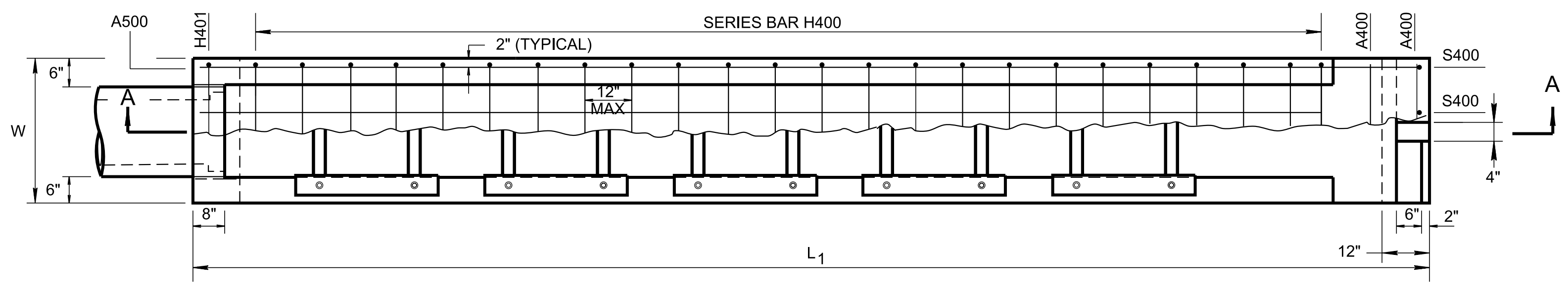
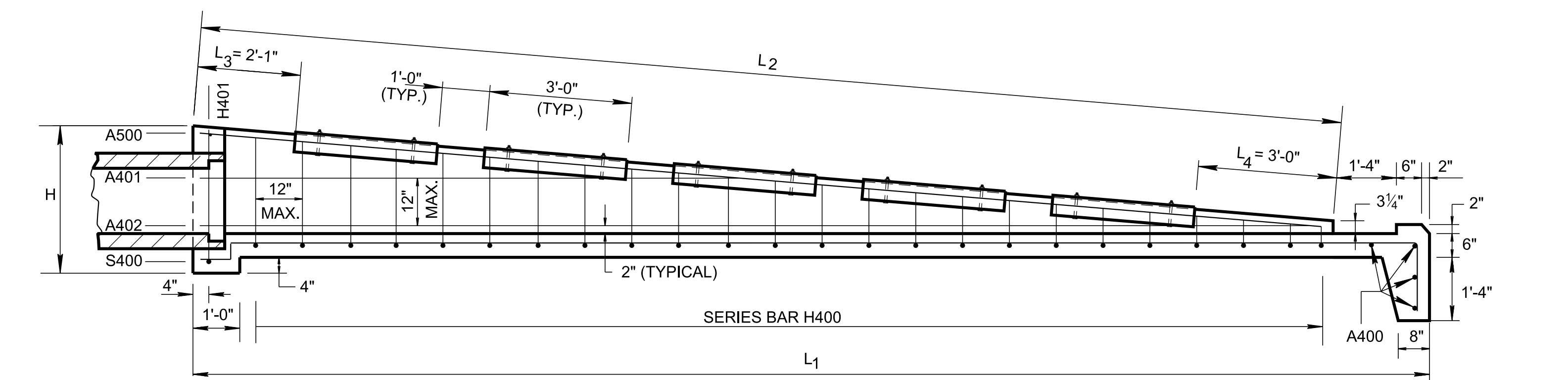


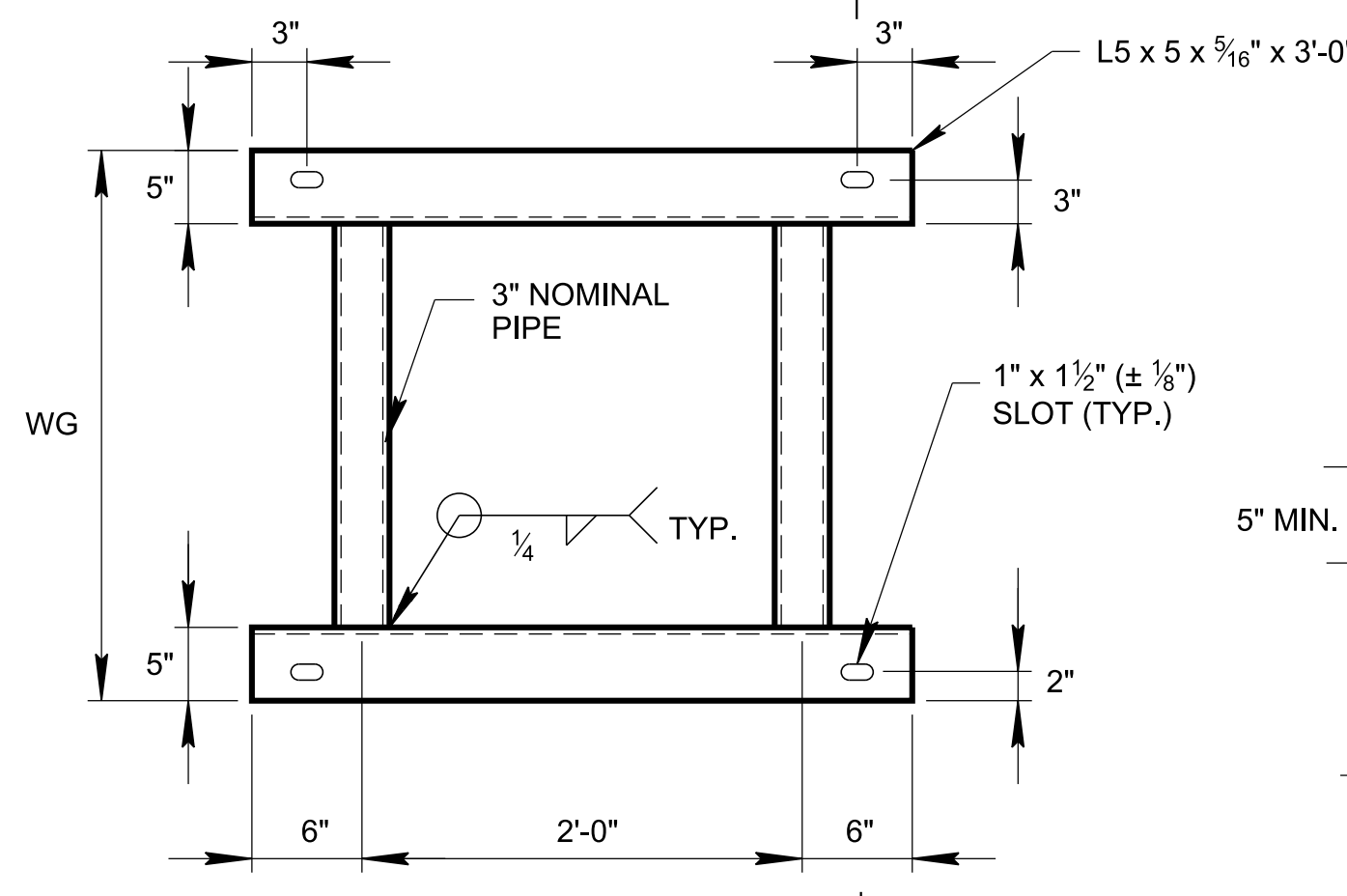
7/5/2023 2:36:48 PM P:\StandDraw\DESIGN STANDARDS\Standards Drawings\Standard Roadway Drawings - CURRENT\In Progress\10-101.00 Pipe Culverts and Endwalls IP\101.03 Safety Side Drain Endwalls IP\DSEW12D-2-



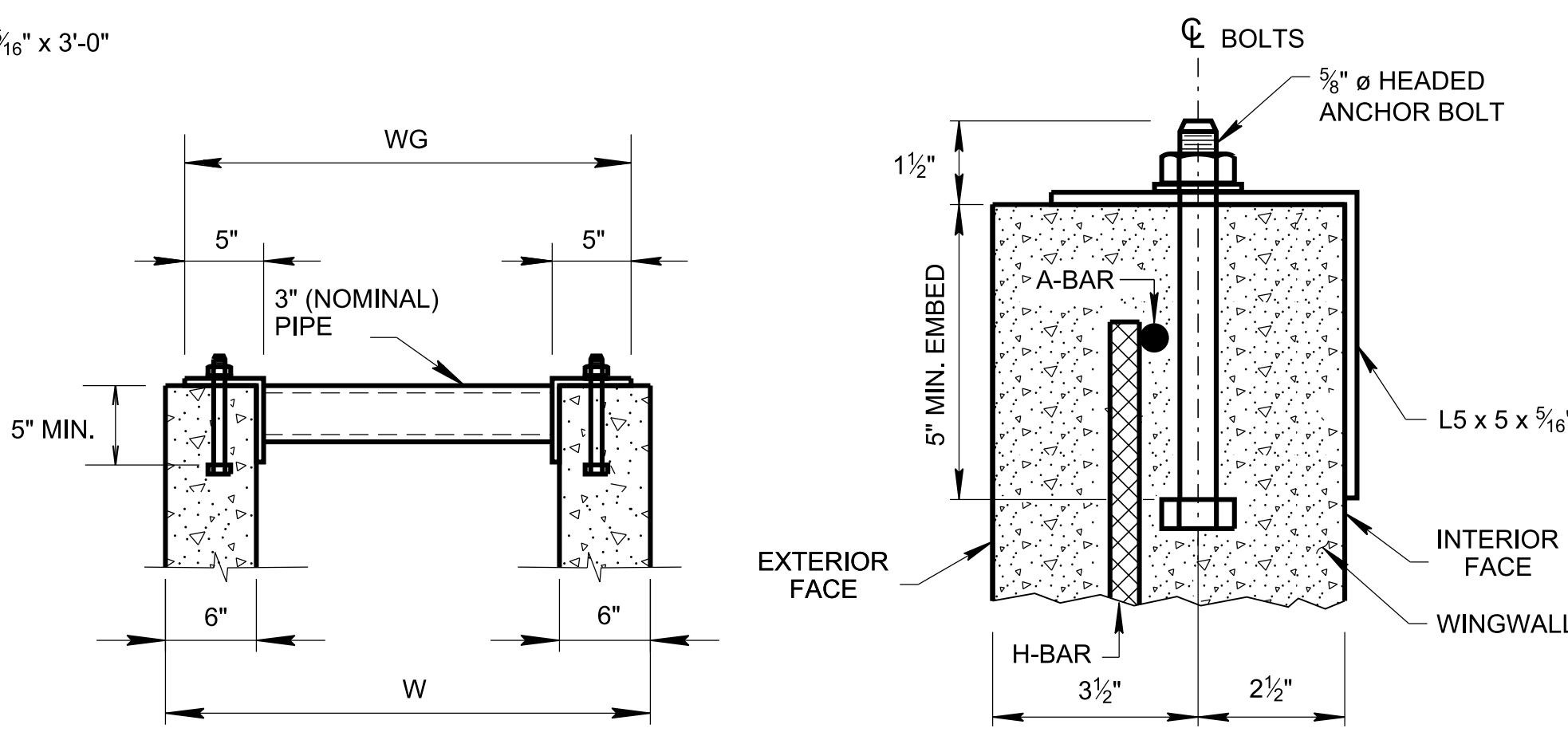
PLAN



SECTION A-A

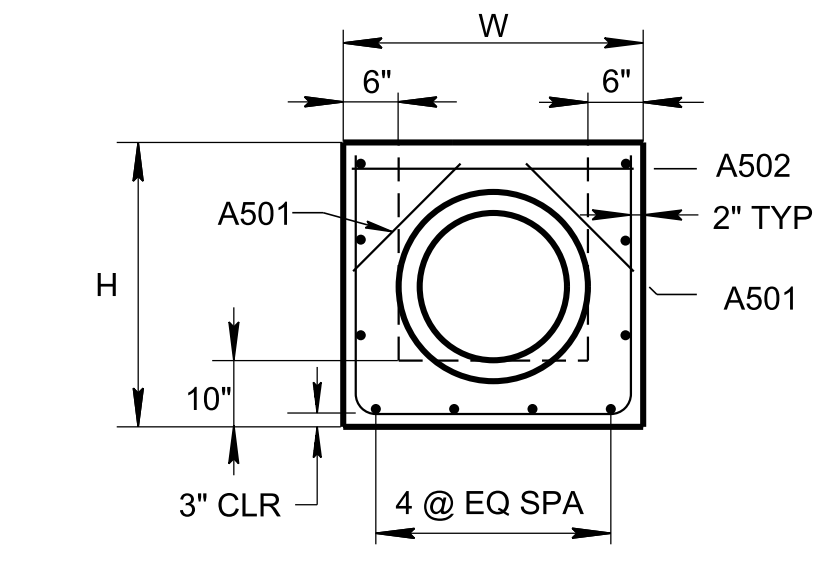


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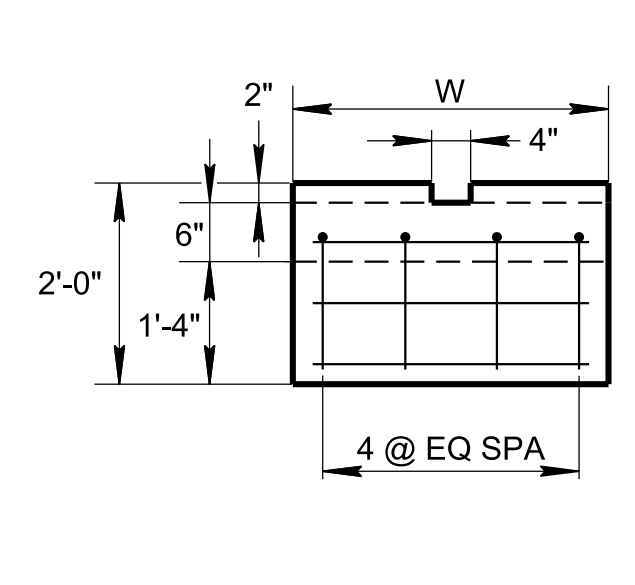


SECTION B-B SHOWING ANCHOR BOLTS AND PARTIAL WINGWALLS

ANCHOR BOLT ASSEMBLY



HEADWALL ELEVATION



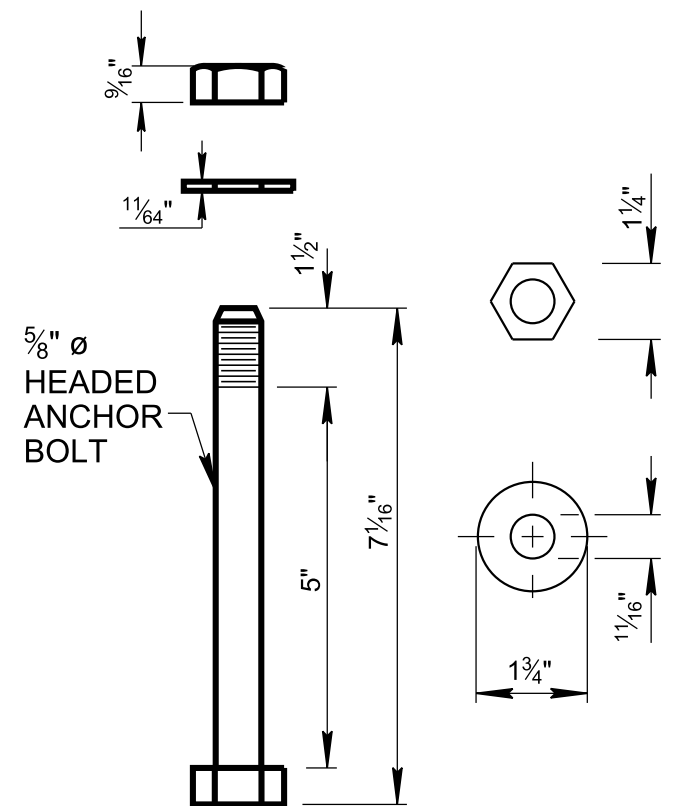
TOEWALL ELEVATION

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

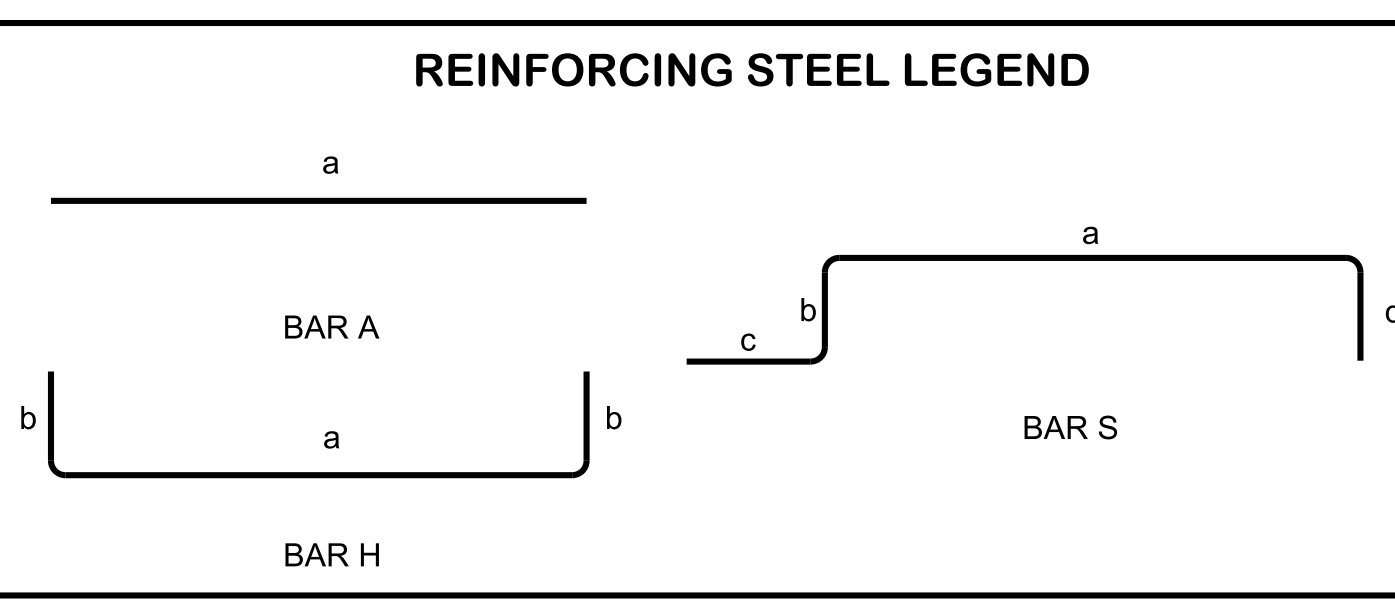
**ALTERNATE ANCHORS FOR STRUCTURAL STEEL GRATES**

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

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



ANCHOR BOLT DETAIL



REINFORCING STEEL CODE

TYPE	SIZE	SERIES
A	5	06

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

BAR TYPE	LOCATION	18" PIPE					
		BENDING DIMENSIONS				NO. REQD	LENGTH
		a	b	c	d		
A400	TOEWALL	2'-9"	—	—	—	4	2'-9"
A401	WINGWALLS	10'-0 1/2"	—	—	—	2	10'-0 1/2"
A402	WINGWALLS	23'-6"	—	—	—	2	23'-6"
A500	WINGWALLS	23'-8"	—	—	—	2	23'-8"
A501	HEADWALL	1'-8 5/8"	—	—	—	2	1'-8 5/8"
A502	HEADWALL	2'-9"	—	—	—	1	2'-9"
H400	BOTTOM SLAB AND WINGWALL	2'-9"	*	—	—	1	102'-11"
		* DIMENSION "b" VARIES FROM 2'-2 1/8" TO 0'-4 7/8" IN INCREMENTS OF 0'-1" (23 BARS)					
H401	BOTTOM SLAB AND HEADWALL	2'-9"	2'-7 7/8"	—	—	1	8'-0 3/4"
S400	BOTTOM SLAB AND TOEWALL	25'-2"	0'-4 1/2"	0'-6"	1'-4"	4	27'-4 1/2"

**GENERAL NOTES**

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

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

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

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

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

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

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

(F) PAYMENT WILL BE MADE UNDER:

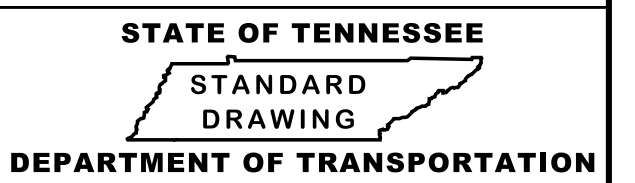
611-07.73 18IN ENDWALL (MEDIAN DRAIN) EACH.

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

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

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

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED



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