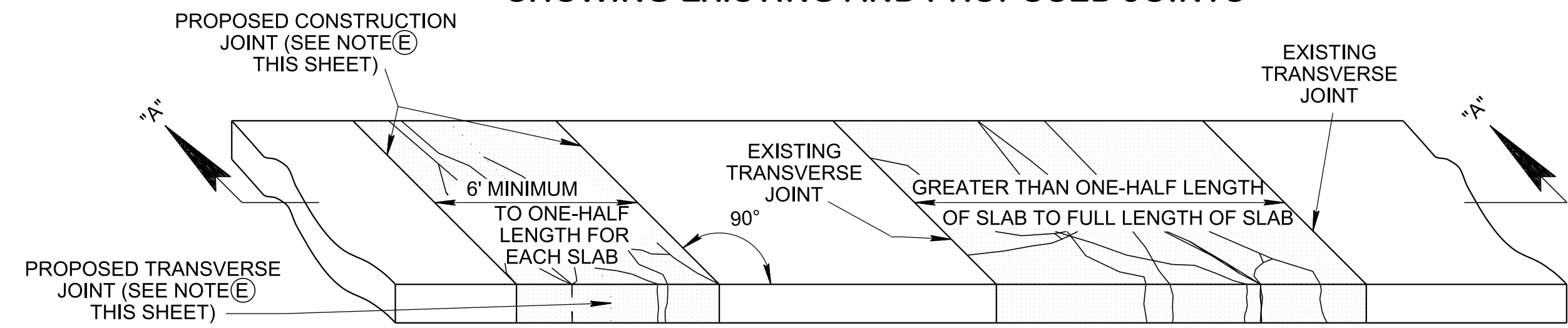
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**PLAN VIEW OF EXISTING LAYOUT OF CONCRETE PAVEMENT REPLACEMENT SHOWING EXISTING JOINTS**

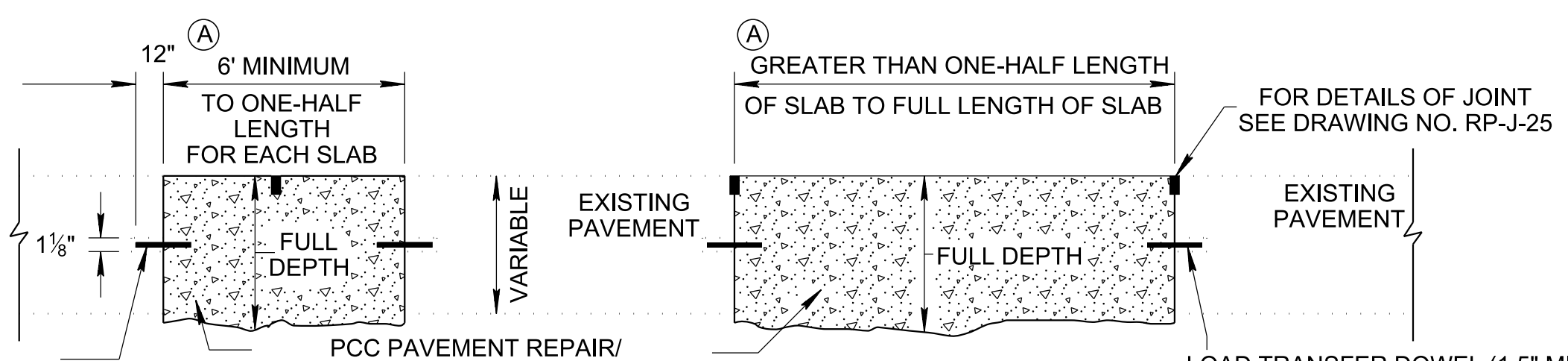


**PLAN VIEW OF PROPOSED LAYOUT OF CONCRETE PAVEMENT REPLACEMENT SHOWING EXISTING AND PROPOSED JOINTS**



**PLAN VIEW OF CONCRETE PAVEMENT REPLACEMENT**

TRANSVERSE DOWEL BARS SHALL BE NO.8 ROUND DEFORMED STEEL, 24" LONG SET 12" INTO EXISTING CONCRETE SLAB AT 12" CENTER-TO-CENTER SPACING BETWEEN DOWEL BARS. DOWEL BARS SHALL CONFORM TO ASTM A615-GRADE 40 SPECIFICATIONS.



**PROFILE VIEW ALONG SECTION "A-A" OF CONCRETE PAVEMENT REPLACEMENT**

**NOTE**  
 IF REPLACEMENT IS MID-SLAB, NO TRANSVERSE JOINT IS REQUIRED. IN THIS SITUATION A CONSTRUCTION JOINT WITH TIE BARS WILL BE USED.

**GENERAL NOTES**

- (A) SEE STANDARD SPECIFICATIONS AND SPECIAL PROVISIONS FOR ADDITIONAL REQUIREMENTS FOR CONCRETE PAVEMENT REPAIR.
- (B) IF THE LENGTH OF CONCRETE SLAB TO BE REPLACED IS GREATER THAN HALF THE ENTIRE LENGTH OF THE SLAB, THE ENTIRE SLAB SHALL BE REPLACED. IF THE LENGTH OF CONCRETE SLAB TO BE REPLACED IS LESS THAN HALF THE ENTIRE LENGTH OF THE SLAB (6' MAX.), THEN ONLY A PORTION OF THE SLAB WILL BE REPLACED.
- (C) THE EXISTING CONCRETE PAVEMENT SHALL BE SAWED FULL DEPTH AROUND THE AREA TO BE REMOVED. WITHIN THE LANE SAWING SHALL BE PERPENDICULAR TO THE CENTERLINE AND A MINIMUM OF 6" OUTSIDE THE DAMAGED AREAS.
- (D) NO ADDITIONAL BASE MATERIAL SHALL BE ADDED AND ALL LOOSE BASE MATERIAL NOT RECOMPACTABLE SHALL BE REMOVED PRIOR TO PLACEMENT OF THE NEW CONCRETE SLAB. THE CONCRETE SLAB SHALL BE PLACED TO THE FULL DEPTH OF THE MATERIAL REMOVED. NO ADDITIONAL COMPENSATION WILL BE ALLOWED FOR ADDITIONAL CONCRETE REQUIRED TO BRING PROPOSED CONCRETE SLAB UP TO PROPOSED GRADE.
- (E) WHEN EXISTING TRANSVERSE JOINTS ARE REMOVED AND NOT TO FULL ROADWAY WIDTH, THEY SHALL BE RECONSTRUCTED IN KIND (WITH OR WITHOUT LOAD TRANSFER DOWELS) AND IN THE SAME LOCATION. WHEN A JOINT IS REPLACED FOR THE FULL ROADWAY WIDTH, LOAD TRANSFER DOWELS SHALL BE USED IN THE JOINT. SEE DRAWING NO. RP-J-9 FOR DOWEL PLACEMENT DETAILS. SPACING IS AT 12" CENTER-TO-CENTER BETWEEN DOWELS.
- (F) FOR DETAILS REGARDING INSTALLATION OF CONTRACTION AND CONSTRUCTION JOINTS, SEE DRAWING NO. RP-J-9.
- (G) LONGITUDINAL CONSTRUCTION JOINT TIE BARS AS SHOWN ON DRAWING NO. RP-J-15 SHALL BE OMITTED BETWEEN THE NEW REPLACEMENT SLAB AND THE EXISTING SLAB. THE CONTRACTOR IS TO REMOVE WHATEVER PORTION OF THE EXISTING TIE BARS THAT EXTENDS FROM EXISTING SLAB ALONG LONGITUDINAL JOINT INTO NEW SLAB. ALL COST WILL BE INCLUDED IN THE PRICE BID FOR PCC PAVEMENT REPAIR.
- (H) REMOVAL OF THE DAMAGED CONCRETE PAVEMENT SHALL BE BY LIFTING. ANY GOOD CONCRETE PAVEMENT WHICH IS DAMAGED DURING REMOVAL OF DAMAGED AREAS SHALL BE REMOVED AND REPLACED BY THE CONTRACTOR, AT HIS EXPENSE.
- (I) IF THE ROADWAY CONTRACT INCLUDES EITHER GRINDING OR UNDERSEALING, THEN THE SLAB REPAIR SHALL BE PERFORMED FIRST.
- (J) THE COSTS OF REMOVAL AND DISPOSAL OF EXISTING CONCRETE PAVEMENT, PLACEMENT OF NEW CONCRETE PAVEMENT, AND SAWING NEW JOINTS SHALL BE INCLUDED IN THE PRICE BID FOR THE PAY ITEM NUMBERS 502-03.XX SERIES LISTED ON THIS STANDARD DRAWING.
- (K) ONCE THE CONTRACTOR BEGINS REMOVING AN EXISTING FULL OR PARTIAL DEPTH CONCRETE SLAB, THEY SHALL CONTINUE THE WORK UNTIL IT IS COMPLETE INCLUDING JOINT SEALING. JOINTS SHALL NOT BE LEFT UNSEALED DURING WINTER MONTHS.
- (L) PAYMENT FOR THE FULL DEPTH AND PARTIAL DEPTH CONCRETE PAVEMENT REPAIR SHALL INCLUDE THE COST OF ALL RELATED WORK (DRILLING HOLES, GROUTING, ETC.) AND SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBERS:
 

502-03.20, FULL DEPTH PCC PAVEMENT REPAIR,	C.Y.,
502-03.21, PARTIAL DEPTH PCC PAVEMENT REPAIR,	S.Y.,
502-04.01, SAWING CONCRETE PAVEMENT (FULL DEPTH),	L.F.,
502-04.02, LOAD TRANSFER DOWELS,	EACH,
502-04.03, TRANSVERSE DOWEL BARS,	EACH.
- (M) PAYMENT FOR THE FULL DEPTH AND PARTIAL DEPTH CONCRETE PAVEMENT REPAIR (CLASS X-HIGH EARLY STRENGTH) SHALL INCLUDE THE COST OF ALL RELATED WORK (DRILLING HOLES, GROUTING, ETC.) AND SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBERS:
 

502-03.25, FULL DEPTH PCC PAVEMENT REPAIR HIGH EARLY,	C.Y.,
502-03.26, PARTIAL DEPTH PCC PAVEMENT REPAIR HIGH EARLY,	S.Y.,
502-04.01, SAWING CONCRETE PAVEMENT (FULL DEPTH),	L.F.,
502-04.02, LOAD TRANSFER DOWELS,	EACH,
502-04.03, TRANSVERSE DOWEL BARS,	EACH.
- (N) FOR FULL SLAB REPLACEMENTS ON SLABS WITH JOINT SPACING LONGER THAN 15', THE SLAB SHALL BE REPLACED WITH TWO SLABS OF EQUAL LENGTH.

- REV. 7-17-84: ADDED EXISTING AND PROPOSED LAYOUTS OF CONCRETE PAVEMENT REPLACEMENT. ADDED TIE BARS AND CHANGED NOTES.
- REV. 4-2-90: REDREW AND RENAMED SHEET. PLACED SPALL REPAIR, RANDOM CRACK REPAIR, AND JOINT REPAIR, AND JOINT REPAIRS DETAILS ON NEW SHEET NO. RP-J-24.
- REV. 12-18-94: ELIMINATED USE OF TIE BARS BETWEEN REPLACEMENT AND EXISTING SLAB.
- REV. 5-27-96: CHANGED MINIMUM SIZE OF LOAD TRANSFER DOWEL TO 1.5".
- REV. 7-29-96: CHANGED GENERAL NOTES (3) AND (8).
- REV. 5-27-01: CHANGED ITEM NO. 501-04.03.
- REV. 1-19-02: IN GENERAL NOTE 9 REMOVED REFERENCE TO UNDERSEALING OF SLAB.
- REV. 10-26-04: CHANGED PAY ITEMS IN GENERAL NOTE (2).
- REV. 1-24-12: ADDED GENERAL NOTE (13).
- REV. 7-25-12: ADDED GENERAL NOTE (14).
- REV. 05-01-20: CONVERTED GENERAL NOTE NOS. TO LETTERS AND REVISED NOTE (5) AND (M). REDREW SHEET.
- REV. 01-28-2022: REMOVED PCC (PLAIN) AND FAST TRACK ITEM NUMBERS 501-01 SERIES FROM GENERAL NOTES (C) AND (M). REVISED GENERAL NOTE (J). REVISED GENERAL NOTES (L) AND (M), AND ADDED NEW ITEM NUMBERS.

CROSS-REFERENCE DRAWINGS FOR THIS SHEET: RP-J-9, RP-J-24, AND RP-J-25.

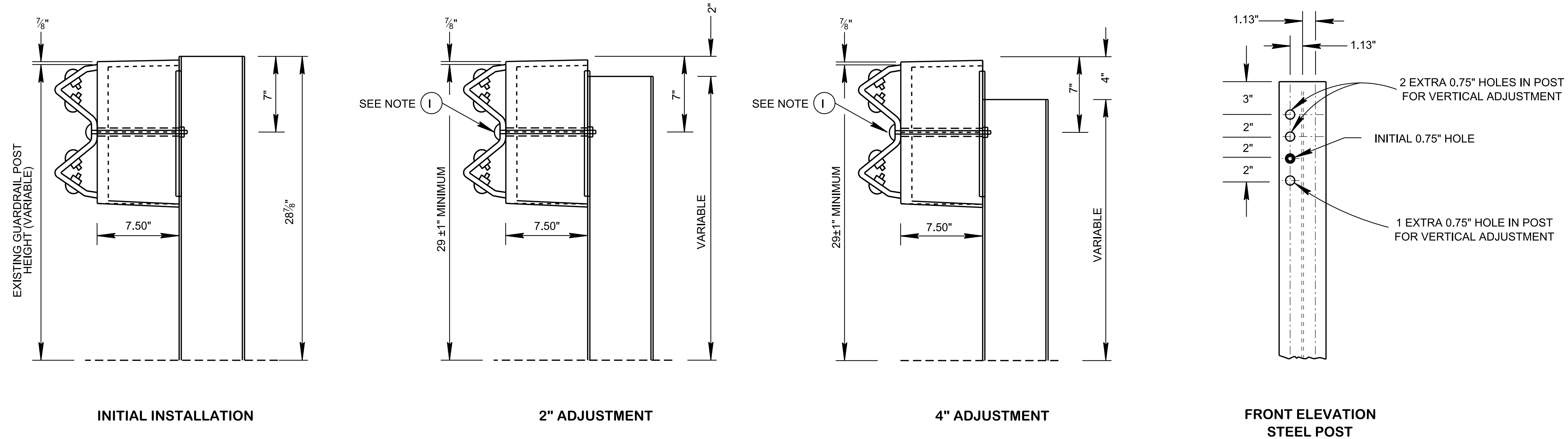
APPROVED BY FHWA (ALL OTHERS APPROVED BY TDOT)

STATE OF TENNESSEE  
 STANDARD DRAWING  
 DEPARTMENT OF TRANSPORTATION

CONCRETE PAVEMENT REPAIR DETAILS

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

- REV. 05-15-18: ADDED GENERAL NOTE (F), REFERRING TO TEXAS A & M TTI, TECHNICAL MEMORANDUM.
- REV. 06-28-19: ADDED NEW GENERAL NOTE (A) AND RENUMBERED NOTES (A) THRU (G), REVISED NOTE (C) AND ADDED NOTE (H), MOVED INSTALLATION NOTES FOR BLOCK-OUTS WITH HORIZONTAL ADJUSTMENT HOLES TO GENERAL NOTE NOS. (I). CHANGED DRAWING NO. AND REDREW SHEET.
- REV. 01-28-2022: REPLACED THE PAY ITEM NUMBER FROM 705-02.02 TO 706-05 ON GENERAL NOTE (H).



**ADJUSTABLE STEEL POSTS AND BLOCK-OUTS**  
(USING EXISTING ADJUSTMENT HOLES)

EXISTING GUARDRAIL HEIGHT ADJUSTMENT TABLE		
EXISTING HEIGHT	ADJUSTMENT	FINAL HEIGHT
24"	4"	28"
25" *	4"	29"
26" *	2"	28"
27" *	2"	29"

\* GUARDRAIL HEIGHTS 25" OR MORE MAY REMAIN ON EXISTING ROADWAYS WITH POSTED SPEED LIMITS < 45 MPH AT LOCATIONS WITH NO FREQUENT CRASH HISTORY.

**GENERAL NOTES**

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

(B) SEE STANDARD DRAWING S-GR28-2M FOR ADDITIONAL POST DETAILS AND SPECIFICATIONS.

(C) SEE STANDARD DRAWING S-GR31-1B FOR ADDITIONAL BOLT, WASHER AND NUT DETAILS AND SPECIFICATIONS.

(D) THE METAL POST SHOWN ON THIS SHEET MAY BE USED WITH WOOD OR COMPOSITE BLOCK-OUTS.

(E) ONLY RECYCLED PLASTIC OR WOOD GUARDRAIL BLOCK-OUTS LISTED ON THE TENNESSEE DEPARTMENT OF TRANSPORTATION'S QUALIFIED PRODUCTS LIST SHALL BE USED. 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.

(F) UP TO 4" BLOCK-OUT ADJUSTMENTS HAS BEEN EVALUATED UNDER MASH TL-3.

(G) THIS STANDARD DRAWING WAS DEVELOPED BASED ON TEXAS A&M TTI, TECHNICAL MEMORANDUM NAME: "PENDULUM TESTING ON COMPOSITE BLOCKOUTS RAISED ON STEEL POSTS", ROADSIDE SAFETY POOLED FUND, TEST REPORT NO.: 605311. NAME: "GUIDANCE FOR RAISING BEAM GUARDRAIL COMPOSITE BLOCK-OUT FOR RAIL HEIGHT ADJUSTMENT".

(H) GUARDRAIL HEIGHT ADJUSTMENT SHOULD BE COMPENSATED BASED ON PARTIAL PAYMENT OF ITEM NO. 706-05, GUARDRAIL ADJUSTMENT, L.F.

**INSTALLATION NOTES FOR BLOCK-OUTS WITH HORIZONTAL ADJUSTMENT HOLES**

(I) THE INITIAL INSTALLATION AND EACH ADJUSTMENT WILL REQUIRE ONE 5/8" DIAMETER X 9 1/2" LONG BUTTON HEAD BOLT WITH ROUND STEEL WASHER.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED

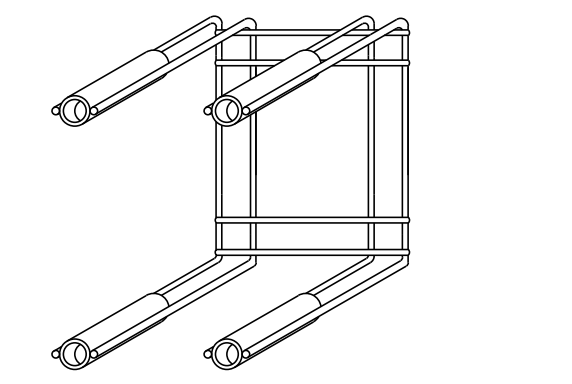
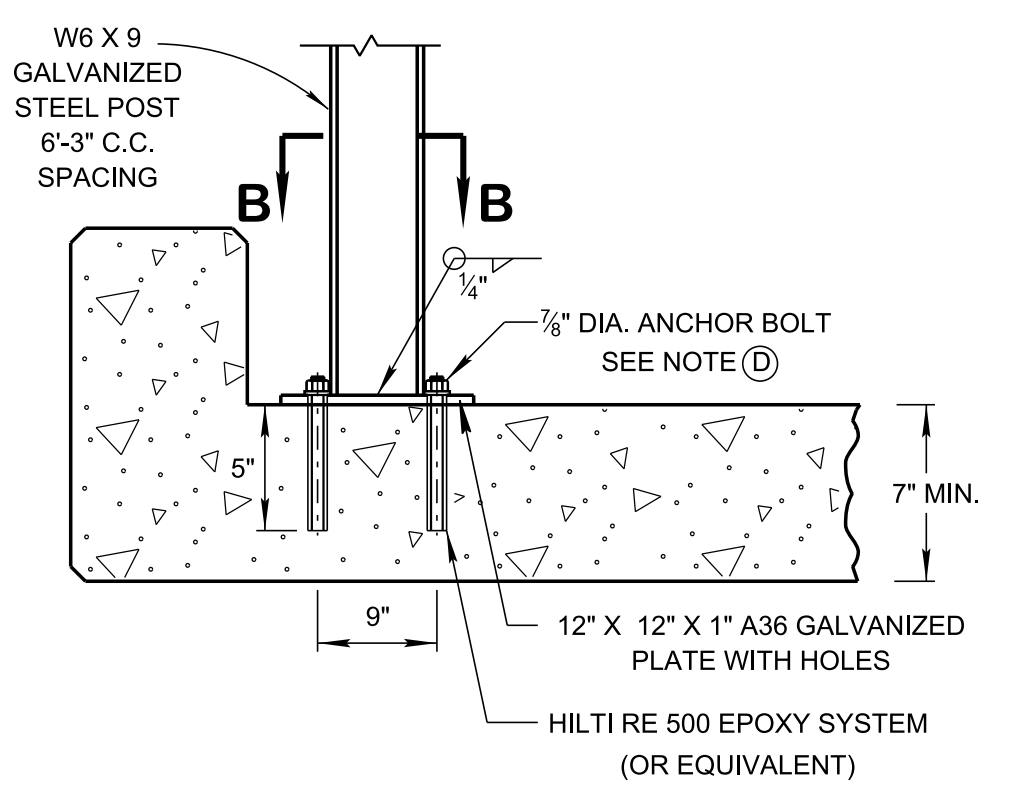
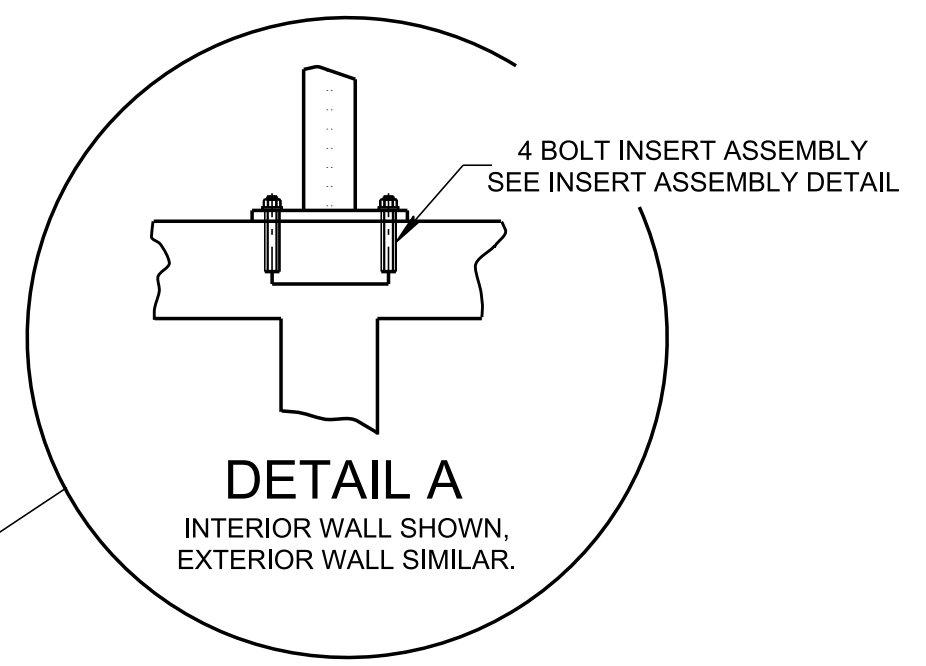
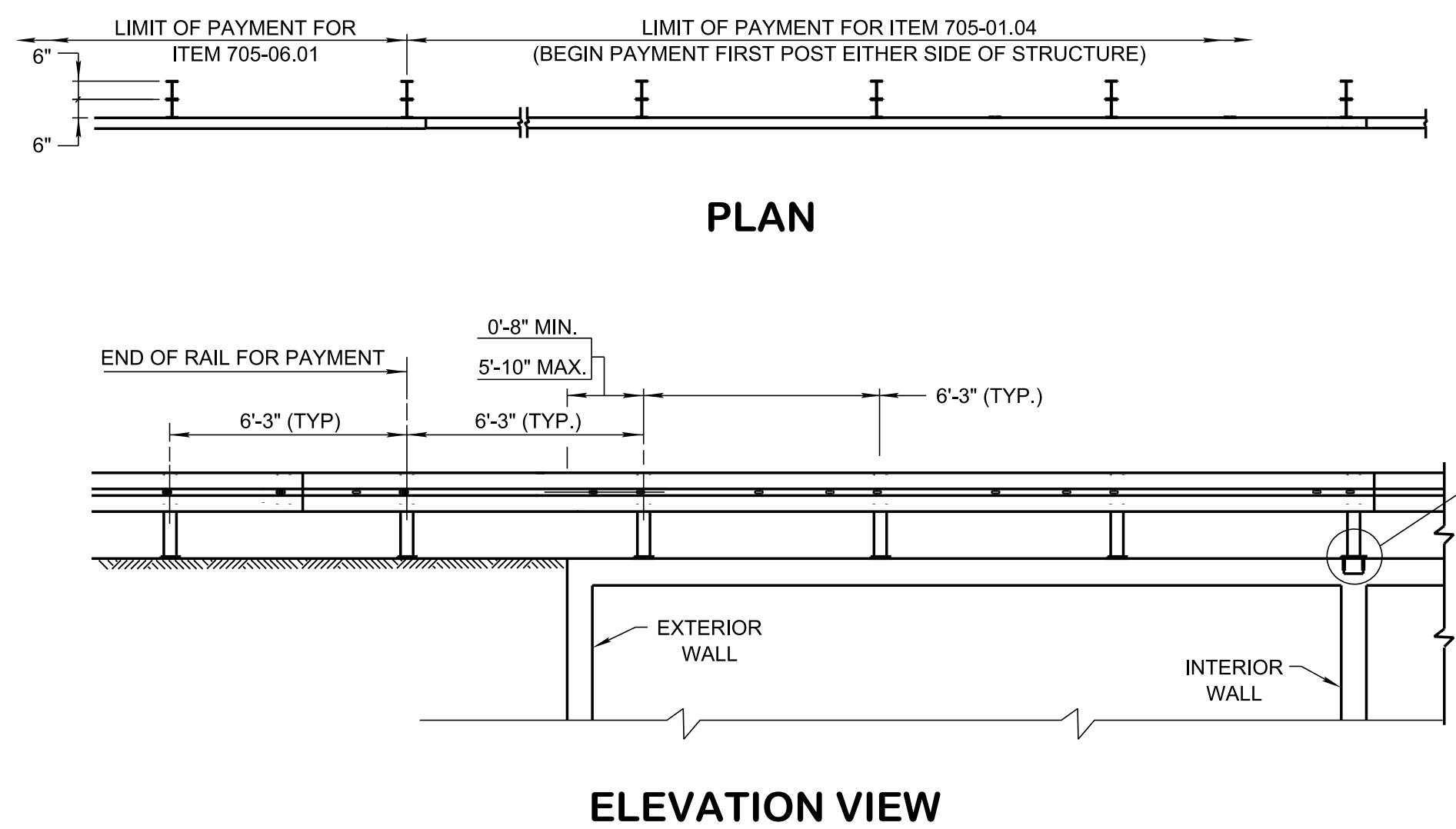
STATE OF TENNESSEE  
STANDARD DRAWING  
DEPARTMENT OF TRANSPORTATION

GUARDRAIL HEIGHT ADJUSTMENT

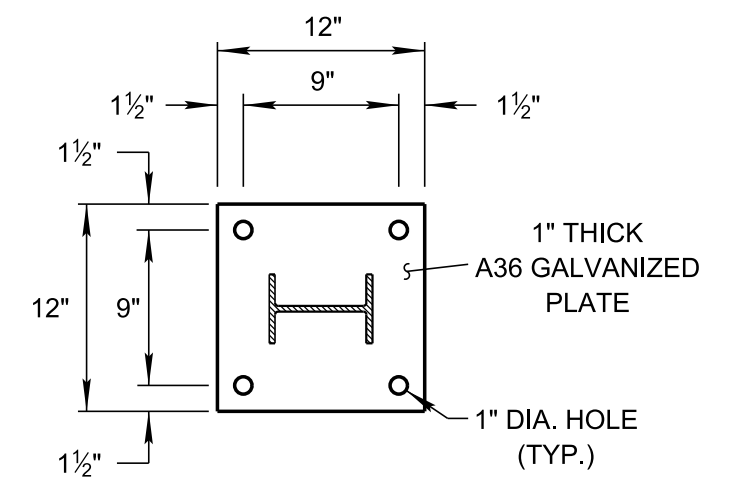
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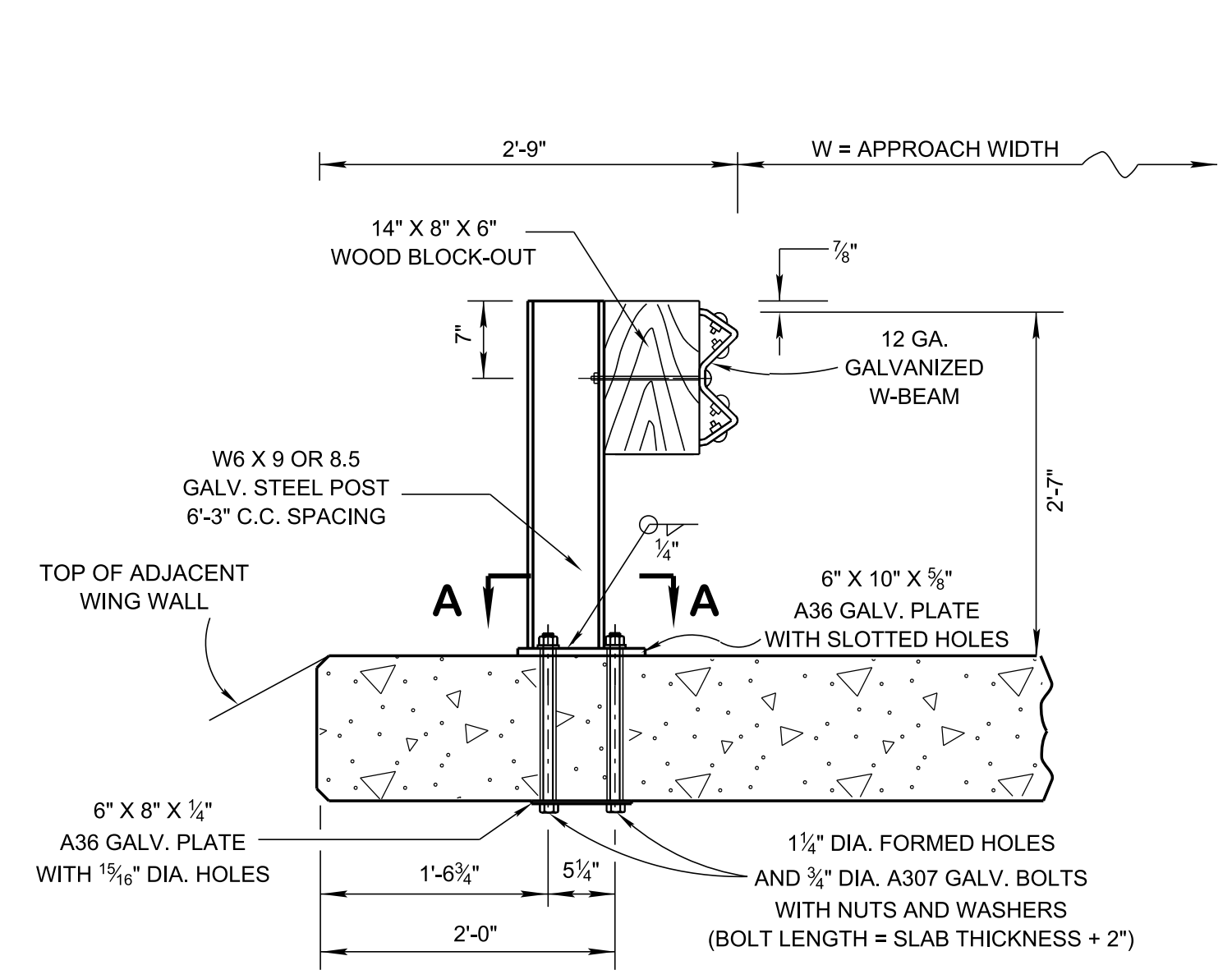


**INSERT ASSEMBLY**  
FOR 3/4" DIA. X 4" HEX HEAD A307 BOLTS  
(SEE NOTE E)

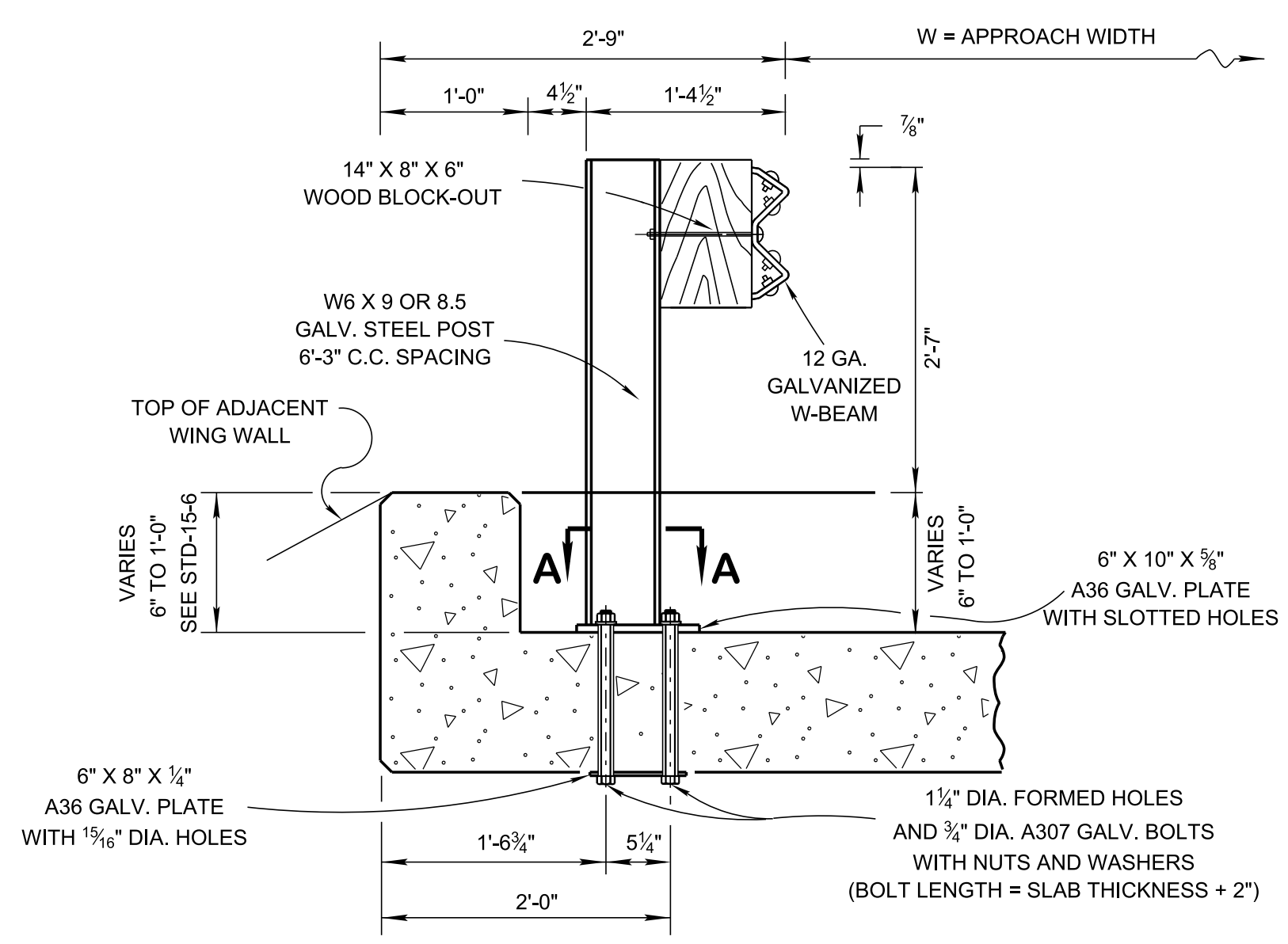


**SECTION B-B**  
**BASEPLATE DETAIL**

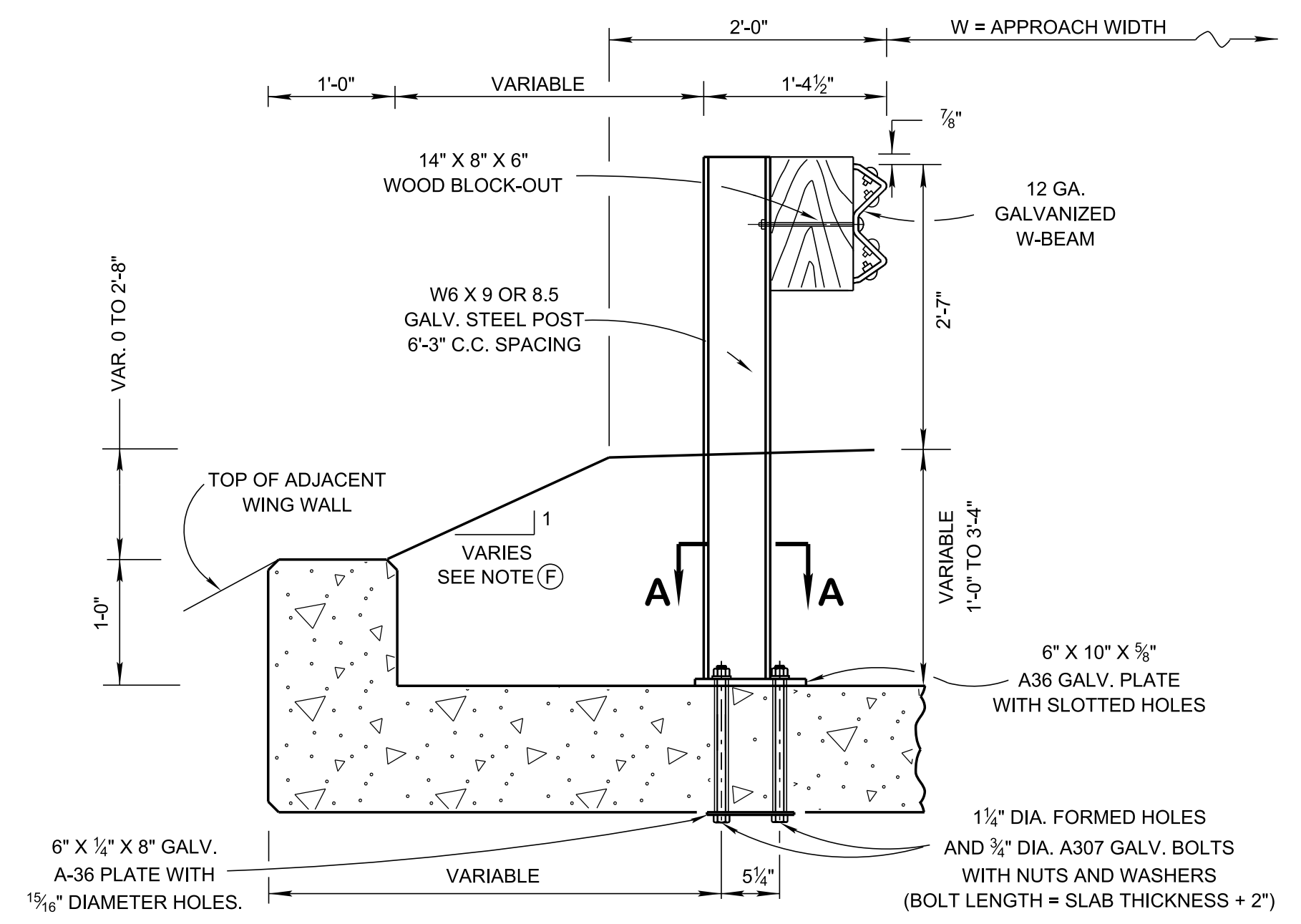
- REV. 5-25-16: CORRECTED WELD DETAIL.
- REV. 7-5-17: CORRECTED STD. DWG. NO'S. ON GENERAL NOTE (B). ADDED GENERAL NOTES (D), (E) AND (F). CHANGED PAY ITEM NUMBER IN DESIGN NOTE (1).
- REV. 06-28-19: REDREW SHEET.
- REV. 06-15-21: REVISED DETAIL A. SWITCHED LABELS ON ALTERNATE DETAIL A.
- REV. 01-28-2022: GENERAL NOTE (C) WAS ADDED.



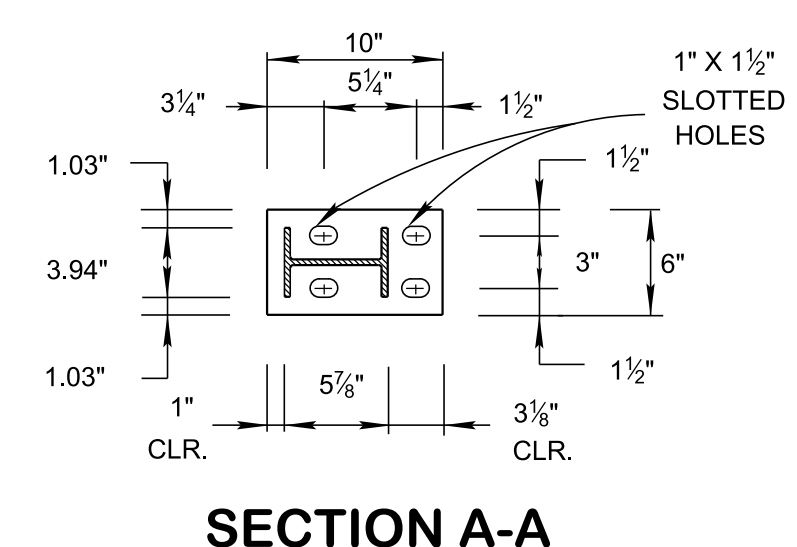
**DETAIL FOR CONCRETE DECK**  
**USED AS A RIDING SURFACE**



**DETAIL FOR CONCRETE DECK**  
**WITH 6" TO 1'-0" OF ROADWAY FILL COVER**



**DETAIL FOR CONCRETE DECK**  
**WITH 1'-0" TO 3'-4" OF ROADWAY FILL COVER**



**SECTION A-A**

- DESIGN NOTES**
- (1) WHEN DEPTH OF FILL AT FACE OF GUARDRAIL EXCEEDS 3'-4", USE ITEM NUMBER 705-06.01 AS SHOWN ON S-GR31-1 SERIES.
  - (2) DO NOT USE ON PRECAST CONCRETE STRUCTURE WITHOUT PRIOR APPROVAL FROM MANUFACTURERS.
  - (3) THIS RAIL SYSTEM HAS BEEN TESTED AND PASSED BY THE CRITERIA SET FORTH BY AASHTO MASH TEST LEVEL 3, AS DOCUMENTED IN ROADSIDE SAFETY RESEARCH PROGRAM POOLED FUND STUDY NO. TPF-5(114) DATED NOV. 11, 2011.
  - (4) ANY REINFORCING STEEL THAT INTERFERES WITH THE 1 1/4" DIAMETER FORMED HOLES SHALL BE MOVED HORIZONTALLY TO PROVIDE A 1" MINIMUM CLEARANCE TO THE HOLE.

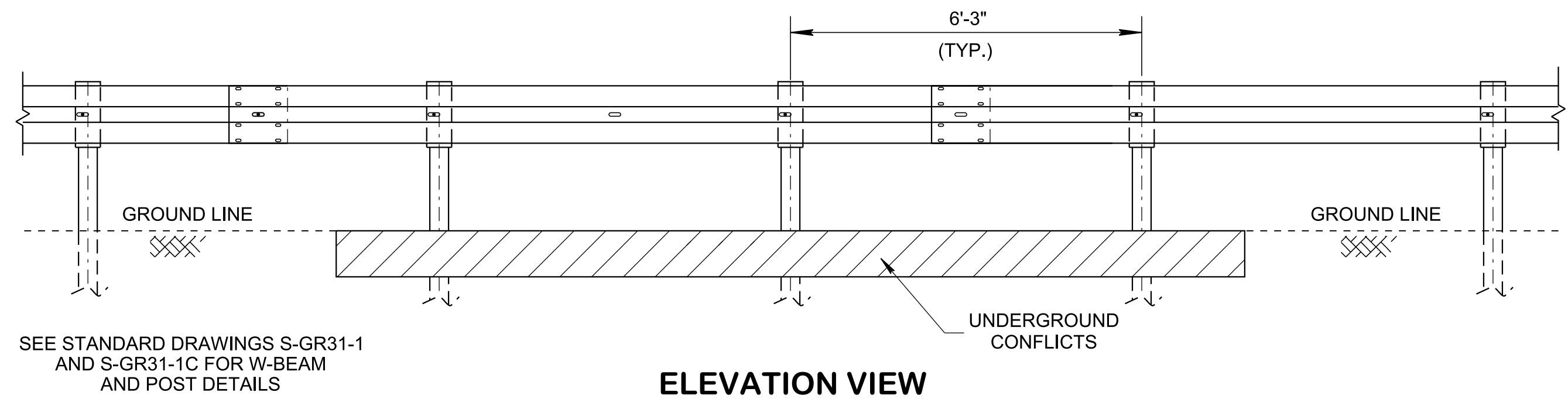
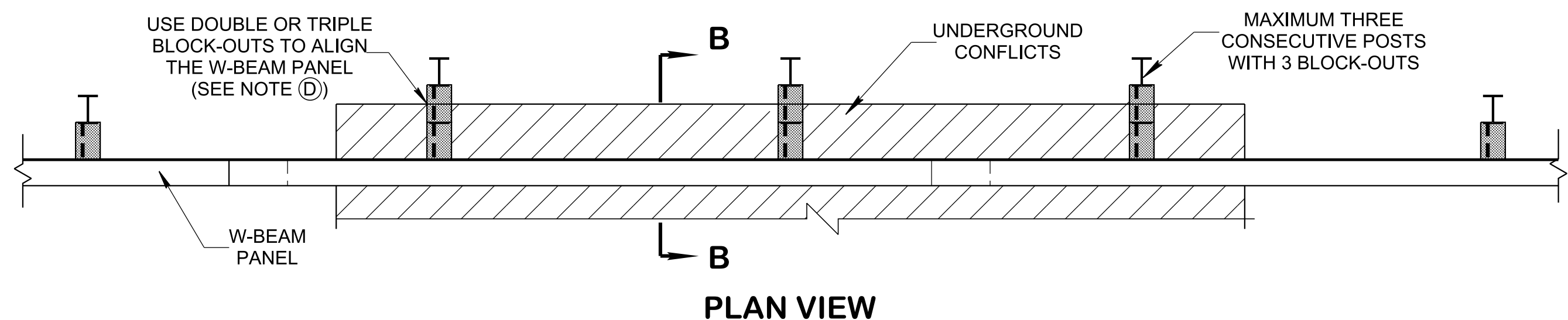
- GENERAL NOTES**
- (A) IN ORDER TO EXPEDITE INSTALLATION, GUARDRAIL POST MAY BE FIELD CUT TO ADJUST THE LENGTH REQUIRED. ALL CUT SURFACES MUST RECEIVE GALVANIZE COATING.
  - (B) FOR DIMENSIONS AND DETAILS NOT SHOWN SEE STANDARD STRUCTURES DRAWING NOS. STD-17-7 AND STD-17-8, AND STANDARD ROADWAY DRAWING S-GR31-1 SERIES.
  - (C) TO BE PAID FOR UNDER ITEM NO: 705-01.04, METAL BEAM GUARD FENCE, PER LF.
  - (D) ANCHOR BOLTS TO BE 7/8" DIA., ASTM A193, GRADE B7. NUTS AND WASHERS TO BE GALVANIZED.
  - (E) INSERT ASSEMBLY TO BE USED FOR CONNECTION OF POSTS OVER WALLS ONLY AND MAY NOT BE USED AS A SUBSTITUTE FOR PLATE ASSEMBLY ELSEWHERE.
  - (F) SLOPE TO MATCH ADJOINING ROADWAY SIDE SLOPE.
  - (G) LOCATIONS WHERE GUARDRAIL ATTACHMENT TO CONCRETE SLAB CANNOT BE ACCOMPLISHED DUE TO SITE CONDITIONS, REFER TO WEAK-POST STANDARD DRAWINGS S-GRS-5 SERIES FOR ALTERNATE ATTACHMENTS.

■ MINOR REVISION -- FHWA APPROVAL NOT REQUIRED

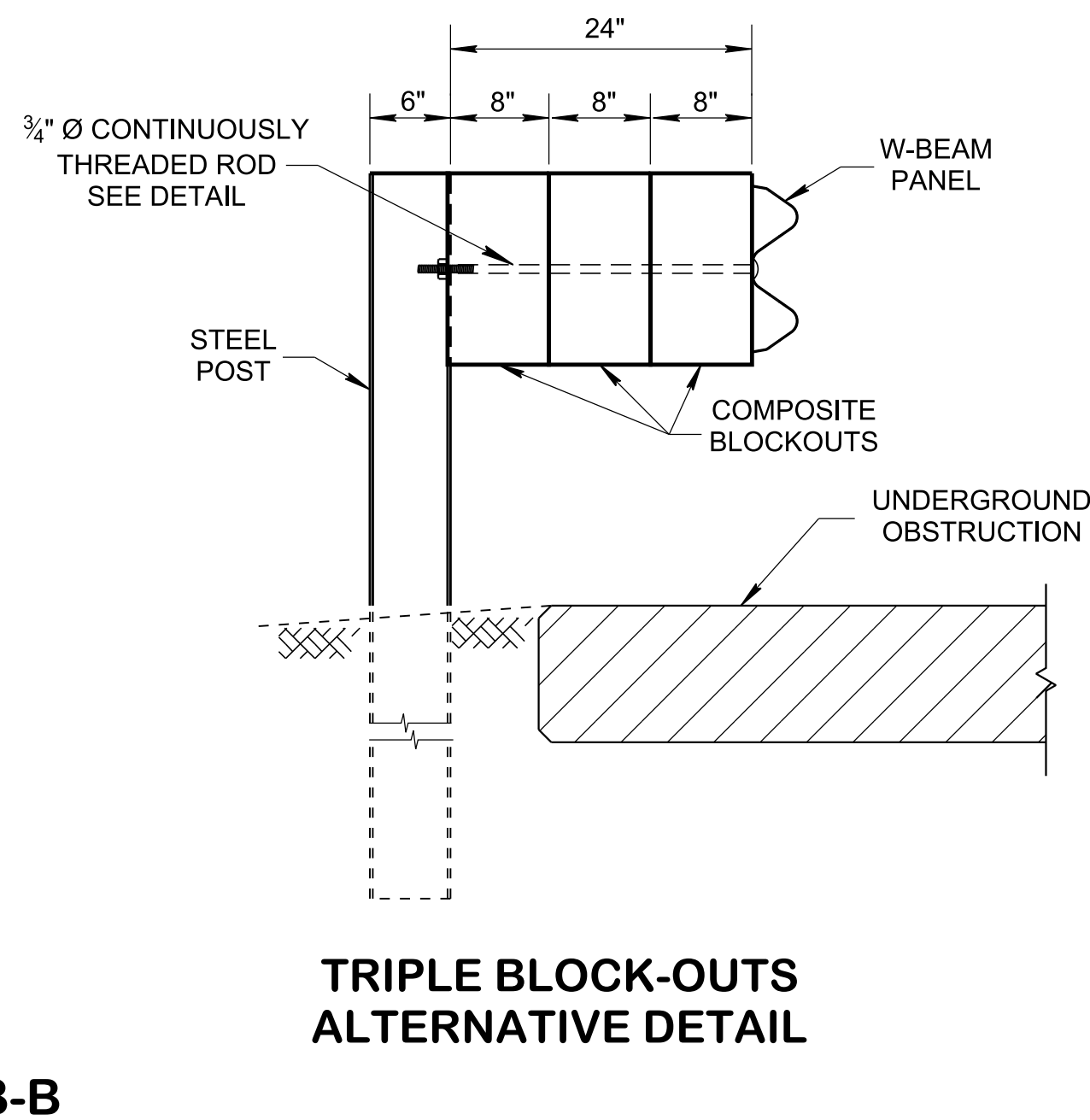
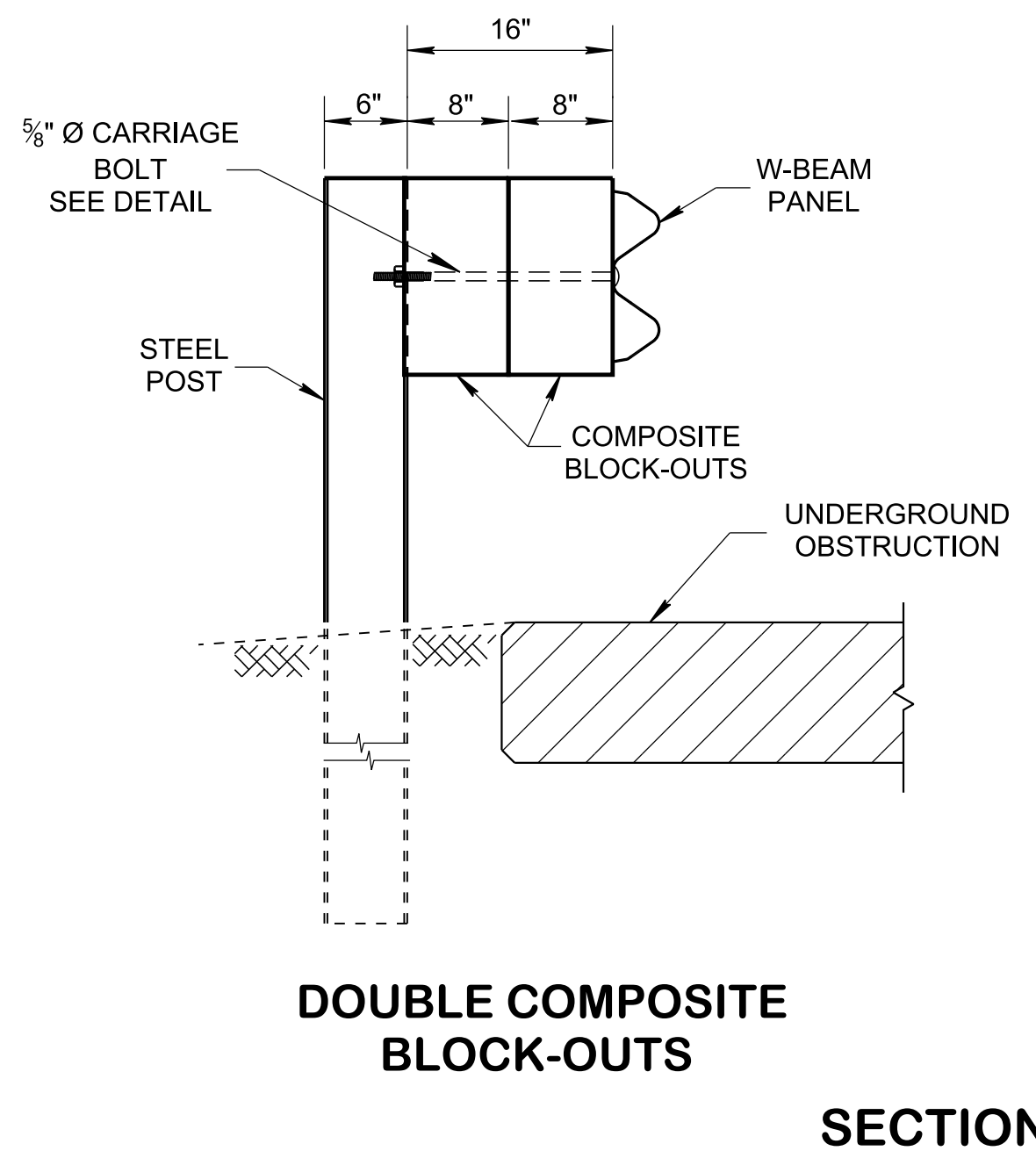
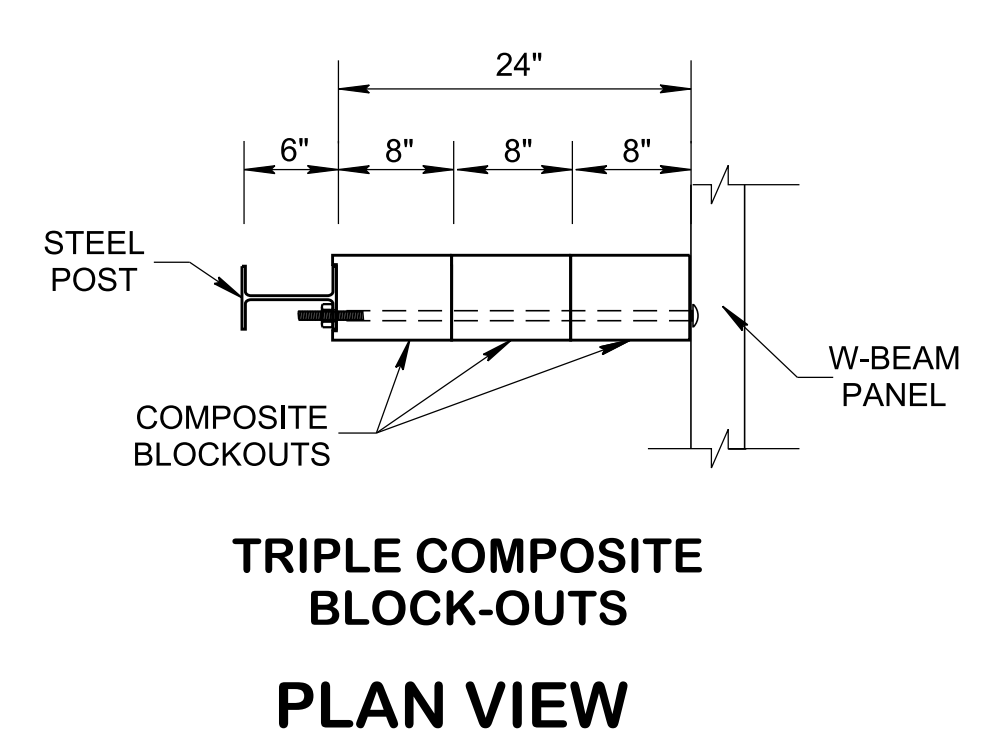
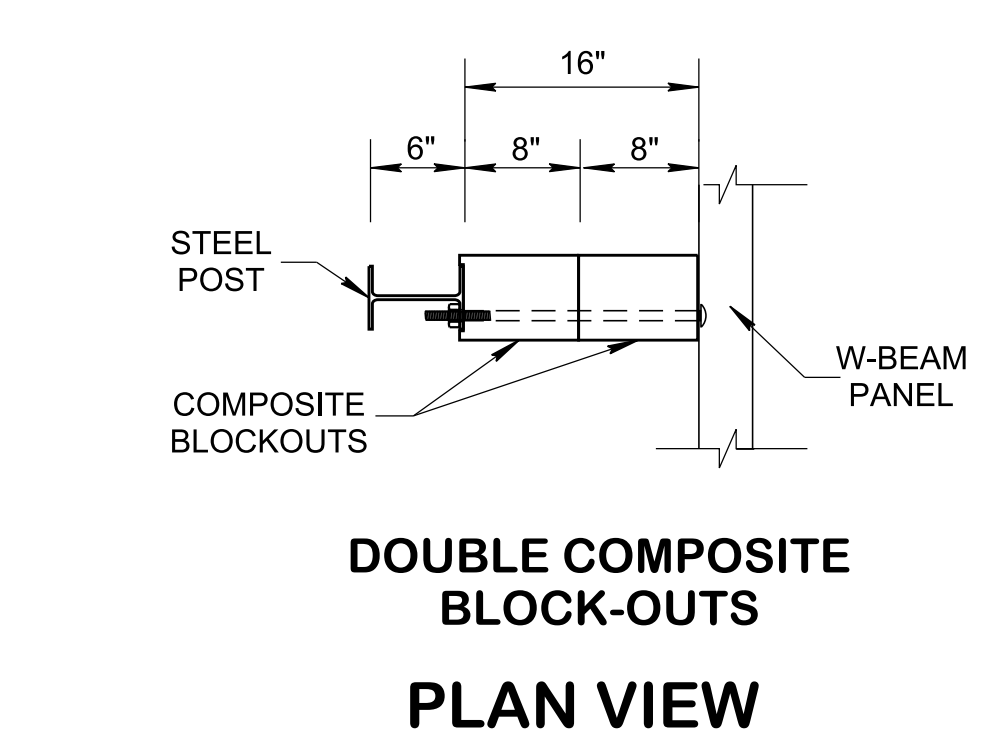
**STATE OF TENNESSEE**  
 STANDARD DRAWING  
**DEPARTMENT OF TRANSPORTATION**

**SPECIAL CASE**  
**GUARDRAIL**  
**ATTACHMENT**  
**TO CONCRETE**  
**DECKS**

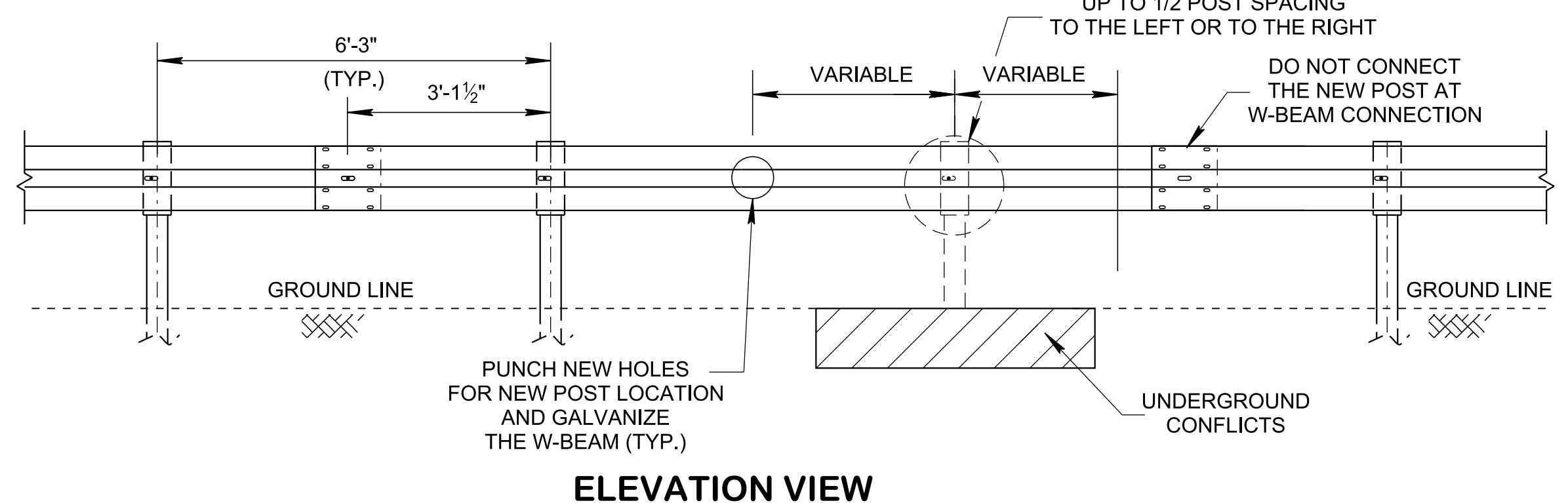
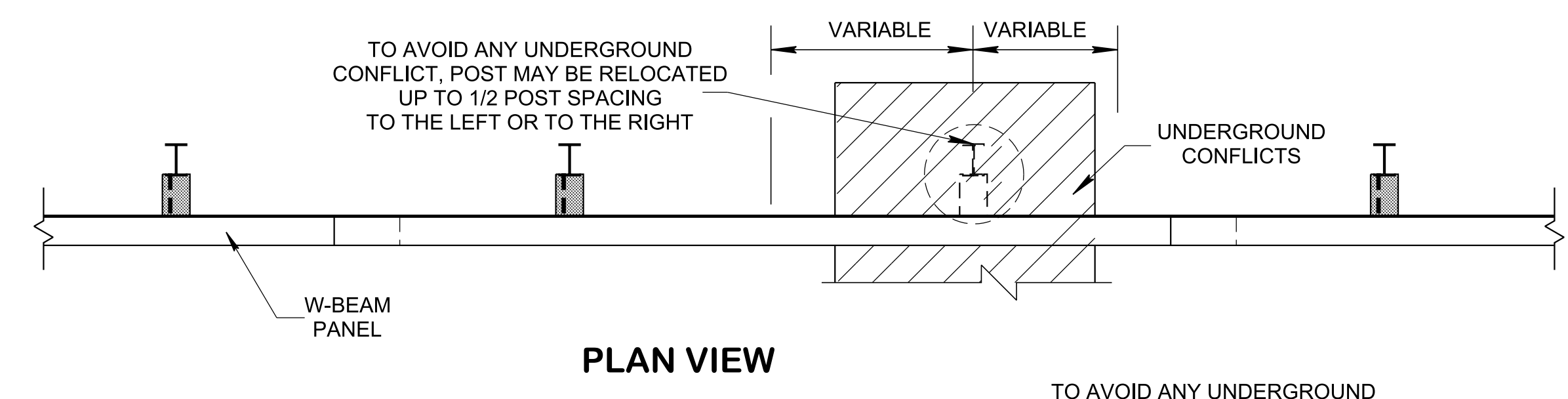
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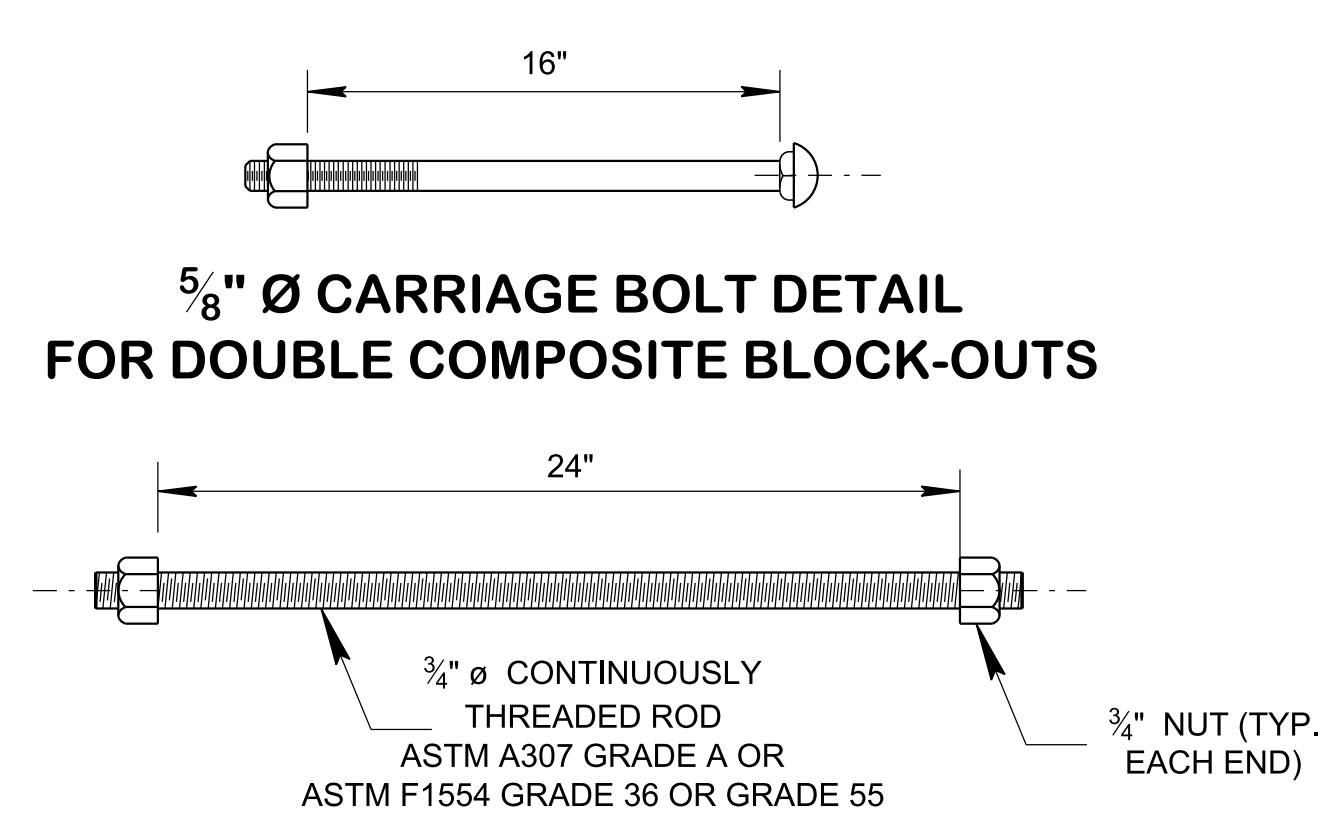
**TO OFFSET GUARDRAIL POSTS TO AVOID UNDERGROUND CONFLICTS**



NOT TO SCALE



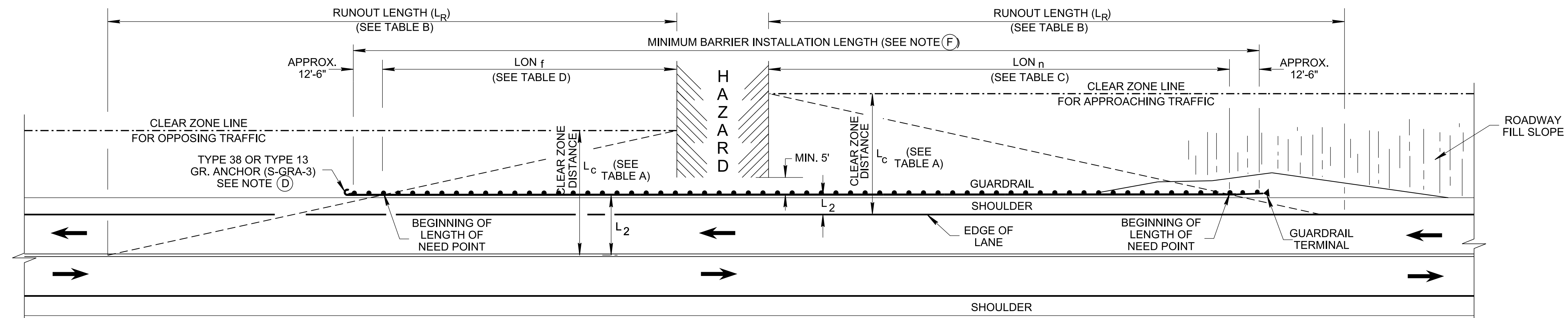
**GUARDRAIL POST INSTALLATION FLEXIBILITY TO AVOID UNDERGROUND CONFLICTS**



- GENERAL NOTES**
- (A) DRAWING IS TO BE USED FOR GUARDRAIL PLACEMENT WHEN ENCOUNTERING AN OBSTRUCTION WHICH WILL PREVENT GUARDRAIL POSTS TO BE INSTALLED PROPERLY.
  - (B) POSTS MAY BE OMITTED ON A RUN OF GUARDRAIL ONLY. THIS APPLICATION IS NOT TO BE USED AS PART OF AN END TERMINAL. IF AN OBSTRUCTION IS ENCOUNTERED AT A TERMINAL LOCATION, THE GUARDRAIL RUN IS TO BE EXTENDED TO A POINT WHERE THE TERMINAL MAY BE INSTALLED PROPERLY.
  - (C) REFER TO STANDARD DRAWING S-GRS-1 FOR LONG SPAN GUARDRAIL OMITTED POST DETAILS.
  - (D) IT IS RECOMMENDED TO INSTALL DOUBLE STANDARD BLOCKOUTS OR COMBINATIONS OF BLOCKOUTS UP TO 16 IN. DEEP MAY BE USED CONTINUOUSLY IN A GUARDRAIL SYSTEM ON OBSTRUCTION AREA OR TRIPLE STANDARD BLOCKOUTS OR COMBINATIONS OF BLOCKOUTS UP TO 24 IN. DEEP SHOULD BE A MAXIMUM OF THREE CONSECUTIVE POSTS IN 75 FT OF GUARDRAIL.
  - (E) SEE STANDARD DRAWINGS RD11-TS-SERIES FOR SLOPE CRITERIA , S-GRT31 SERIES FOR GUARDRAIL DETAILS AND S-PL-6 FOR GUARDRAIL PLACEMENT DETAILS.
  - (F) PAYMENT FOR FURNISHING AND INSTALLING LONG SPAN GUARDRAIL INCLUDING ALL MATERIAL AND LABOR FOR CONSTRUCTION WILL BE MADE UNDER PAY ITEM NUMBER:
- 705-06.01, W-BEAM GUARDRAIL (TYPE 2) MASH TL-3 PER L.F.

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

**SPECIAL CASE FLEXIBILITY ON GUARDRAIL POST INSTALLATIONS**



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

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

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

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

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

NOTE: CLEAR ZONE VALUES SHOWN IN TABLE A ARE BASED ON THE LARGEST CLEAR ZONE FOR ADT > 6000, AND FILL SLOPE 1.5 TO 1:4 FOR A GIVEN SPEED. REFER S-CZ-1 FOR MORE INFORMATION.

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

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

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

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

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

NO NEED FAR SIDE LENGTH OF NEED (LON<sub>f</sub>) FOR SPEEDS LESS THAN 30 MPH USE ENGINEERING JUDGEMENT.

#### BARRIER LENGTH OF NEED (LON) CALCULATION

$$\text{LON}_f \text{ or } \text{LON}_n = \frac{L_c - L_2}{L_c / L_R}$$

SEE "ROADSIDE DESIGN GUIDE" SECTION 5.6.4, AASHTO, 2011, FOR ADDITIONAL INFORMATION.

LEGEND	
L <sub>c</sub>	= THE CLEAR ZONE DISTANCE AS DETERMINED IN TABLE "A" ON S-CZ-1.
L <sub>2</sub>	= DISTANCE FROM EDGE OF TRAVELED WAY TO BARRIER.
L <sub>R</sub>	= RUNOUT LENGTH.

NOTES: 1 THE EQUATION FOR LON FOR THE NEARSIDE AND FAR SIDE APPROACHES IS THE SAME. THE ONLY DIFFERENCE IS THE FAR SIDE VARIABLES ARE MEASURED FROM THE CENTERLINE OR THE INSIDE EDGE OF THE LANE FOR DIVIDED ROADS.  
 2 AS A CONSERVATIVE APPROACH DESIGNER MAY USE RUNOUT LENGTH (L<sub>R</sub>) DIMENSIONS WHEN DETERMINING LENGTH OF NEED.

#### GENERAL NOTES

(A) EVERY LOCATION WHERE GUARDRAIL IS REQUIRED MUST BE INVESTIGATED SEPARATELY. THE HAZARD MUST BE IDENTIFIED AND THE "POINT OF NEED" CALCULATED TO DETERMINE THE BEST TREATMENT FOR PROTECTION OF VEHICLES FROM THE HAZARD.

(B) LENGTH OF NEED STARTS FROM THE THIRD POST OF THE END TREATMENT.

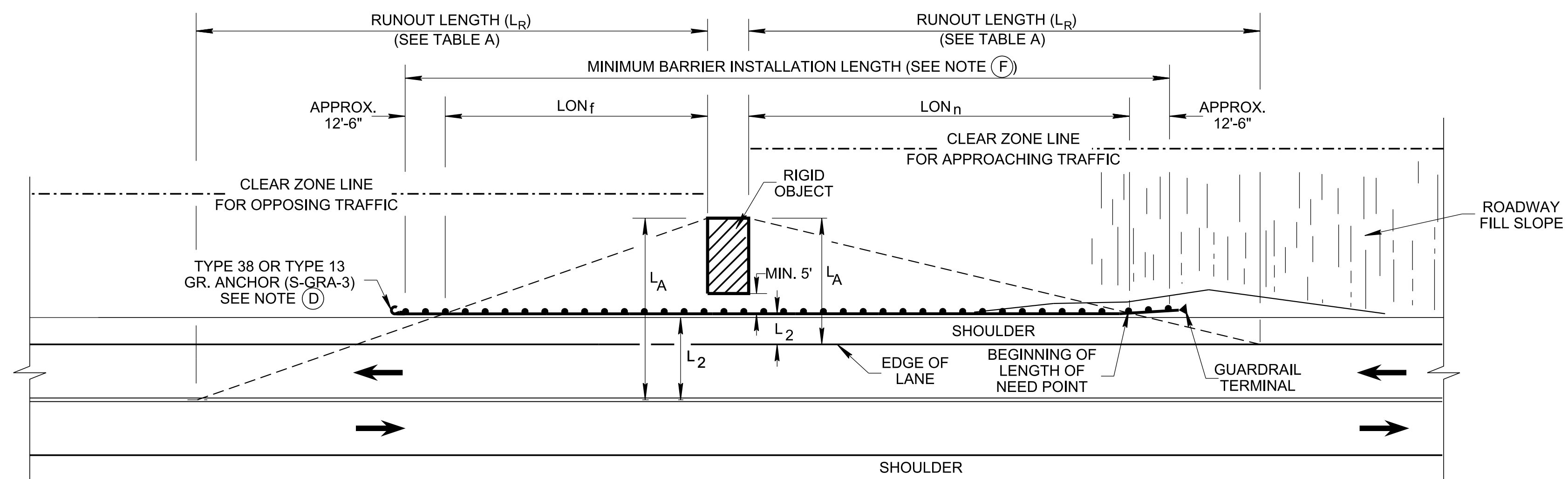
(C) IF THE CLEAR ZONE FALLS INSIDE OF 3:1 SLOPE OR STEEPER, EXTEND THE CLEAR ZONE TO THE TOE OF THE SLOPE.

(D) TRAILING END GUARDRAIL ANCHORS (TYPE 13) MAY ONLY BE USED FOR DIVIDED ROADWAYS, ONE WAY ROADS, OR TWO WAY MULTI-LANE ROADS WHERE LOCATION IS OUTSIDE THE CLEAR ZONE FOR THE OPPOSING DIRECTION TRAFFIC.

(E) SEE THE FOLLOWING STANDARD DRAWINGS :  
 S-PL-1A: SAFETY PLAN FOR BARRIER LENGTH OF NEED (FOR RIGID OBJECTS)  
 S-PL-1B: SAFETY PLAN FOR BARRIER LENGTH OF NEED ON CURVED ROADWAYS  
 S-PL-2: SAFETY PLAN AT SIDEROADS OR PRIVATE DRIVES  
 S-PL-3: SAFETY PLAN MINIMUM INSTALLATION AT BRIDGE ENDS  
 S-PL-4: SAFETY PLAN FOR BRIDGE PIERS IN CLEAR ZONE  
 S-PL-5: SAFETY PLAN FOR BRIDGE ENDS IN MEDIANS  
 S-PL-6: SAFETY PLAN SAFETY HARDWARE PLACEMENT ON OUTSIDE EDGE  
 S-PL-6A: SAFETY PLAN SAFETY HARDWARE PLACEMENT IN MEDIAN  
 S-GRT SERIES FOR GUARDRAIL TERMINALS.

(F) THE MINIMUM BARRIER INSTALLATION LENGTH IS EQUAL TO THE LON<sub>n</sub> + LON<sub>f</sub> + THE LENGTH OF THE HAZARD + (2 x 12.5'). CALCULATE THE FINAL GUARDRAIL QUANTITY IN AN INCREMENT OF 12'-6".

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

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

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

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

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

#### BARRIER LENGTH OF NEED CALCULATION FOR TANGENT ROADS WITH RIGID OBJECT

$$LON_f \text{ or } LON_n = \frac{L_A - L_2}{L_A / L_R}$$

SEE "ROADSIDE DESIGN GUIDE" SECTION 5.6.4, AASHTO, 2011, FOR ADDITIONAL INFORMATION.

##### LEGEND

$L_A$  = DISTANCE FROM EDGE OF TRAVELED WAY (EDGE OF PAVEMENT) TO THE LATERAL EXTENT OF OBSTACLE.  
NOTE:  $L_A \leq L_C$ .

$L_C$  = THE CLEAR ZONE DISTANCE AS DETERMINED IN TABLE "A" ON S-CZ-1.

$L_2$  = DISTANCE FROM EDGE OF TRAVELED WAY TO BARRIER.

$L_R$  = RUNOUT LENGTH (SEE TABLE A FOR VALUE).

NOTES: 1. THE EQUATION FOR LON FOR THE NEAR SIDE AND FAR SIDE APPROACHES IS THE SAME. THE ONLY DIFFERENCE IS THE FAR SIDE VARIABLES ARE MEASURED FROM THE CENTERLINE OR THE INSIDE EDGE OF THE LANE FOR DIVIDED ROADS.

2. RIGID OBJECTS OUTSIDE THE CLEAR ZONE SHOULD BE EVALUATED BASED ON CRASH SEVERITY OR CONSEQUENCES TO OPERATION.

3. AS A CONSERVATIVE APPROCH DESIGNER MAY USE RUNOUT LENGTH ( $L_R$ ) DIMENSIONS WHEN DETERMINING LENGTH OF NEED.

#### GENERAL NOTES

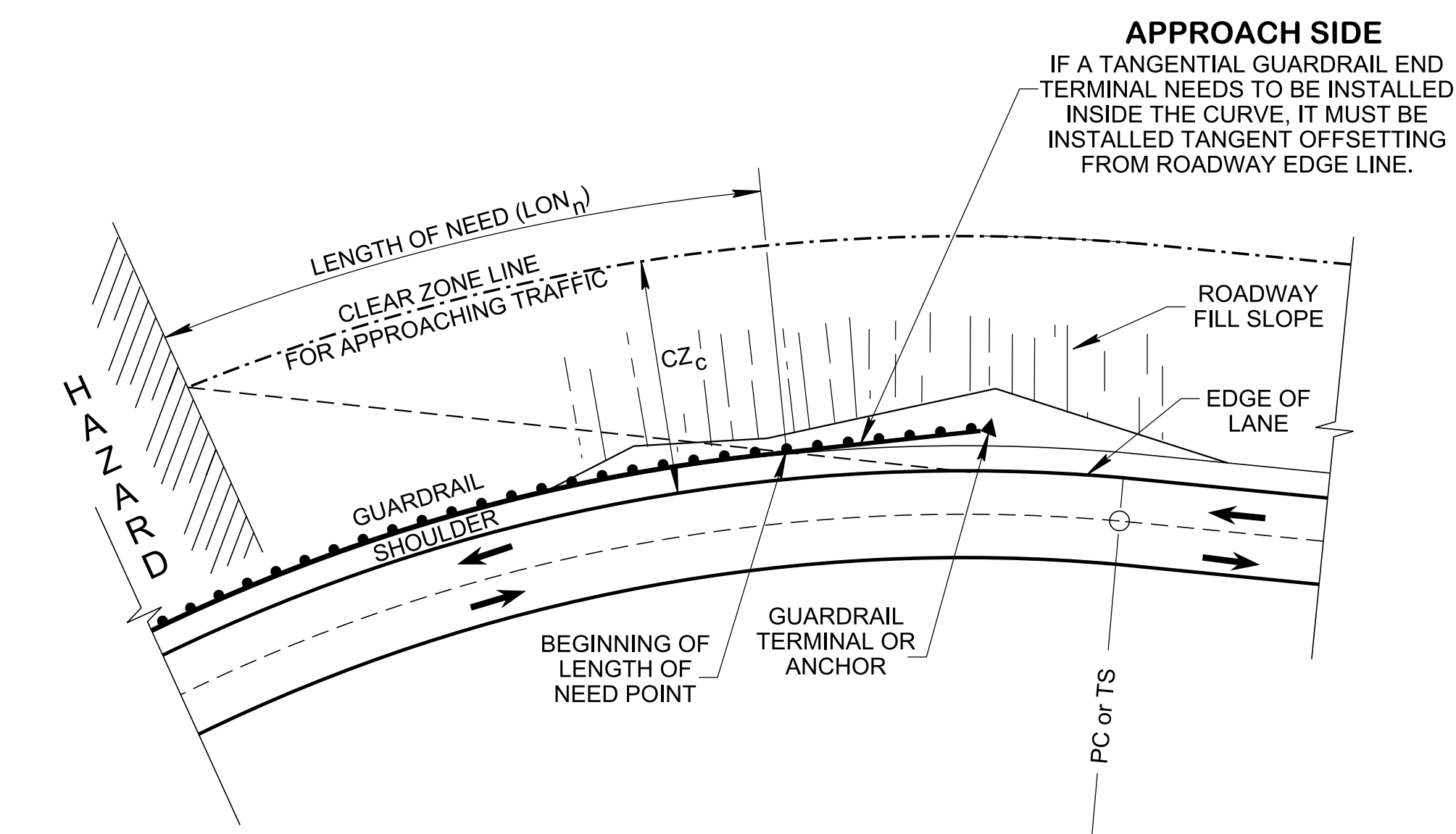
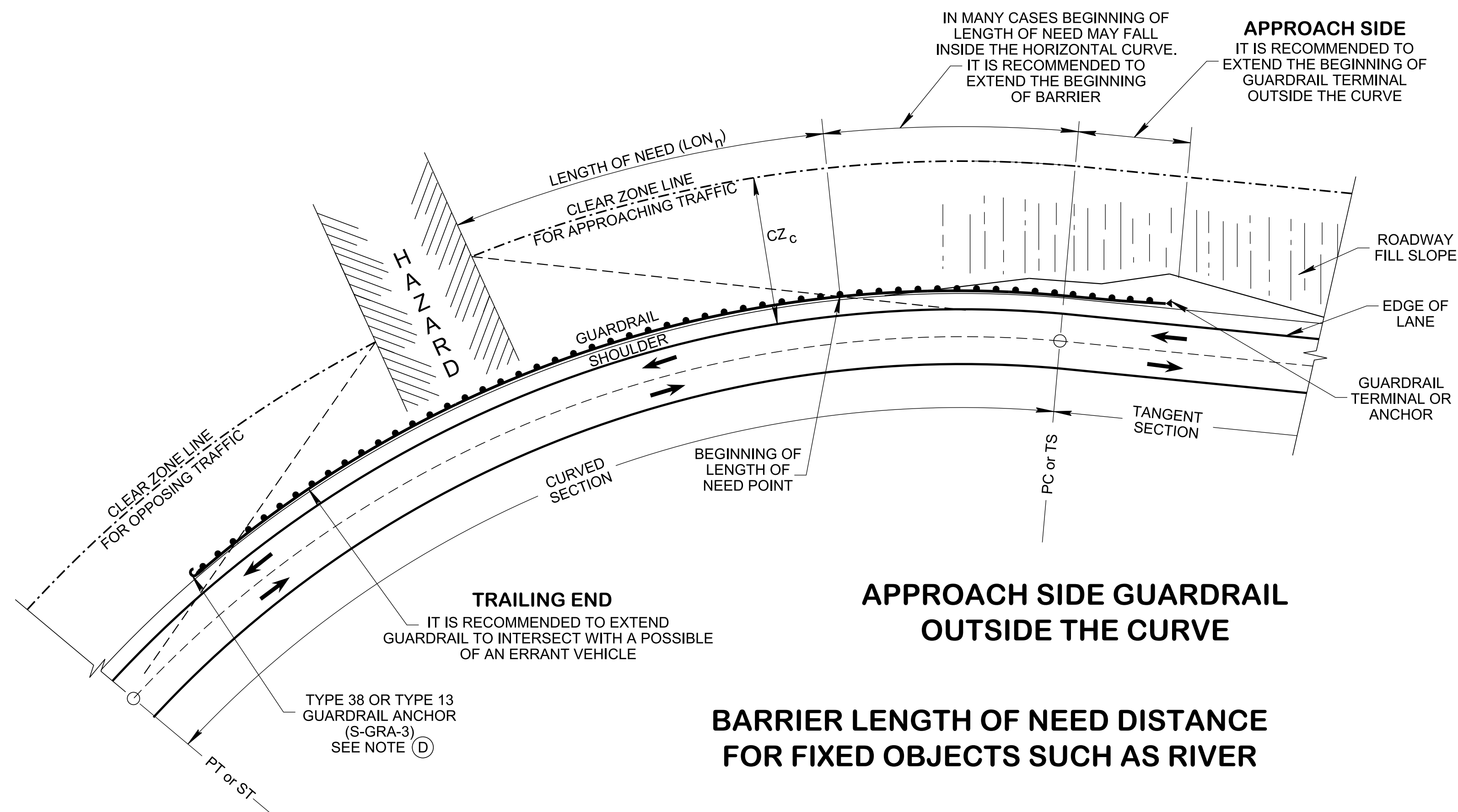
- (A) EVERY LOCATION WHERE GUARDRAIL IS REQUIRED MUST BE INVESTIGATED SEPARATELY. THE OBJECT MUST BE IDENTIFIED AND THE "POINT OF NEED" CALCULATED TO DETERMINE THE BEST TREATMENT FOR PROTECTION OF VEHICLES FROM THE OBJECT.
- (B) LENGTH OF NEED STARTS FROM THE THIRD POST OF THE END TREATMENT.
- (C) IF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

STATE OF TENNESSEE  
STANDARD DRAWING  
DEPARTMENT OF TRANSPORTATION

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

01-28-2022 S-PL-1A

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

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

**TABLE A**

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

$CZ_c = K_{CZ} * L_c$

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

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

**TABLE B**

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

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

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

**LEGEND**

CZ<sub>c</sub> = THE CLEAR ZONE DISTANCE AS DETERMINED BY THE CURVE EQUATION ON S-CZ-1:  
 $CZ_c = (L_c)(K_{CZ})$   
WHERE L<sub>c</sub> = THE CLEAR ZONE DISTANCE AS DETERMINED IN TABLE "A" ON S-CZ-1.  
K<sub>CZ</sub> = THE CURVE CORRECTION FACTOR FOUND IN TABLE "B" ON S-CZ-1.

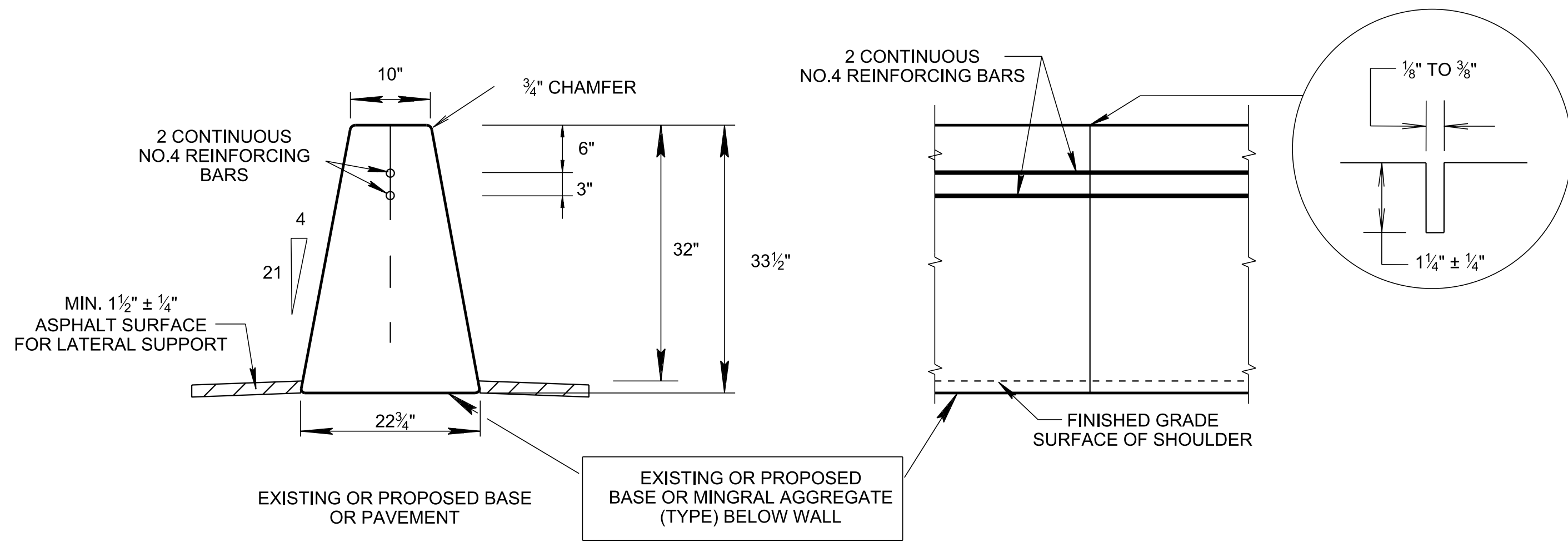
- GENERAL NOTES**
- (A) EVERY LOCATION WHERE GUARDRAIL IS REQUIRED MUST BE INVESTIGATED SEPARATELY. THE OBJECT MUST BE IDENTIFIED AND THE "POINT OF NEED" CALCULATED TO DETERMINE THE BEST TREATMENT FOR PROTECTION OF VEHICLES FROM THE OBJECT. THIS DRAWING IS SHOWN ONLY ONE DIRECTION.
  - (B) LENGTH OF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

STATE OF TENNESSEE  
STANDARD DRAWING  
DEPARTMENT OF TRANSPORTATION

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

01-28-2022 S-PL-1B

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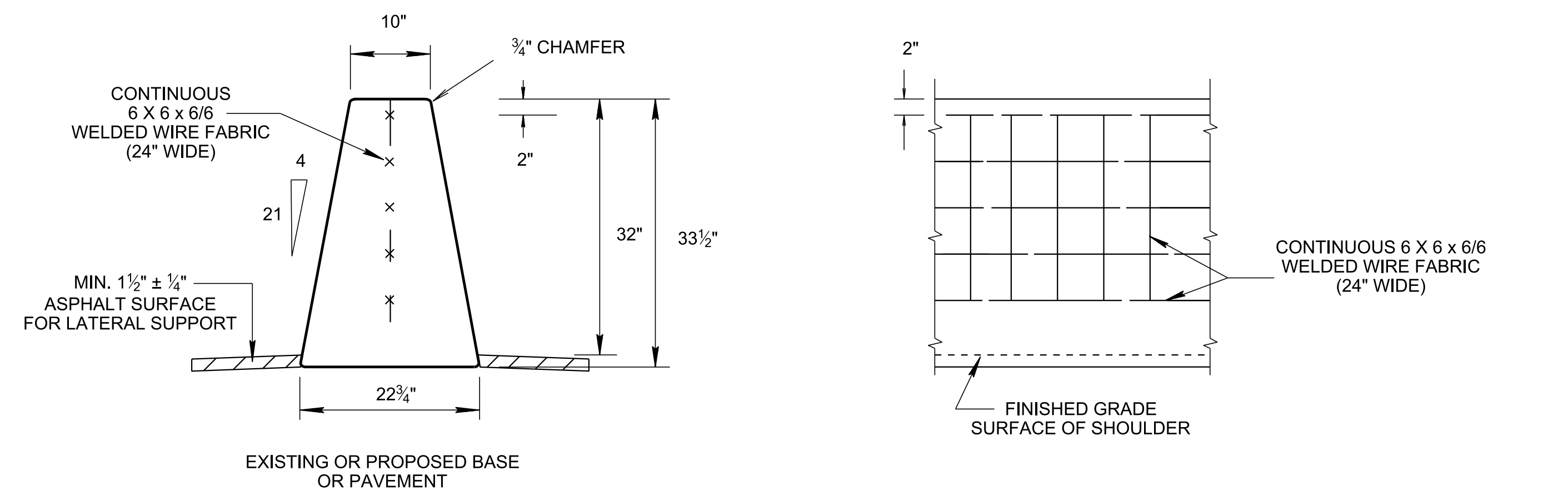


EXISTING OR PROPOSED BASE OR MINGRAL AGGREGATE (TYPE) BELOW WALL

SECTION VIEW

ELEVATION VIEW

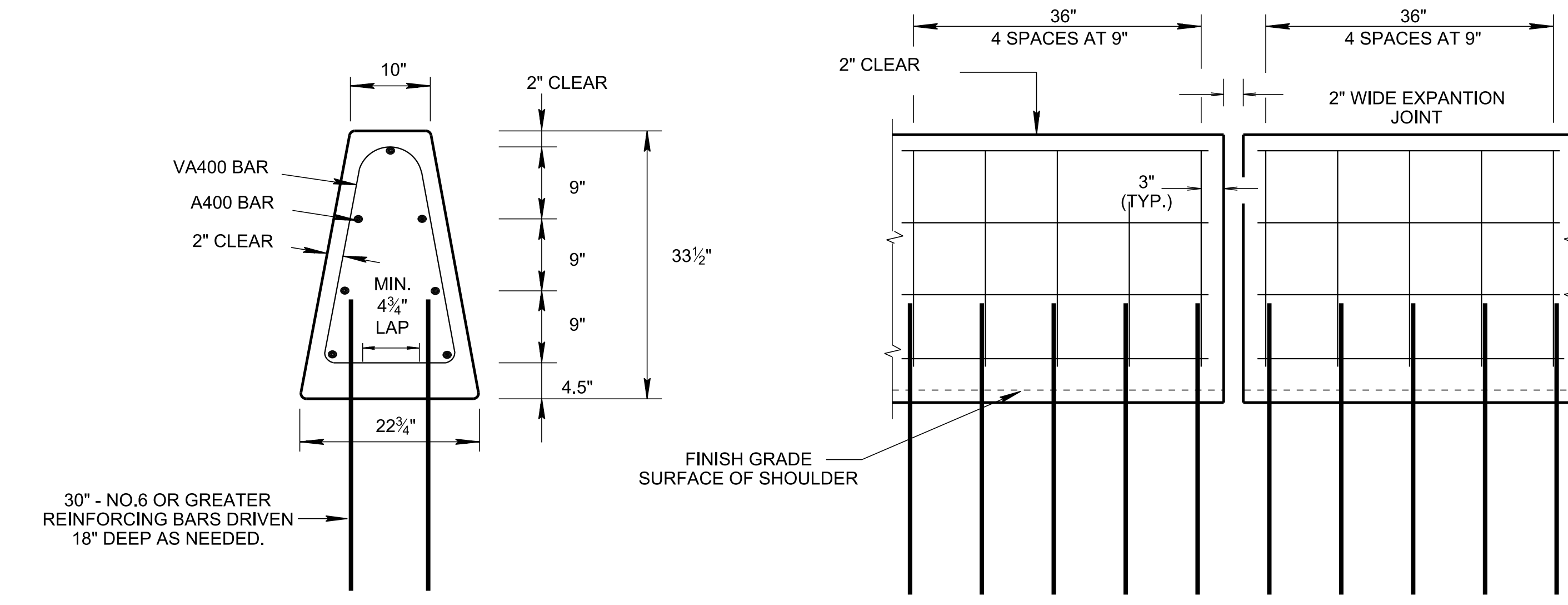
32" HEIGHT WALL



SECTION VIEW

ELEVATION VIEW

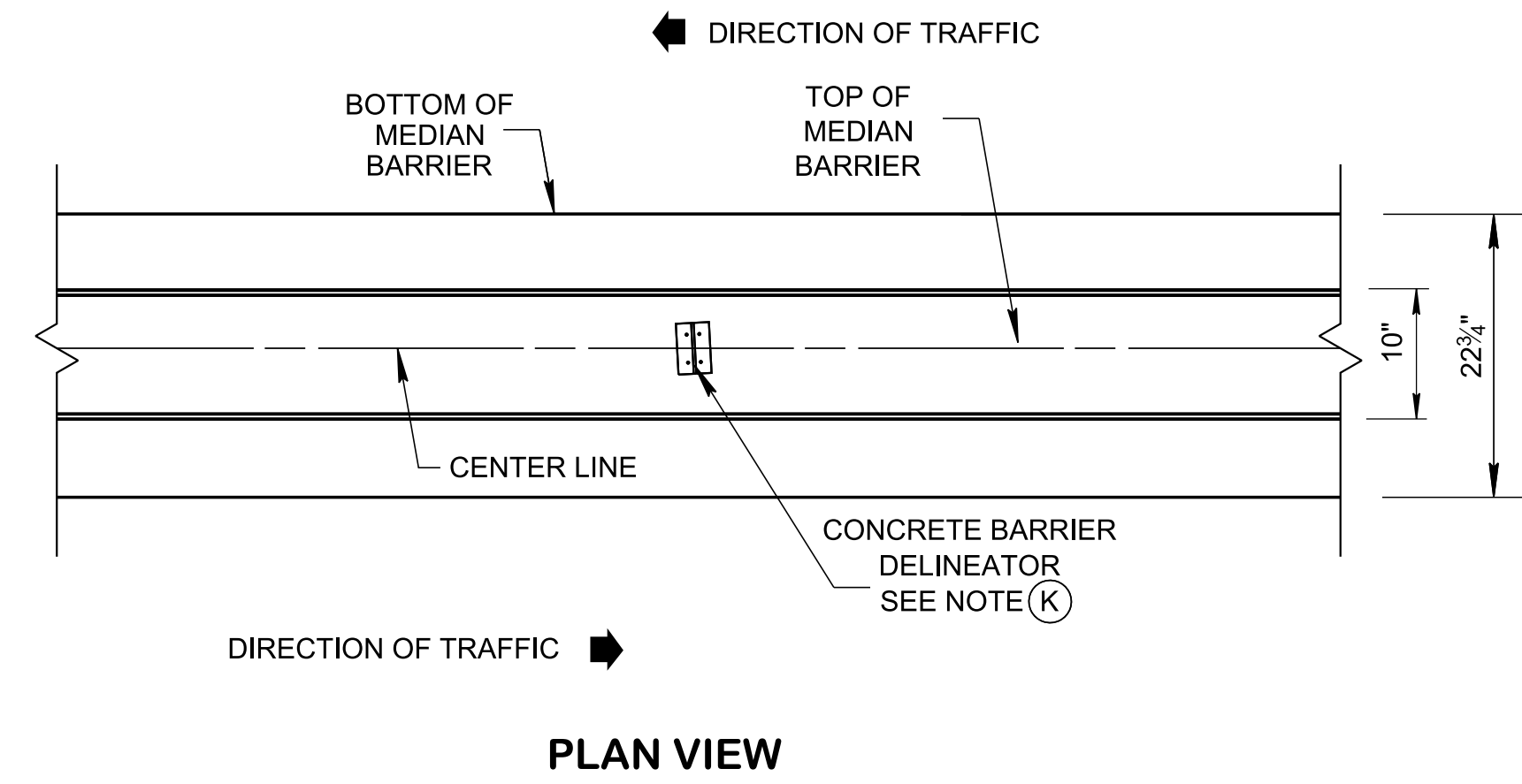
32" HEIGHT WALL WITH ALTERNATE REINFORCING



SECTION VIEW

ELEVATION VIEW

DETAILS OF ADDITIONAL REINFORCING AT THE WALL ENDS OR AT EXPANTION JOINT



**NOTE TO DESIGNER**

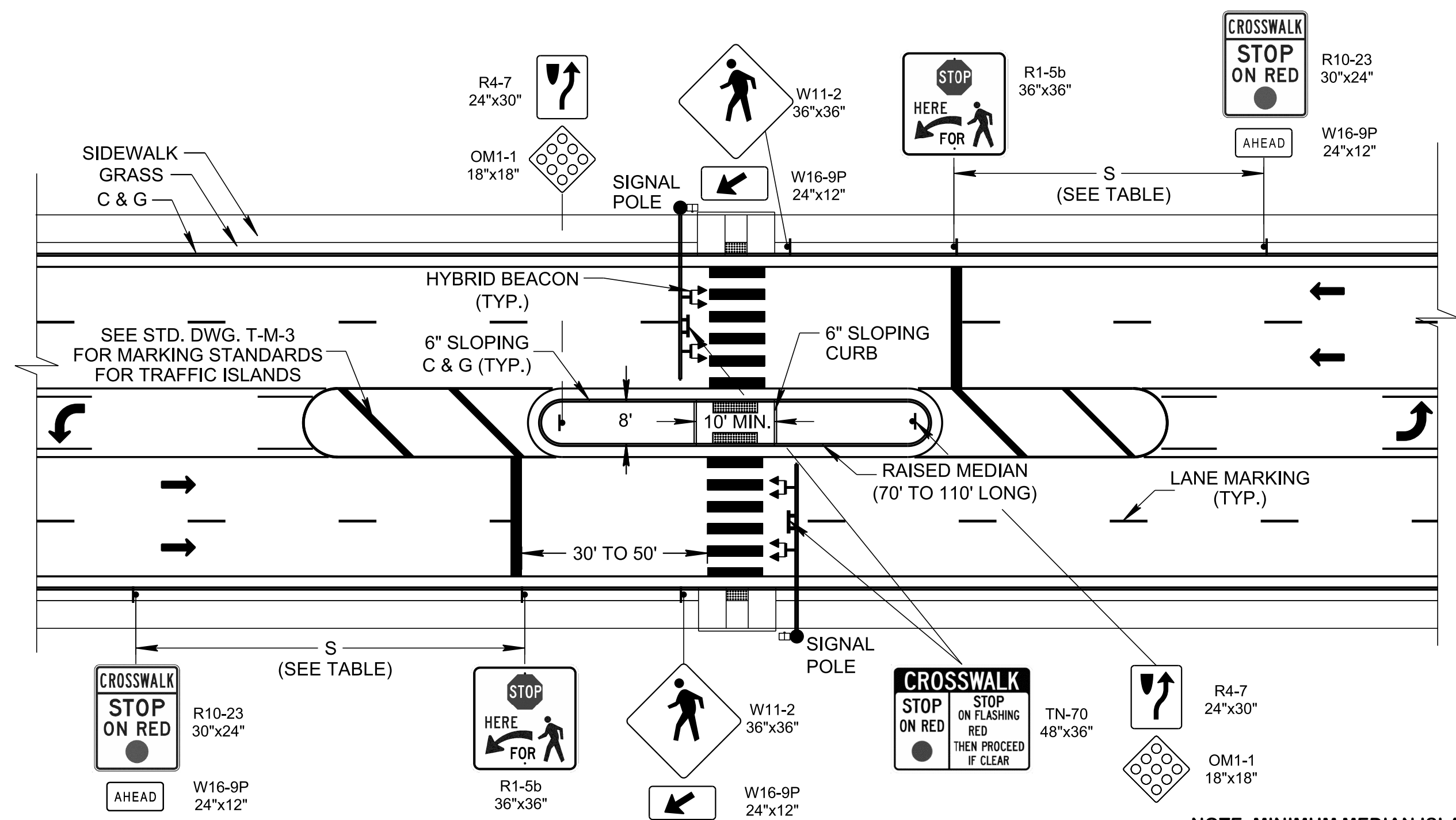
THIS DRAWING IS TO BE USED ON THE MAINTENANCE OF EXISTING 32" MEDIAN BARRIER WALLS ONLY. ON NEW CONSTRUCTION PROJECTS, WHEN THE PROPER SIGHT DISTANCE CANNOT BE ACHIEVED WITH THE USE OF THE 36" MEDIAN BARRIER WALL, THE DESIGNER IS TO USE THE 32" MEDIAN BARRIER WALL. IN ALL OTHER CASES, THE DESIGNER IS TO USE 36" OR 51" MEDIAN BARRIER WALL ON ALL NEW CONSTRUCTION PROJECTS. SEE STANDARD DRAWINGS S-SSMB-1A AND S-SSMB-2 FOR DETAILS.

**GENERAL NOTES**

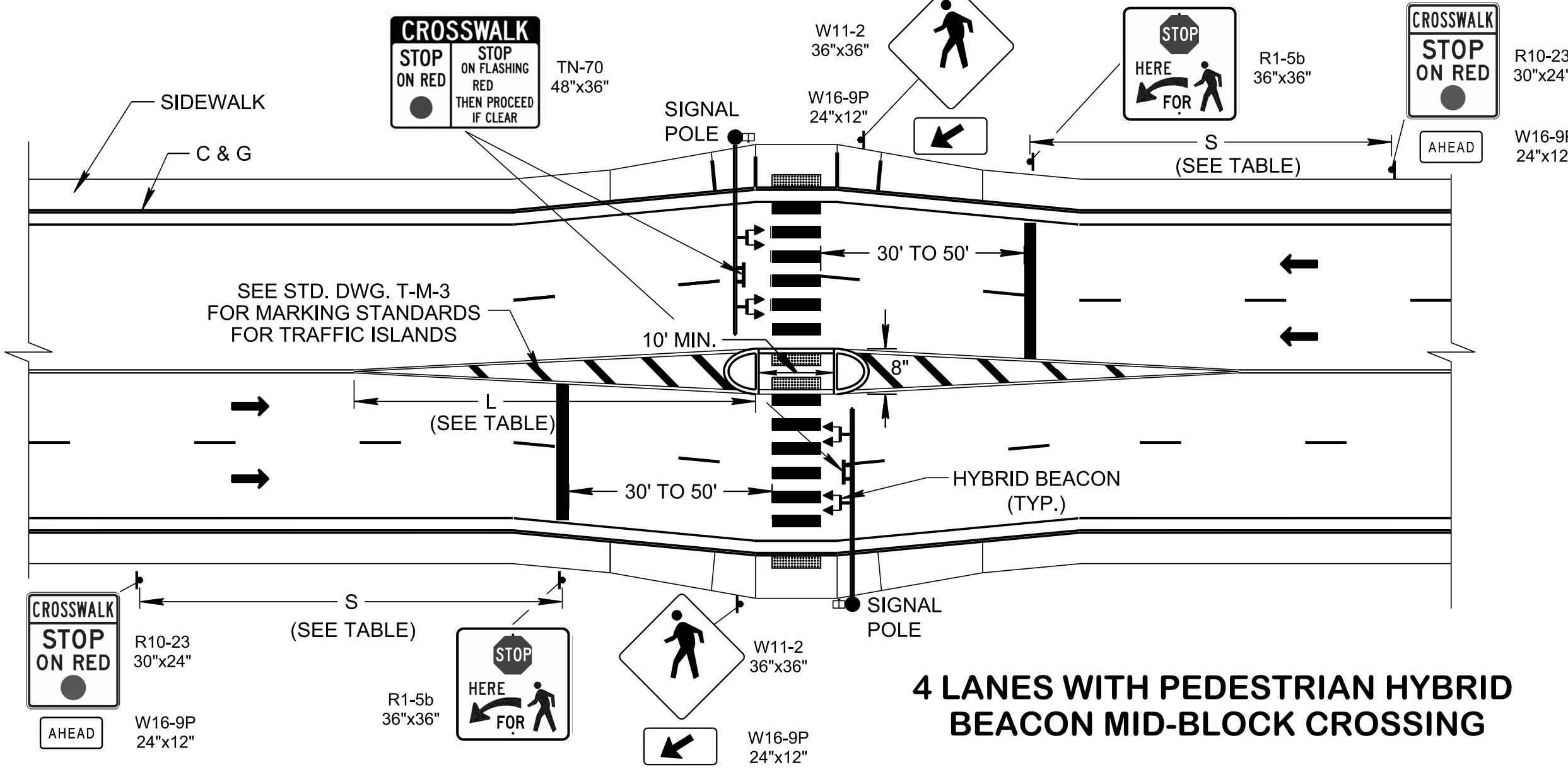
- (A) CONCRETE BARRIER WALL SHALL BE CONSTRUCTED IN ACCORDANCE WITH STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, SECTION 711 AND/OR CURRENT SPECIAL PROVISIONS.
- (B) IF SAWED CONTRACTION JOINTS ARE USED, THE JOINTS MUST BE SAWED WITHIN FOUR (4) HOURS AFTER THE CONCRETE IS PLACED.
- (C) THE CONTRACTION JOINTS ARE TO BE SPACED AT 20 TO 25 FOOT INTERVALS WHEN CONSTRUCTED ON ASPHALT PAVEMENT. WHEN THE CONCRETE BARRIER WALL IS ATTACHED TO CONCRETE PAVEMENT THE CONTRACTION JOINTS WILL CORRESPOND TO THE JOINTS IN THE CONCRETE PAVEMENT. THE COST OF MATERIAL AND LABOR FOR THE JOINT INSTALLATION SHALL BE INCLUDED IN THE BID PRICE FOR CONCRETE MEDIAN BARRIER.
- (D) THE CONCRETE BARRIER WALL SHALL BE GIVEN AN APPLIED TEXTURE FINISH. THE COLOR OF THE FINISH SHALL BE WHITE, FEDERAL SPECIFICATION NO. 37886. THE COST OF MATERIALS AND LABOR FOR THE TEXTURE FINISH SHALL BE INCLUDED IN THE BID PRICE FOR CONCRETE MEDIAN BARRIER.
- (E) THE TWO (2) INCH OPEN EXPANSION JOINTS SHALL BE PLACED AT A MAXIMUM SPACING NOT TO EXCEED 300 FEET. IF FIXED OBJECTS SUCH AS BRIDGE PIERS, BRIDGE ENDS, OVERHEAD SIGN SUPPORTS, OR OTHER FEATURES PROJECTING THROUGH, INTO OR AGAINST THE BARRIER EXIST THAT REQUIRE TWO INCH EXPANSION JOINTS, THEN THE DISTANCE BETWEEN THE EXPANSION JOINTS IS TO BE REDUCED IN ORDER TO ALLOW AN EQUAL DISTANCE BETWEEN JOINTS THAT IS LESS THAN 300 FEET. ALL ADDITIONAL STEEL REQUIRED AT EXPANSION JOINTS TO BE EPOXY COATED REINFORCING STEEL. THE COST OF MATERIAL AND LABOR FOR THE JOINT INSTALLATION SHALL BE INCLUDED IN THE BID PRICE FOR CONCRETE MEDIAN BARRIER.
- (F) CHAMFER TOP AND END EDGES 3/4 INCH.
- (G) BAR SPLICES FOR ROADWAY BARRIER SHALL BE A MINIMUM OF 24 TIMES THE NOMINAL DIAMETER OF THE BAR.
- (H) ANY METHOD DEvised BY THE CONTRACTOR AND APPROVED BY THE ENGINEER THAT WILL ASSURE THE LONGITUDINAL ROADWAY REINFORCING STEEL WILL BE FIXED AGAINST MOVEMENT AND POSITIONED ± 1/2 INCH AS DIMENSIONED WHEN TIED TO THE TRANSVERSE ROADWAY REINFORCING STEEL WILL BE SATISFACTORY.
- (I) PAYMENT WILL BE MADE UNDER ITEM NO.:  
711-05.70, 32IN SINGLE SLOPE CONCRETE BARRIER WALL, L.F.
- (J) 32" SINGLE SLOPE MEDIAN BARRIER WALL MEETS MASH TL-3 EVALUATION CRITERIA. REFER TO TEST REPORT TTI: 9-1002-5.
- (K) REFER TO STANDARD DRAWING T-M-18A FOR MEDIAN BARRIER DELINEATOR MOUNTING DETAILS AND NOTES. THE COST OF FURNISHING AND INSTALLING MEDIAN BARRIER DELINEATORS SHALL BE INCLUDED WITH THE BID PRICE FOR CONCRETE MEDIAN BARRIERS.

REV. 8-19-13: REVISED ITEM NUMBER DESCRIPTION.  
 REV. 05-01-20: ADDED NOTE TO DESIGNER. REDREW SHEET.  
 REV. 07-17-20: REVISED NOTE TO DESIGNER.  
 REV. 10-29-2021: DELINEATOR MOUNTING DETAIL AND DELINEATOR NOTES WERE REMOVED. ADDED GENERAL NOTE (K) FOR DELINEATOR MOUNTING DETAILS REFERENCE STD. DWG. AND PLAN VIEW.  
 REV. 01-28-2022: THE NCHRP 350 TL-4 NOTE WAS REPLACED WITH A MASH TL-3 NOTE ON GENERAL NOTE (J).

STATE OF TENNESSEE  
 STANDARD DRAWING  
 DEPARTMENT OF TRANSPORTATION  
 32" SINGLE SLOPE CONCRETE BARRIER WALL  
 S-SSMB-1



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



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

REV. 07-17-20: REMOVED RIGHT TURN ARROWS FROM THE MIDDLE LANE.  
 REV. 11-30-20: REVISED CROSSWALK SIGN ON GENERAL NOTE (C). ADDED GENERAL NOTE (P).  
 REV. 06-15-21: REVISED GENERAL NOTES (E) AND (I). REMOVED MINIMUM ADVANCE PLACEMENT TABLE NOTE.  
 REV. 10-29-21: REMOVED PHB SIGN AND ADDED TN-70 AND R10-23 SIGNS ON THE DRAWINGS. REVISED GENERAL NOTE (X).  
 REV. 01-28-22: REVISED SIGNING STANDARDS FOR TRAFFIC ISLANDS ON 4 LANES WITH PEDESTRIAN HYBRID BEACON MID-BLOCK CROSSING DRAWING.

**GENERAL NOTES**

- (A) DETAILS SHOWN ON THIS STANDARD DRAWING APPLY TO THE CONSTRUCTION OR RECONSTRUCTION OF MID-BLOCK CROSSINGS AND MODIFICATION OF STREETS, CURBS, OR SIDEWALKS ASSOCIATED WITH IT. SEE TDOT-RDG FOR ADDITIONAL INFORMATION FOR SITE SELECTION, NEW CONSTRUCTION OR RECONSTRUCTION DURING PEDESTRIAN SAFETY INITIATIVE, SPOT SAFETY IMPROVEMENTS AT LOCATIONS MAX 45 MPH. OTHER LOCATIONS WILL NEED SITE SPECIFIC ANALYSIS.
- (B) FOR NEW CONSTRUCTION A TRAFFIC ENGINEERING STUDY WILL HAVE TO BE CONDUCTED TO DETERMINE IF A MID-BLOCK CROSSING IS WARRANTED. MID-BLOCK CROSSINGS SHALL BE INSTALLED DURING RECONSTRUCTION PROJECTS AND REPAVING PROJECTS AT LOCATIONS WHERE EXISTING PEDESTRIAN SAFETY IS A CONCERN.
- (C) PEDESTRIAN IN CROSSWALK SIGNS (W11-2) SHALL BE INSTALLED AT EACH END OF THE CROSSWALK LOCATION. THE SIGNS SHALL BE PLACED IN ADVANCE OF THE CROSSWALK ADJACENT TO THE TRAVEL LANE AND FACING THE DRIVER. REFER TO THE MUTCD FOR ADDITIONAL WARNING SIGNS, TYPE AND LOCATION.
- (D) FOR CURB RAMP, THE DETECTABLE WARNING SURFACE, PAVEMENT MARKINGS, AND CROSSWALK MARKING DETAILS, SEE STD. DWG. SERIES MM-CR AND MM-PM RESPECTIVELY. FOR MARKING STANDARDS AND CONCRETE CURB AND GUTTER SEE STD. DWG T-M- SERIES AND RP-VC SERIES RESPECTIVELY.
- (E) FOR PEDESTRIAN SIGNAL PUSH BUTTONS, I.E HAWK, SEE TDOT TRAFFIC DESIGN MANUAL. IF THE PEDESTRIAN CLEARANCE TIME IS SUFFICIENT ONLY TO CROSS FROM THE CURB OR SHOULDER TO A MEDIAN OF SUFFICIENT WIDTH FOR PEDESTRIANS TO WAIT AND THE SIGNALS ARE PEDESTRIAN ACTUATED, AN ADDITIONAL PEDESTRIAN DETECTOR SHALL BE PROVIDED IN THE MEDIAN.
- (F) STOP LINES SHOULD BE PLACED AT A SUFFICIENT DISTANCE (30' TO 50') FROM THE CROSSWALK TO ENSURE VISIBILITY IS PROVIDED FOR BOTH MOTORISTS AND PEDESTRIANS. STOP LINES AT MID-BLOCK SIGNALIZED LOCATIONS SHOULD BE PLACED AT LEAST 40 FEET IN ADVANCE OF THE NEAREST SIGNAL INDICATION.
- (G) STOP LINES SHALL CONSIST OF SOLID WHITE LINES EXTENDING ACROSS APPROACH LINES TO INDICATE THE POINT AT WHICH THE STOP IS INTENDED OR REQUIRED TO BE MADE. IF STOP LINES ARE USED AT A CROSSWALK THAT CROSSES AT AN UNCONTROLLED MULTI-LANE APPROACH, STOP HERE FOR PEDESTRIANS (R1-5 SERIES) SIGNS SHALL BE USED.
- (H) THE PLACEMENT OF MID-BLOCK SIGNALS. THE PRIMARY SIGNALIZED TREATMENT THAT SHOULD BE CONSIDERED AT MID-BLOCK OR NON- INTERSECTION CROSSINGS IS THE HIGH INTENSITY ACTIVATED CROSSWALK (HAWK) PEDESTRIAN HYBRID BEACON (PHB). A HAWK PEDESTRIAN HYBRID BEACON SHOULD BE EXAMINED WHERE THE PPH EXCEEDS 20 AND MOTOR VEHICULAR SPEEDS EXCEED 35 MPH.
- (I) RECTANGULAR RAPID FLASHING BEACON (RRFB) MAYBE USED AS AN ALTERNATIVE TO ASSIST PEDESTRIANS CROSSING IN A MARKED CROSSWALK AT AN UNSIGNALIZED INTERSECTION WITH SPEED LIMITS LESS THAN 40 MPH. SEE STANDARD DRAWING T-M-4A FOR UNSIGNALIZED MID-BLOCK CROSSING.
- (J) A MEDIAN SHOULD BE AT LEAST 8.0 FEET WIDE TO ALLOW THE PEDESTRIAN TO WAIT COMFORTABLY IN THE CENTER, IF THE DESIRED 8 FEET CANNOT BE ACHIEVED, USE A MINIMUM WIDTH OF 6 FEET. THE PEDESTRIAN CROSSWALK MEDIAN ISLAND ARE ADA-APPROVED RAMPS (1:12 GRADE) SHOULD BE USED. IT IS BEST TO PROVIDE A SLIGHT GRADE 2 PERCENT TO PERMIT WATER AND SILT TO DRAIN FROM THE AREA. DRAINAGE STRUCTURES SHALL NOT BE PLACED IN LINE WITH RAMPS. INSTALL CATCH BASINS ON UPSTREAM SIDE OF RAMP FOR ROADS WITH GRADES LESS THAN 2%.
- (K) WHEN A PEDESTRIAN HYBRID BEACON IS USED, A CROSSWALK STOP ON RED (TN-70) SIGN SHALL BE MOUNTED ADJACENT TO A PEDESTRIAN HYBRID BEACON FACE ON EACH MAJOR STREET APPROACH. THE PEDESTRIAN HYBRID BEACON SHOULD BE INSTALLED AT LEAST 100 FEET FROM SIDE STREETS OR DRIVEWAYS THAT ARE CONTROLLED BY STOP OR YIELD SIGNS.
- (L) PARKING AND OTHER SIGHT OBSTRUCTIONS SHOULD BE PROHIBITED FOR AT LEAST 100 FEET IN ADVANCE OF AND AT LEAST 20 FEET BEYOND THE MARKED CROSSWALK, OR SITE ACCOMMODATIONS SHOULD BE MADE THROUGH CURB EXTENSIONS OR OTHER TECHNIQUES TO PROVIDE ADEQUATE SIGHT DISTANCE. THE INSTALLATION SHOULD INCLUDE SUITABLE STANDARD SIGNS AND PAVEMENT MARKINGS.
- (M) STREETLIGHTS SHOULD BE INSTALLED AT THE CROSSWALK ON BOTH SIDES ROAD TO IMPROVE PEDESTRIAN COMFORT, SECURITY, AND SAFETY DURING DARK AND BAD WEATHER CONDITIONS. FLUORESCENT YELLOW-GREEN SIGNS PROVIDE SUPERIOR VISIBILITY AND ARE EASILY NOTICEABLE IN DAYLIGHT AND DARK CONDITIONS. USE FLUORESCENT YELLOW-GREEN SIGNS FOR PEDESTRIAN AND BICYCLE WARNING TO HELP KEEP PEDESTRIANS AND DRIVERS SAFE.
- (N) MID BLOCK CROSSWALKS SHOULD BE LOCATED AT LEAST 100 FEET FROM THE NEAREST SIDE STREET OR DRIVEWAY SO THAT DRIVERS TURNING ONTO THE MAJOR STREET HAVE A CHANCE TO NOTICE PEDESTRIANS AND PROPERLY YIELD TO PEDESTRIANS WHO ARE CROSSING THE STREET.
- (O) ADD CHANNELIZING DEVICES AT MID-BLOCK PEDESTRIAN CROSSINGS IN CONJUNCTION WITH IN STREET PEDESTRIAN CROSSING (R1-6 SERIES) SIGNS AS NEEDED.
- (P) PAYMENT 702-01, CONCRETE CURB, PER C.Y.,  
 702-03, CONCRETE COMBINED CURB AND GUTTER, PER C.Y.,  
 713-15.40, SIGN INSTALLATION (DESCRIPTION), PER L.S.,  
 716-02.03, PLASTIC PAVEMENT MARKING (CROSSWALK), PER L.F.,  
 716-02.04, PLASTIC PAVEMENT MARKING (CHANNELIZATION STRIPING), PER S.Y.,  
 716-02.05, PAVEMENT MARKING (STOP LINE), PER L.F.,  
 730-26.01, PEDESTRIAN SIGNAL DISPLAY, PER EACH.

**MINIMUM ADVANCE PLACEMENT OF PEDESTRIAN WARNING SIGNS**

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

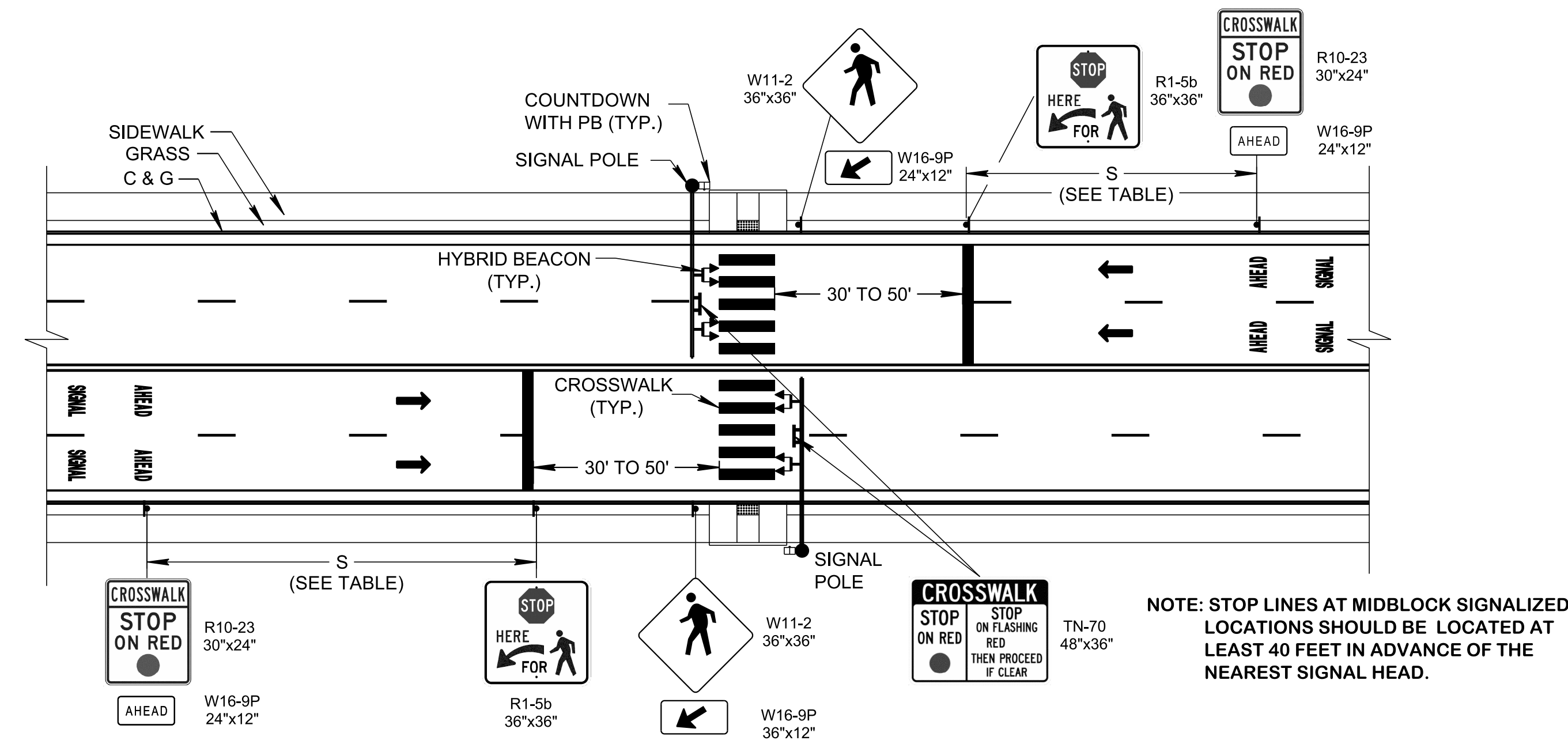
**THE APPROPRIATE TAPER LENGTH (L)**

$L = \frac{WS^2}{60}$	40 MPH OR LESS
$L = WS$	45 MPH OR MORE

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

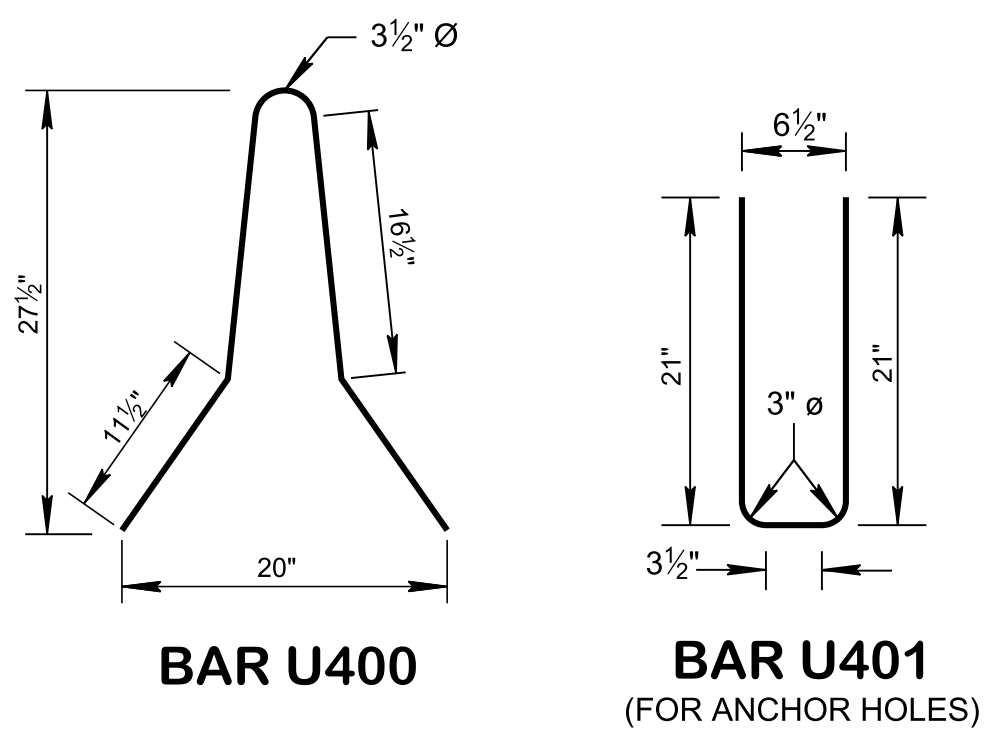
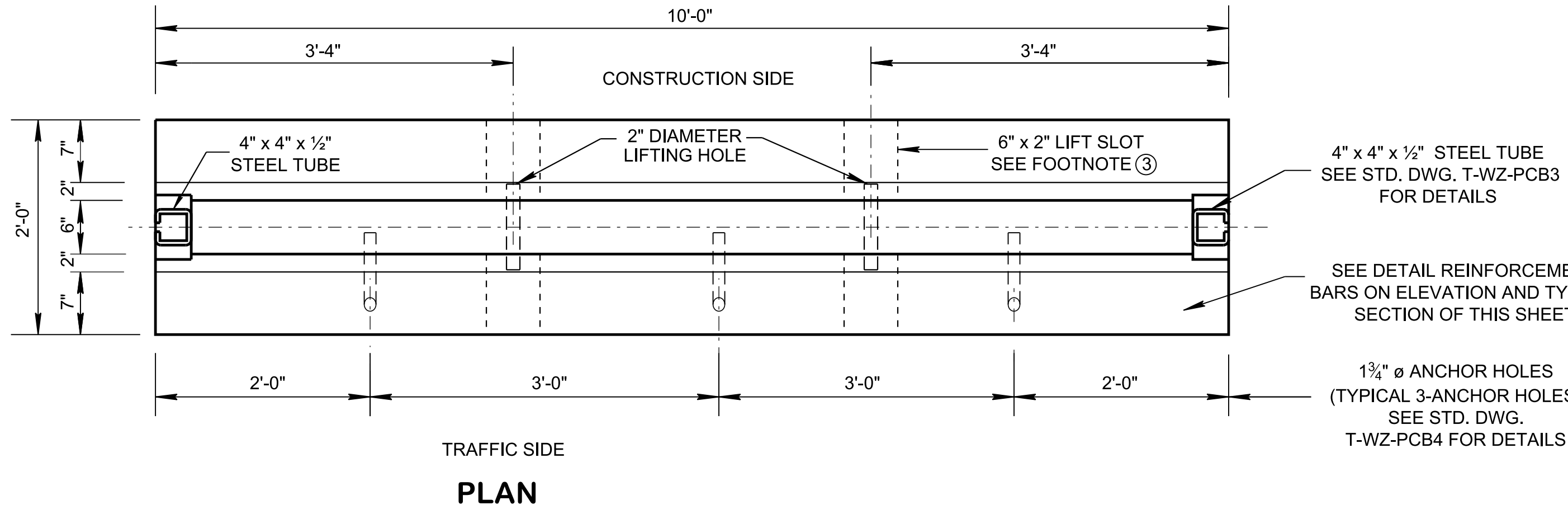
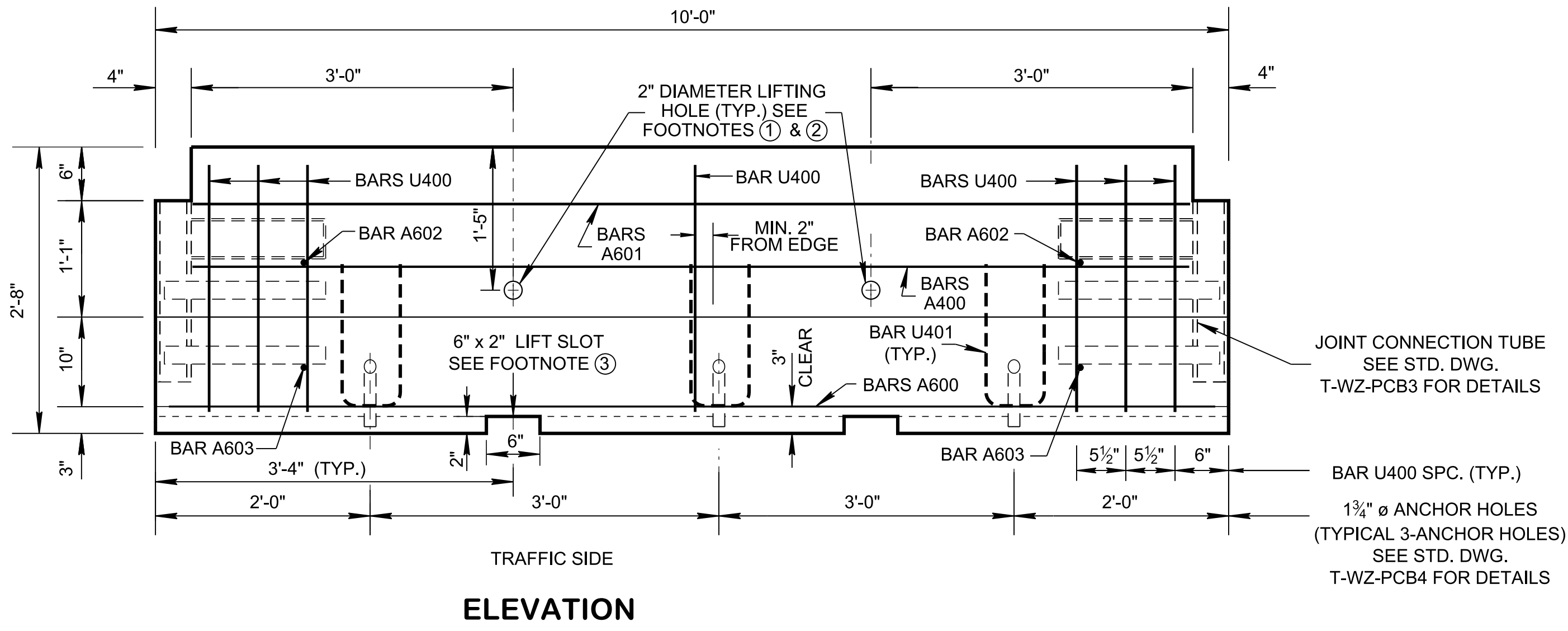
**LEGEND**

- PEDESTRIAN HYBRID BEACON
- GROUND MOUNT SIGN
- MAST ARM SIGNAL POLE
- COUNTDOWN PEDESTRIAN SIGNAL HEAD WITH PUSH BUTTON AND SIGN
- DETECTABLE WARNING SURFACE



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

NOTE: STOP LINES AT MIDBLOCK SIGNALIZED LOCATIONS SHOULD BE LOCATED AT LEAST 40 FEET IN ADVANCE OF THE NEAREST SIGNAL HEAD.



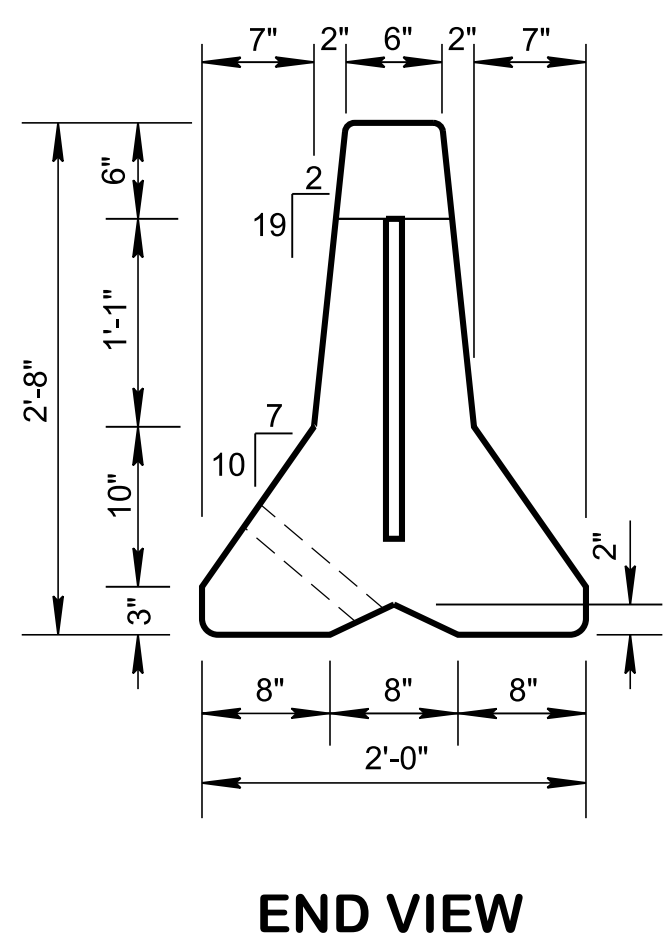
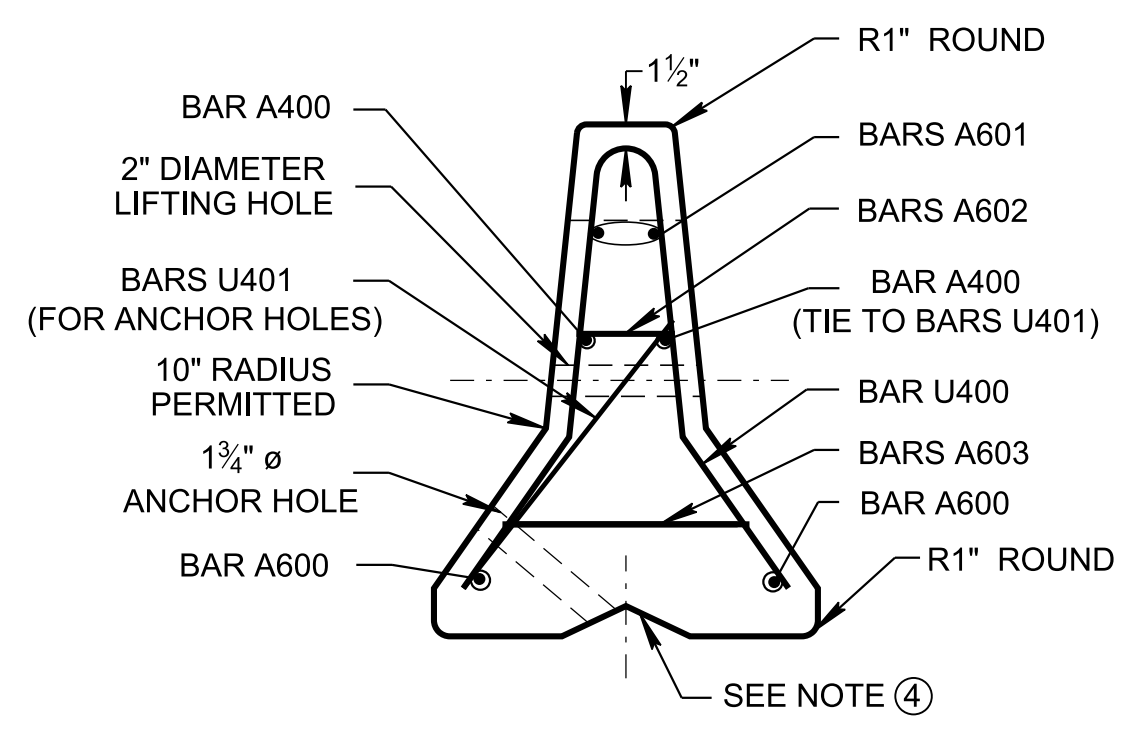
**VARIABLE**

**BARS A400, A600, A601, A602 AND A603**

(SEE TABLE FOR LENGTH)

BILL OF STEEL			
BAR TYPE	BAR SIZE	NUMBER REQUIRED	LENGTH
A600	6	2	9'-6"
A601	6	2	9'-0"
A602	6	2	0'-6"
A603	6	2	1'-2"
A400	4	2	9'-0"
U400	4	7	5'-1 1/2"
U401	4	3	4'-2"

APPROXIMATE WEIGHT AND QUANTITIES			
SECTION LENGTH (FT.)	WEIGHT (LB.)	REINFORCING STEEL (LB.)	CONCRETE (C. Y.)
10	4253	115	1.05



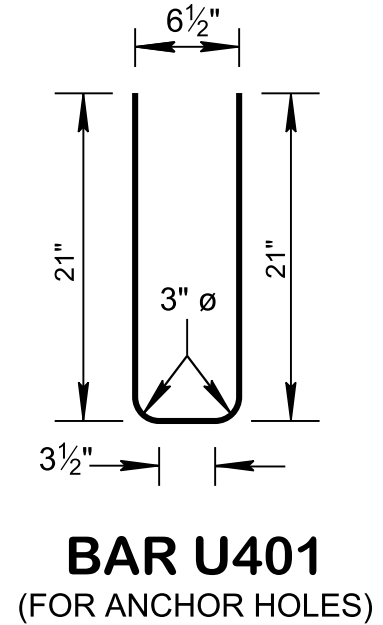
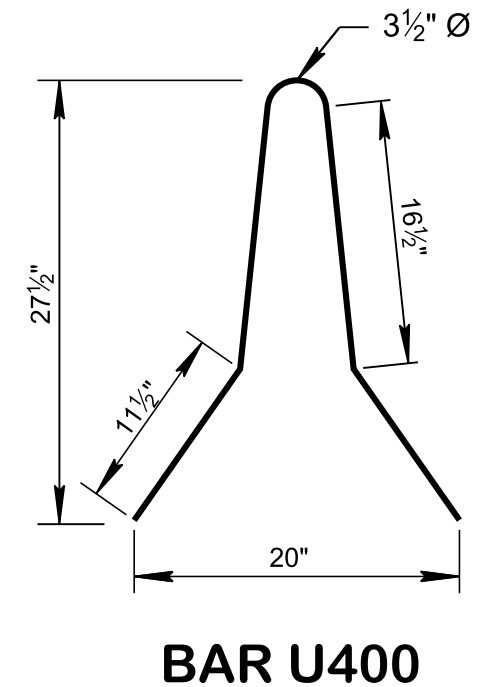
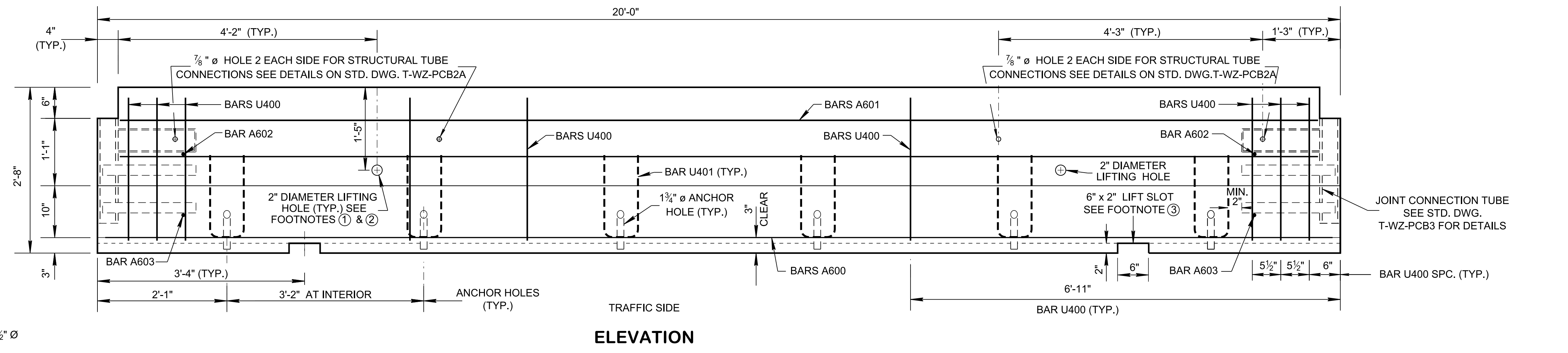
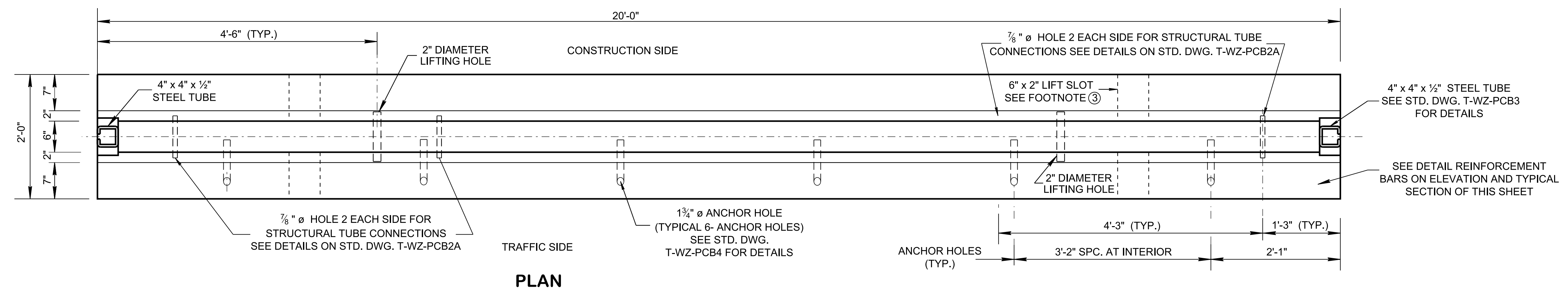
- LIFTING HOLE AND SLOT FOOTNOTES**
- (1) 2" DIAMETER LIFTING HOLE - 2 REQUIRED FOR EACH UNIT AND TO BE PLACED 3'-4" FROM EACH END OF THE 10 FOOT BARRIER WALL. LIFTING HOLES ARE TO BE FORMED WITH 2" PVC PIPE OR EQUAL.
  - (2) LIFTING BARS SHALL BE REQUIRED WHEN MOVING THE BARRIER WALLS TO PREVENT SPALLING OF CONCRETE AROUND HOLES.
  - (3) SIX INCH LIFT SLOTS PROVIDES DRAINAGE FOR THE PAVEMENT, THE OPENINGS SHALL NOT BE BLOCKED.
  - (4) AT THE DISCRETION OF THE FABRICATOR LIFTING DEVICES MAY BE USED AT THE BOTTOM OF BARRIER. THE LIFTING DEVICES SHALL NOT INTERFERE WITH THE PIN HOLE LOCATIONS.

- GENERAL NOTES**
- PRECAST PORTABLE CONCRETE BARRIER SHALL BE CONSTRUCTED WITH CLASS 'A' CONCRETE WITH A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI, AND MANUFACTURED IN ACCORDANCE WITH SECTION 604 OF THE STANDARD SPECIFICATIONS.
  - REINFORCING STEEL: TO BE ASTM A615. PLACE ALL STEEL REINFORCEMENT 1 1/2" MINIMUM FROM OUTSIDE FACE OF WALL, EXCEPT AS OTHERWISE SHOWN.
  - SEE STANDARD DRAWING T-WZ-PCB3 FOR CONNECTION KEY DETAILS.
  - THE 32 INCH TALL 10 FOOT LONG PORTABLE CONCRETE BARRIER RAIL HAS BEEN EVALUATED BY THE MIDWEST ROADSIDE SAFETY FACILITY AND MEET MASH TL-3 STANDARDS. THE EVALUATION OF THE PCB HAS BEEN DOCUMENTED IN REPORT NUMBER TRP-03-355-18
  - BASED ON SEGMENT LENGTH AND MAXIMUM JOINT ROTATION, 10 FEET PORTABLE CONCRETE BARRIER CANNOT BE INSTALLED ON RADIUS TIGHTER THAN 115 FEET.
  - FOR BARRIER TO PERFORM BOTH ENDS MUST BE ANCHORED. ANCHORING THE ENDS MAY BE ACCOMPLISHED BY ATTACHING A CRASH CUSHION OR USING ANCHOR PINS SEE STANDARD DRAWING T-WZ-PCB4.
  - A 3" x 4" DELINEATOR SHALL BE INSTALLED ON EACH BARRIER WALL. SEE STANDARD DRAWING T-WZ-PBR2.
  - AFTER A BARRIER UNIT HAS BEEN PLACED AND ALL THE CONNECTION KEYS HAVE BEEN INSERTED, REMOVE ANY SLACK IN THE JOINT BY PULLING THE UNIT IN A DIRECTION PARALLEL TO IT'S LONGITUDINAL AXIS.
  - ANY SALVABLE VALUE OF THE PORTABLE CONCRETE BARRIER RAIL WILL BECOME THE PROPERTY OF THE CONTRACTOR. UPON COMPLETION OF THE PROJECT, THE FREE STANDING PORTABLE CONCRETE BARRIER RAIL SHALL BE REMOVED FROM THE PROJECT SITE.
  - PAYMENT: PAYMENT FOR CONNECTION KEY, JOINT ASSEMBLY STEEL TUBE, PLATES, ANCHOR PINS AND OTHER HARDWARE MATERIALS WILL BE INCLUDED IN THE UNIT PRICE OF PORTABLE BARRIER RAIL ITEM NUMBER: 712-02.10, PORTABLE BARRIER RAIL (MASH TL-3), PER L.F.

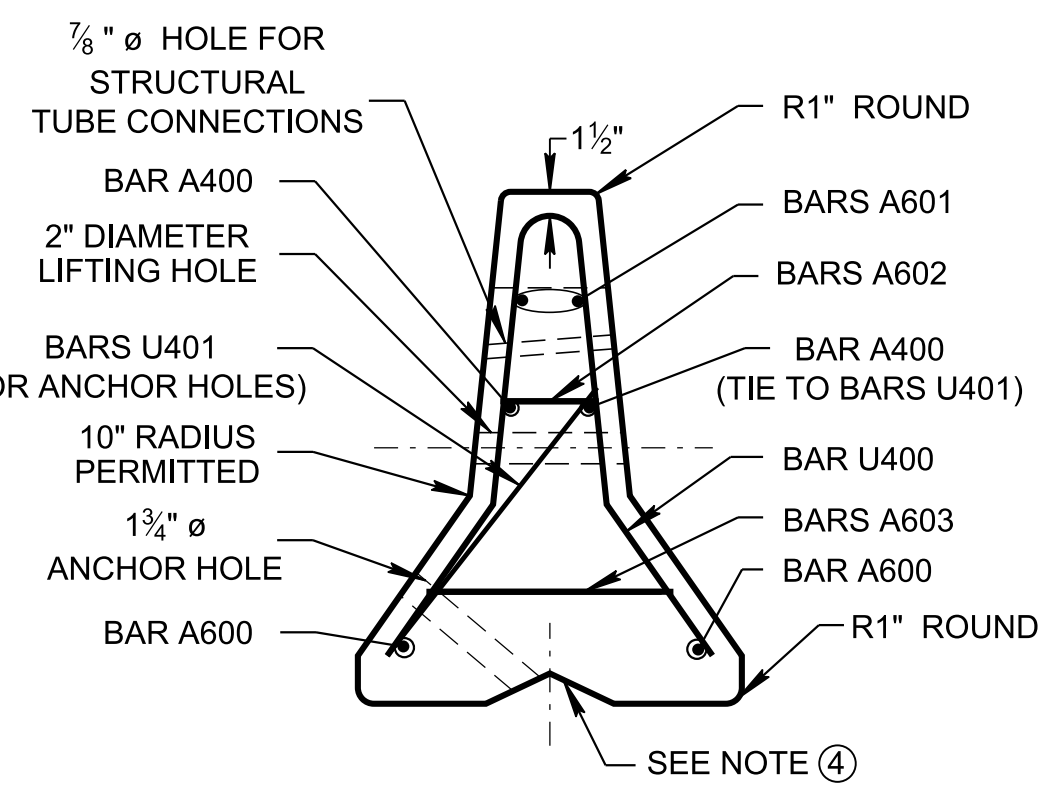
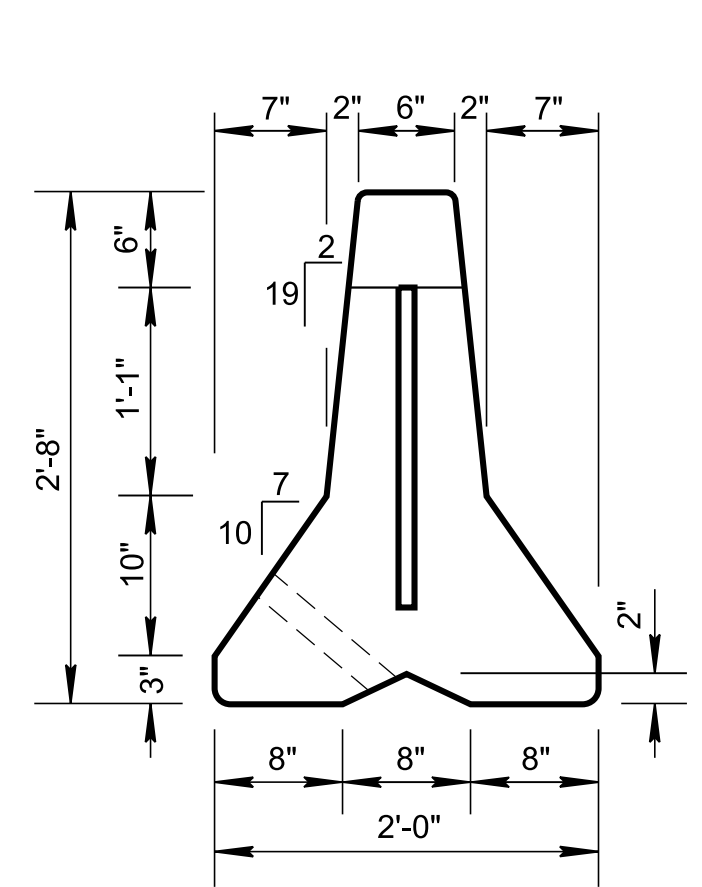
STATE OF TENNESSEE  
STANDARD DRAWING  
DEPARTMENT OF TRANSPORTATION

10 FOOT PORTABLE CONCRETE BARRIER RAIL





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



APPROXIMATE WEIGHT AND QUANTITIES			
SECTION LENGTH (FT.)	WEIGHT (LB.)	REINFORCING STEEL (LB.)	CONCRETE (C. Y.)
20	8505	209	2.1

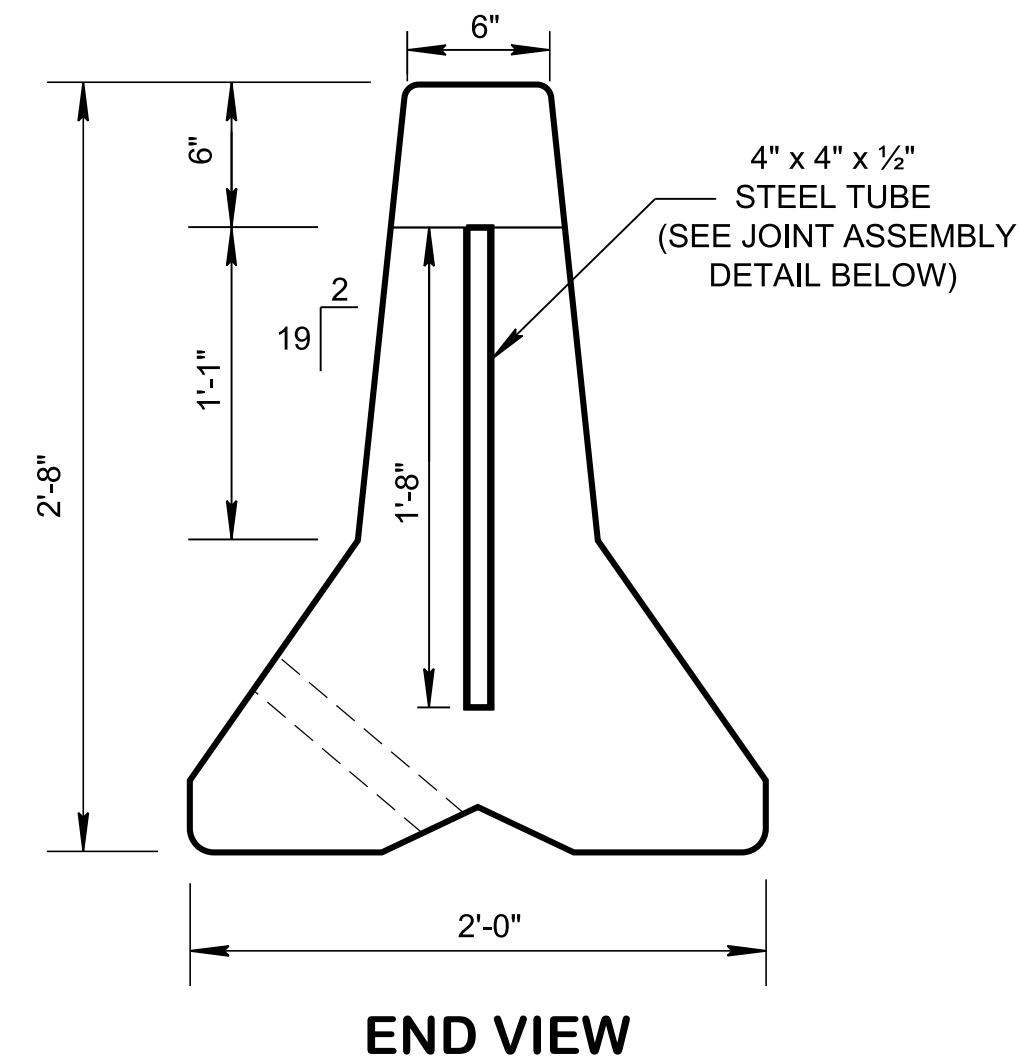
BILL OF STEEL			
BAR TYPE	BAR SIZE	NUMBER REQUIRED	LENGTH
A600	6	2	19'-6"
A601	6	2	19'-0"
A602	6	2	0'-6"
A603	6	2	1'-2"
A400	4	2	19'-0"
U400	4	8	5'-1 1/2"
U401	4	6	4'-2"

- LIFTING HOLE AND SLOT FOOTNOTES**
- 2" DIAMETER LIFTING HOLE - 2 REQUIRED FOR EACH UNIT AND TO BE PLACED 4'-6" FROM EACH END OF THE 20 FOOT BARRIER WALL. ADDITIONAL HOLES MAY BE ADDED AT THE DISCRETION OF THE FABRICATOR. LIFTING HOLES ARE TO BE FORMED WITH 2" PVC PIPE OR EQUAL.
  - LIFTING BARS SHALL BE REQUIRED WHEN MOVING THE BARRIER WALLS TO PREVENT SPALLING OF CONCRETE AROUND HOLES.
  - SIX INCH LIFT SLOTS PROVIDES DRAINAGE FOR THE PAVEMENT, THE OPENINGS SHALL NOT BE BLOCKED.
  - AT THE DISCRETION OF THE FABRICATOR LIFTING DEVICES MAY BE USED AT THE BOTTOM OF BARRIER. THE LIFTING DEVICES SHALL NOT INTERFERE WITH THE PIN HOLE LOCATIONS.

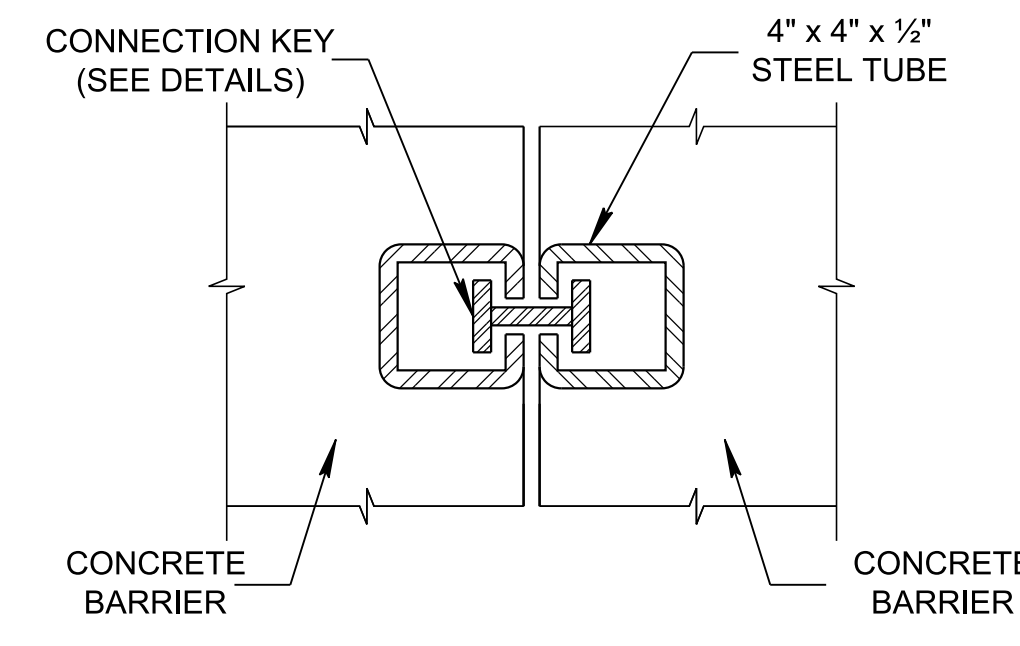
- GENERAL NOTES**
- PRECAST PORTABLE CONCRETE BARRIER RAIL SHALL BE CONSTRUCTED WITH CLASS 'A' CONCRETE WITH A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI, AND MANUFACTURED IN ACCORDANCE WITH SECTION 604 OF THE STANDARD SPECIFICATIONS.
  - REINFORCING STEEL: TO BE ASTM A615. PLACE ALL STEEL REINFORCEMENT 1 1/2" MINIMUM FROM OUTSIDE FACE OF WALL, EXCEPT AS OTHERWISE SHOWN.
  - SEE STANDARD DRAWING T-WZ-PCB3 FOR CONNECTION KEY DETAILS.
  - THE 32 INCH TALL 20 FOOT LONG PORTABLE CONCRETE BARRIER RAIL HAS BEEN EVALUATED BY THE MIDWEST ROADSIDE SAFETY FACILITY AND MEET MASH TL-3 STANDARDS. THE EVALUATION OF THE PCB HAS BEEN DOCUMENTED IN REPORT NUMBER TRP-03-355-18. THE FREE STANDING PORTABLE CONCRETE BARRIER RAIL SYSTEM HAS A DYNAMIC DEFLECTION OF 38.1". THE DESIGNER SHOULD CONSIDER PLACING THE PCB SO THAT THERE IS ENOUGH SPACE BETWEEN THE WORK SPACE AND THE PCB FOR A 3 FOOT DYNAMIC DEFLECTION.
  - LOCATIONS WHERE PERMANENT DEFLECTION BETWEEN THE BARRIER AND WORK SPACE IS NOT AVAILABLE, BOX BEAM STIFFENER TUBE OR DROP ANCHOR PINS SHALL BE USED TO REDUCE DEFLECTION.
  - BASED ON SEGMENT LENGTH AND MAXIMUM JOINT ROTATION, THE 20 FEET PORTABLE CONCRETE BARRIER CANNOT BE INSTALLED ON RADIUS TIGHTER THAN 230 FEET.
  - FOR BARRIER TO PERFORM BOTH ENDS MUST BE ANCHORED. ANCHORING THE ENDS MAY BE ACCOMPLISHED BY ATTACHING A CRASH CUSHION OR USING ANCHOR PINS SEE STANDARD DRAWING T-WZ-PCB4.
  - A 3" x 4" DELINEATOR SHALL BE INSTALLED ON EACH BARRIER WALL. SEE STANDARD DRAWING T-WZ-PBR2.
  - AFTER A BARRIER UNIT HAS BEEN PLACED AND ALL THE CONNECTION KEYS HAVE BEEN INSERTED, REMOVE ANY SLACK IN THE JOINT BY PULLING THE UNIT IN A DIRECTION PARALLEL TO IT'S LONGITUDINAL AXIS.
  - ANY SALVABLE VALUE OF THE PORTABLE CONCRETE BARRIER RAIL WILL BECOME THE PROPERTY OF THE CONTRACTOR. UPON COMPLETION OF THE PROJECT, THE FREE STANDING PORTABLE CONCRETE BARRIER RAIL SHALL BE REMOVED FROM THE PROJECT SITE.
  - PAYMENT:  
 PAYMENT FOR CONNECTION KEY, JOINT ASSEMBLY STEEL TUBE, PLATES, ANCHOR PINS AND OTHER HARDWARE MATERIALS WILL BE INCLUDED IN THE UNIT PRICE OF PORTABLE BARRIER RAIL ITEM NUMBER:  
 712-02.10, PORTABLE BARRIER RAIL (MASH TL-3), PER L.F.

STATE OF TENNESSEE  
 STANDARD DRAWING  
 DEPARTMENT OF TRANSPORTATION  
**20 FOOT PORTABLE CONCRETE BARRIER RAIL**

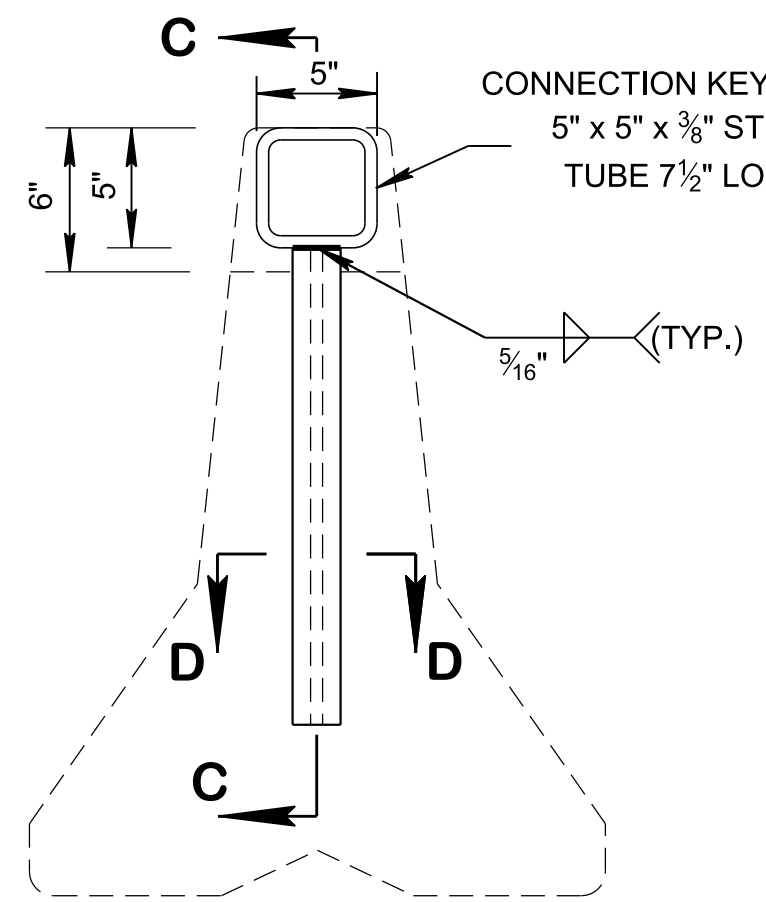
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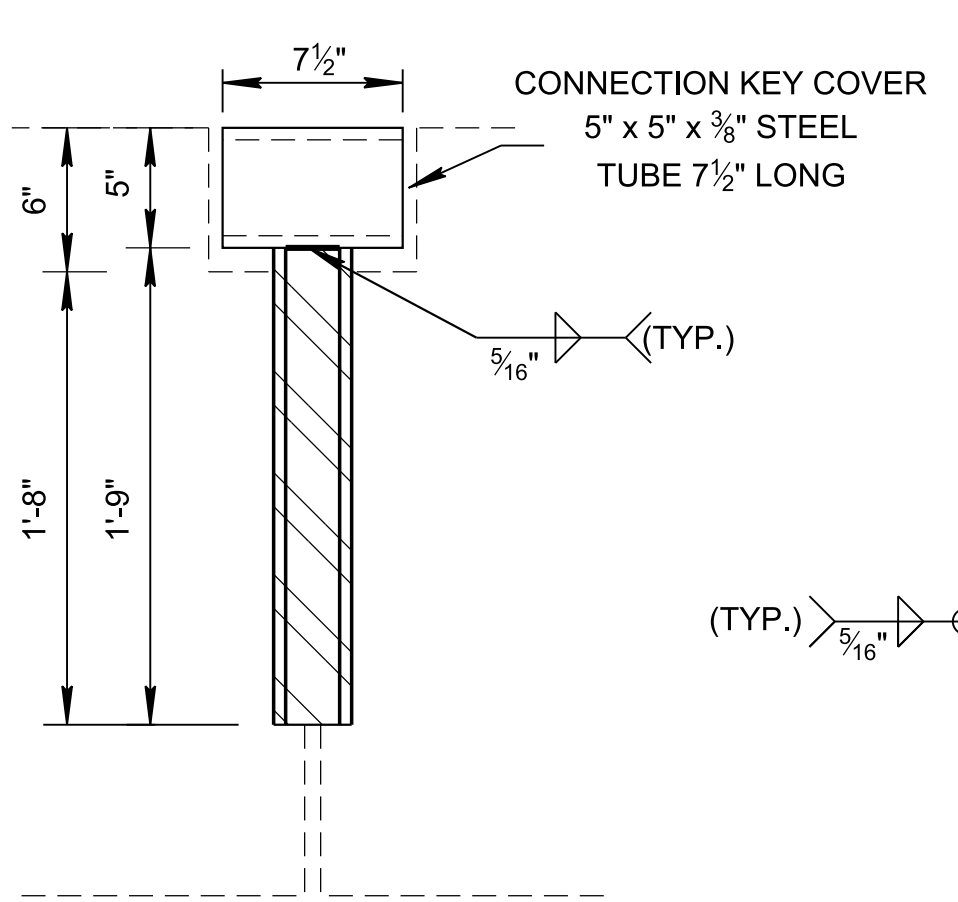
END VIEW



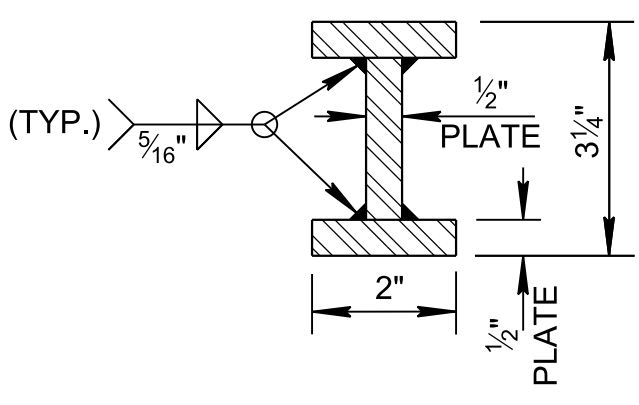
PLAN OF CONNECTION KEY DETAIL



CONNECTION KEY VIEW

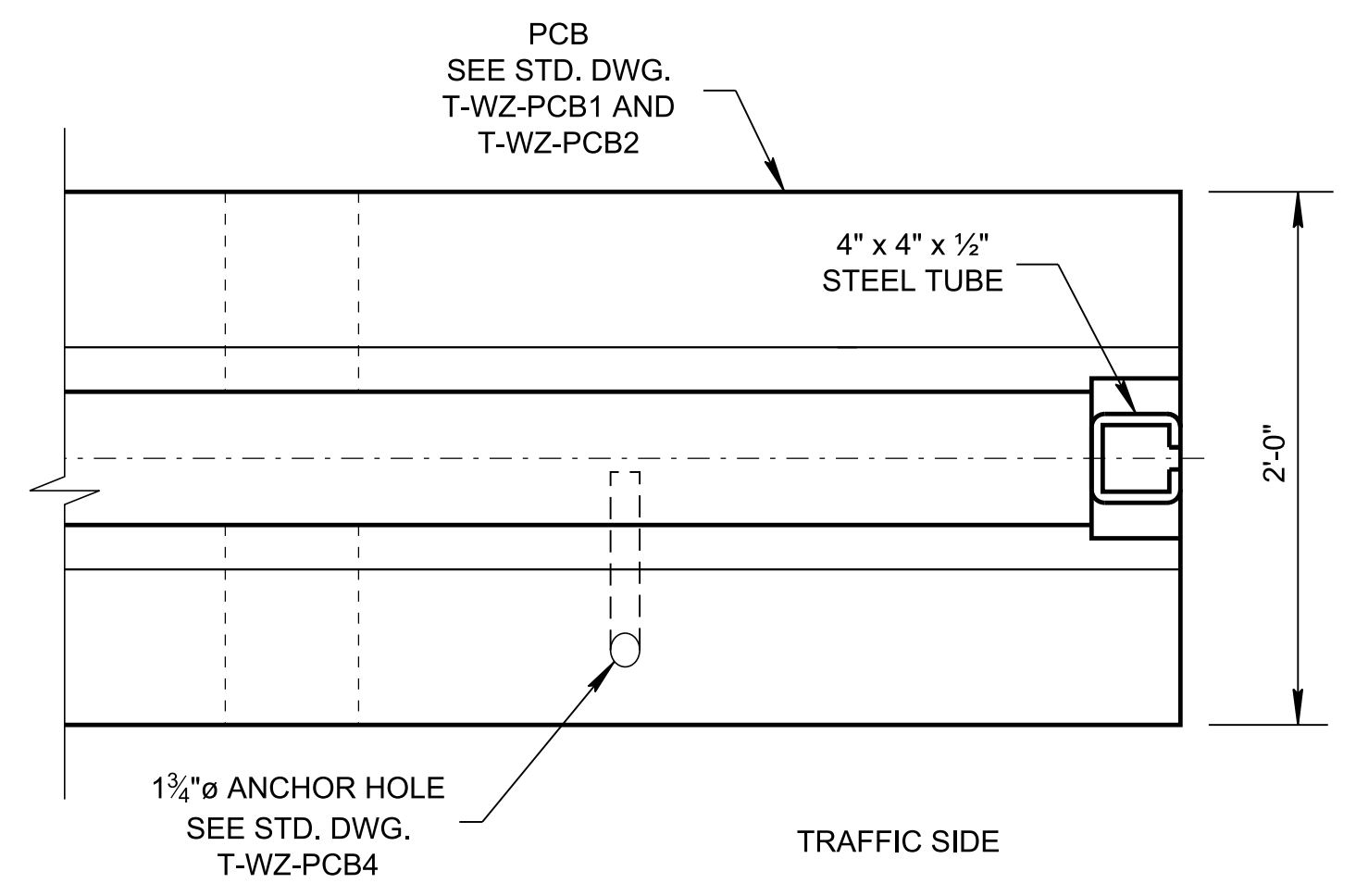


SECTION C - C

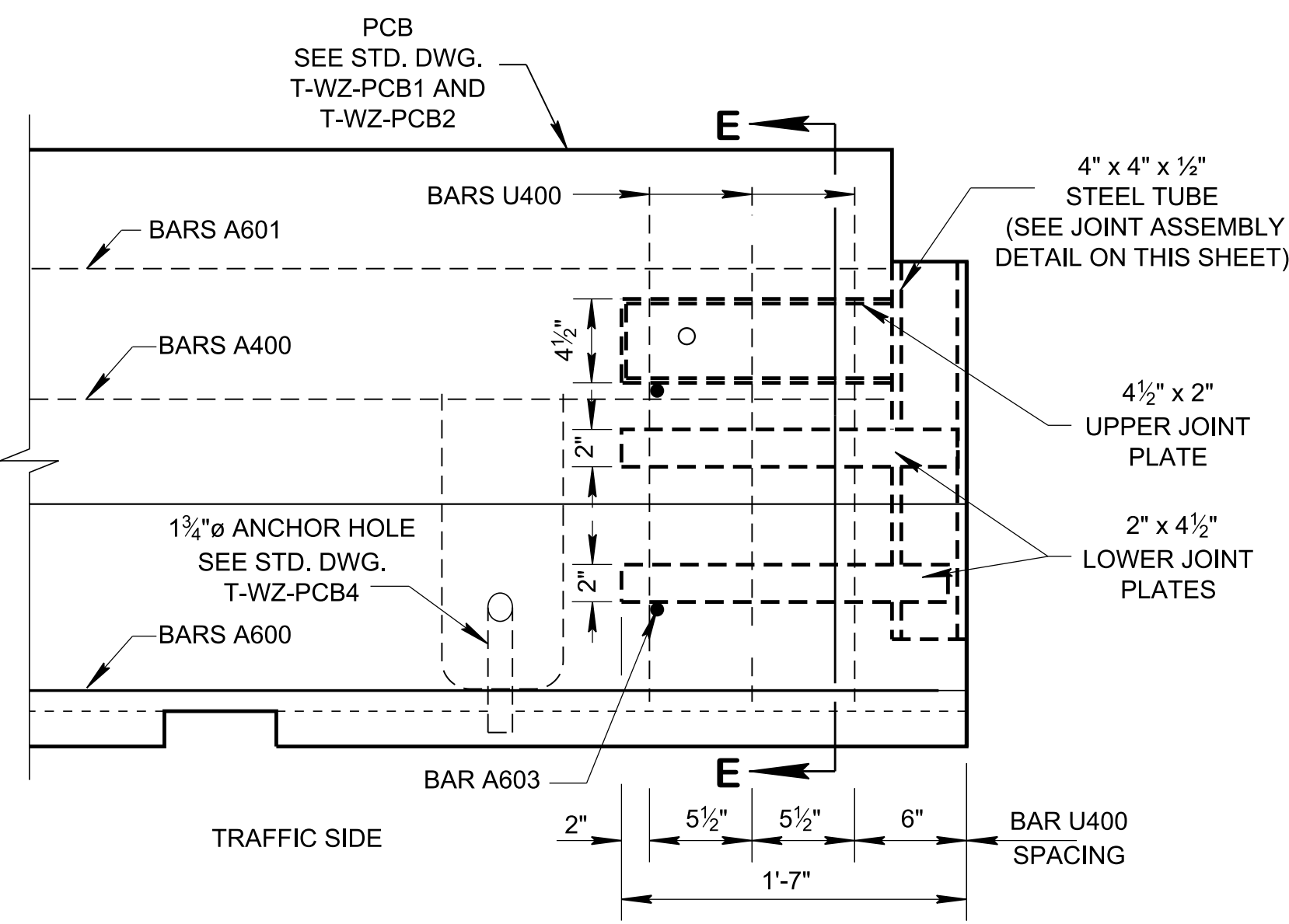


SECTION D - D

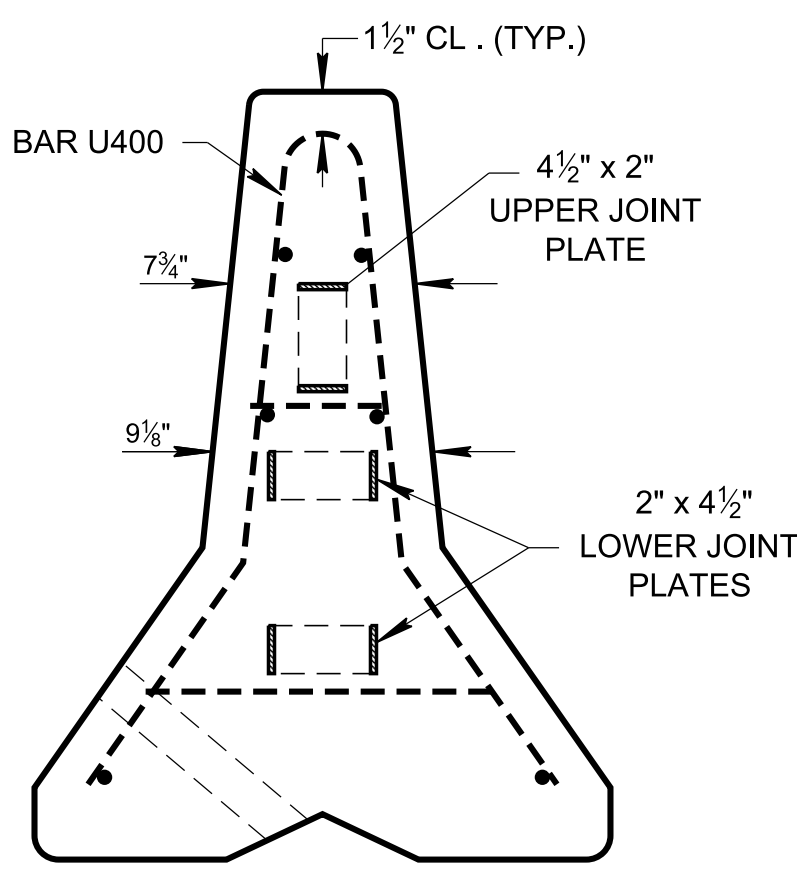
CONNECTION KEY DETAILS



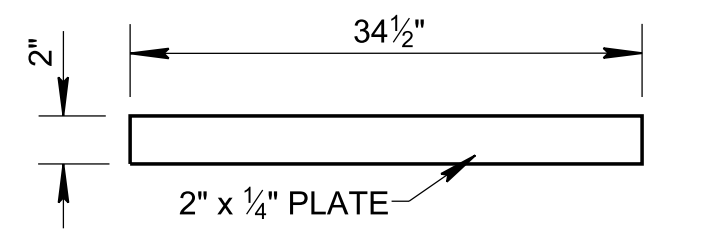
END PLAN VIEW



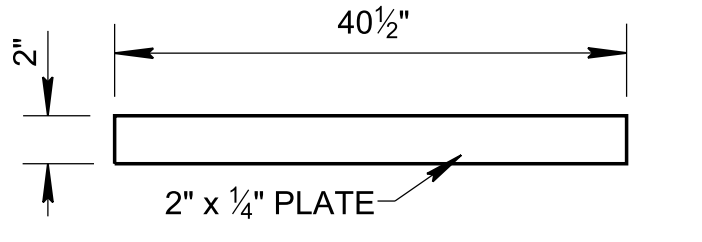
END ELEVATION VIEW



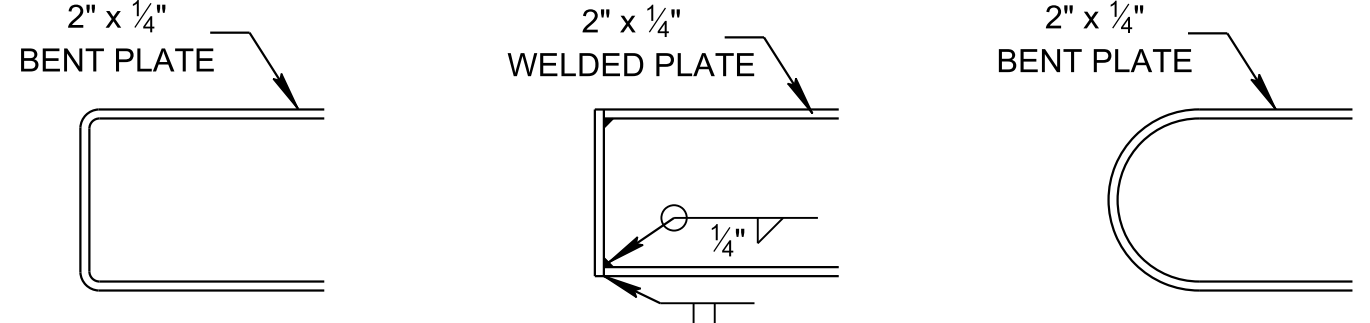
SECTION E - E



UPPER JOINT PLATE SIZE

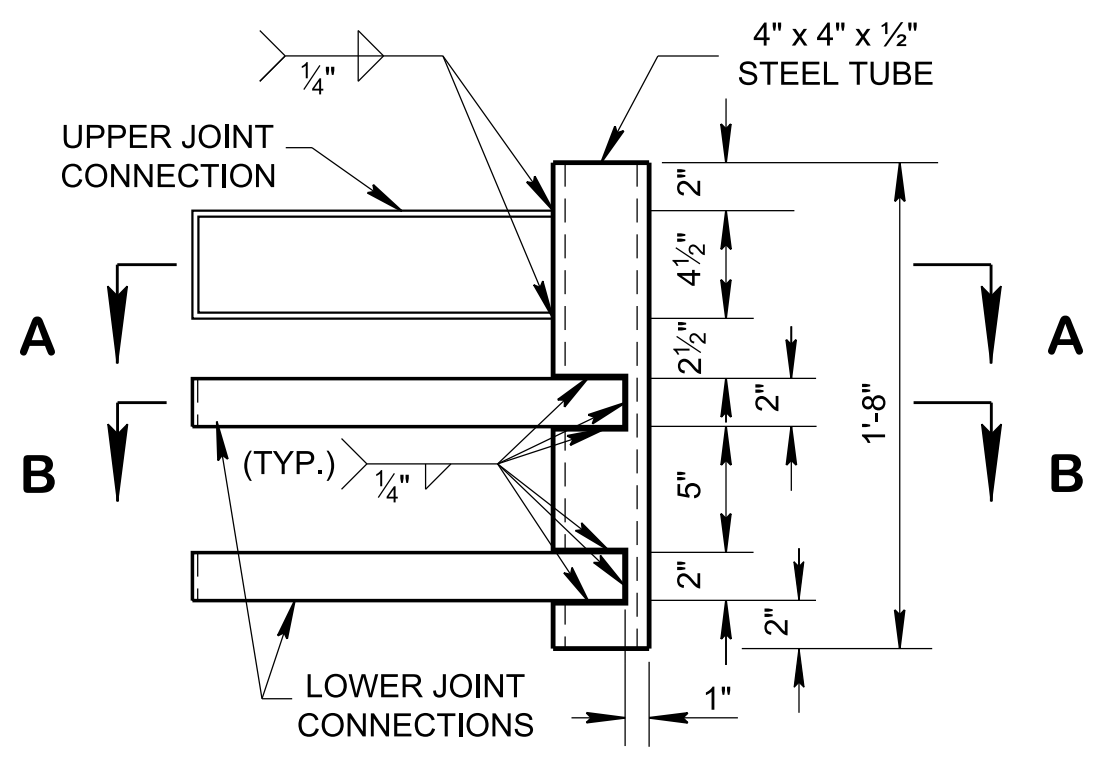


LOWER JOINT PLATE SIZE

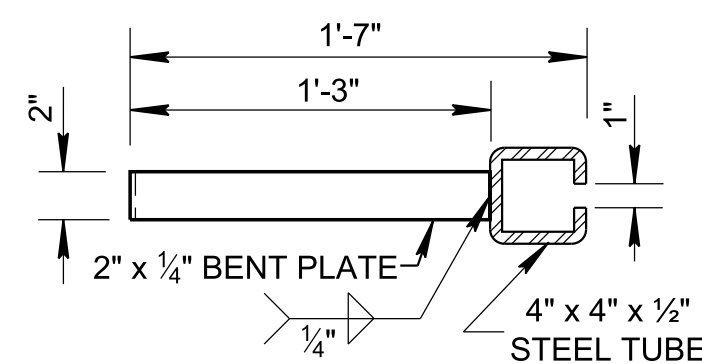


ALTERNATIVE DETAILS

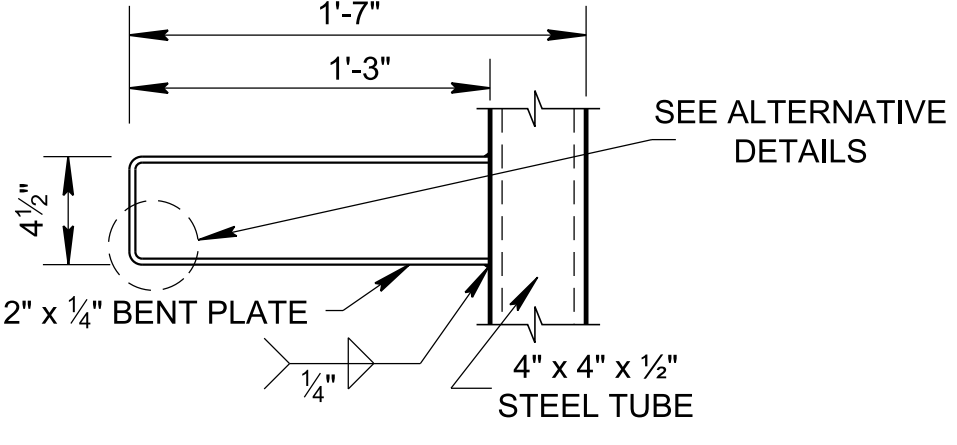
NOTE: MANUFACTURERS MAY USE ROUND BENT PLATES DURING MANUFACTURING OF UPPER AND LOWER JOINT CONNECTIONS.



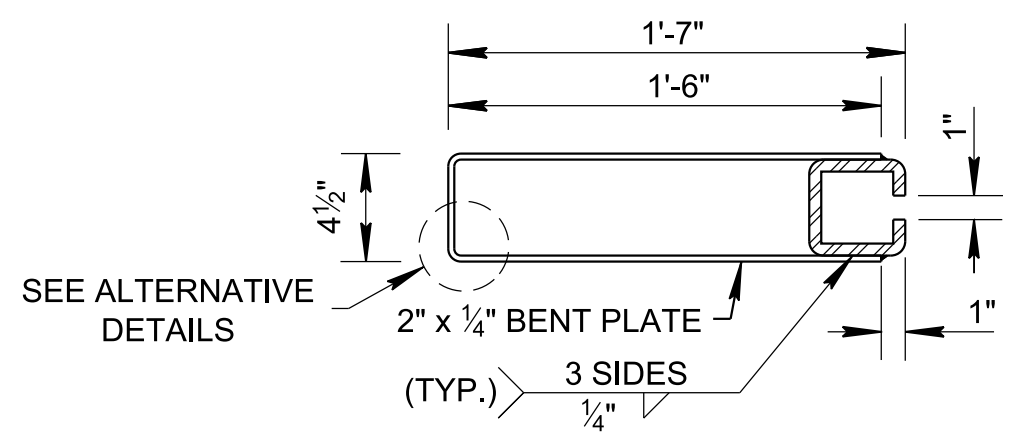
JOINT ASSEMBLY DETAIL



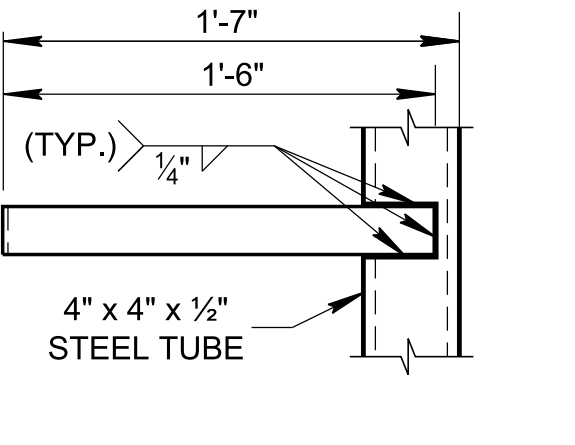
SECTION A - A



ELEVATION UPPER JOINT CONNECTION



SECTION B - B



ELEVATION LOWER JOINT CONNECTION

**GENERAL NOTES**

- (A) SEE STANDARD DRAWINGS T-WZ-PCB1 AND T-WZ-PCB2 FOR PORTABLE CONCRETE BARRIER RAILS.
- (B) THE CONNECTION KEY AND STEEL PLATES SHALL CONFORM TO ASTM A36. THE STEEL TUBE SHALL CONFORM TO ASTM A500 GRADE B. ALL THE STEEL PLATES FOR THE CONNECTION KEY ASSEMBLY, THE TRANSITION KEY ASSEMBLY AND THE STEEL TUBES SHALL BE GALVANIZED. ALL CUTTING, DRILLING, AND WELDING OF STEEL COMPONENTS SHALL BE DONE BEFORE BEING GALVANIZED.
- (C) ALL WELDING SHALL BE PERFORMED BY A WELDER QUALIFIED IN ACCORDANCE WITH SECTION 602 OF THE STANDARD SPECIFICATIONS.
- (D) CONNECTION KEY COVER TUBE SHALL BE INSTALLED FLUSH WITH THE BARRIER TOP.
- (E) SEE STANDARD DRAWING T-WZ-PCB4 FOR ANCHOR PIN DETAILS.
- (F) PAYMENT FOR CONNECTION KEY, JOINT ASSEMBLY STEEL TUBE AND PLATES WILL BE INCLUDED IN THE UNIT PRICE OF PORTABLE BARRIER RAIL ITEM NUMBER.
- (G) THE DIMENSIONS SHALL BE AS SHOWN ON THE DRAWING WITHIN MANUFACTURING TOLERANCE OF +/- 1/8 INCH BUT NOT TO EXCEED 1/4 INCH.

REV. 03-04-2021: REVISED CONNECTION KEY DETAILS AND REVISED GENERAL NOTES (B) AND (C). ADDED GENERAL NOTE (G).

REV. 10-29-2021: ADDED ALTERNATIVE DETAIL FOR UPPER AND LOWER JOINT CONNECTIONS.

REV. 01-28-2022: ADDED REBARS AND REBARS SPACING DIMENSIONS ON END ELEVATION VIEW. NEW SECTION E-E WAS ADDED TO SHOW THE LOWER AND UPPER JOINTS VIEW. ADDED BENT AND WELDED PLATES ALTERNATIVE DETAILS WITH NOTE.

STATE OF TENNESSEE  
STANDARD DRAWING  
DEPARTMENT OF TRANSPORTATION

PORTABLE CONCRETE BARRIER RAIL DETAILS