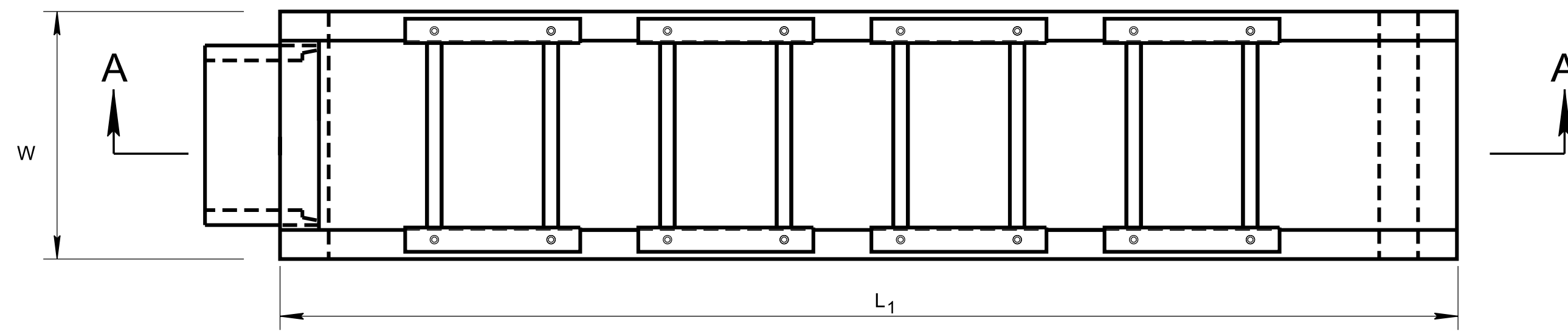
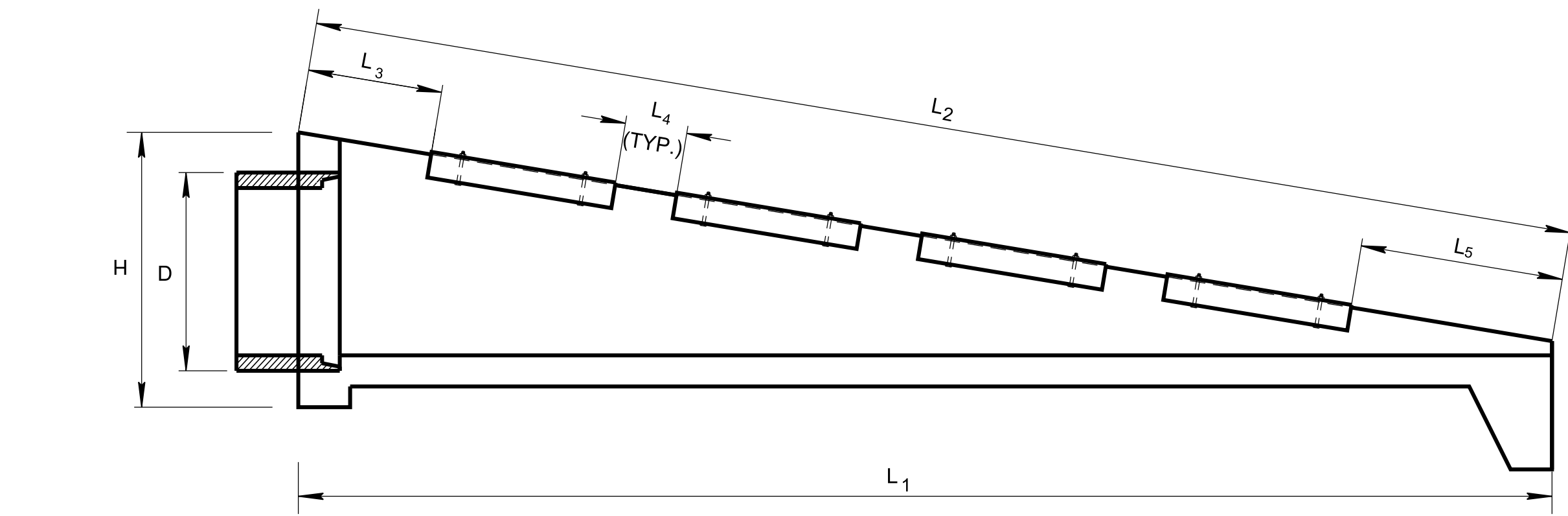


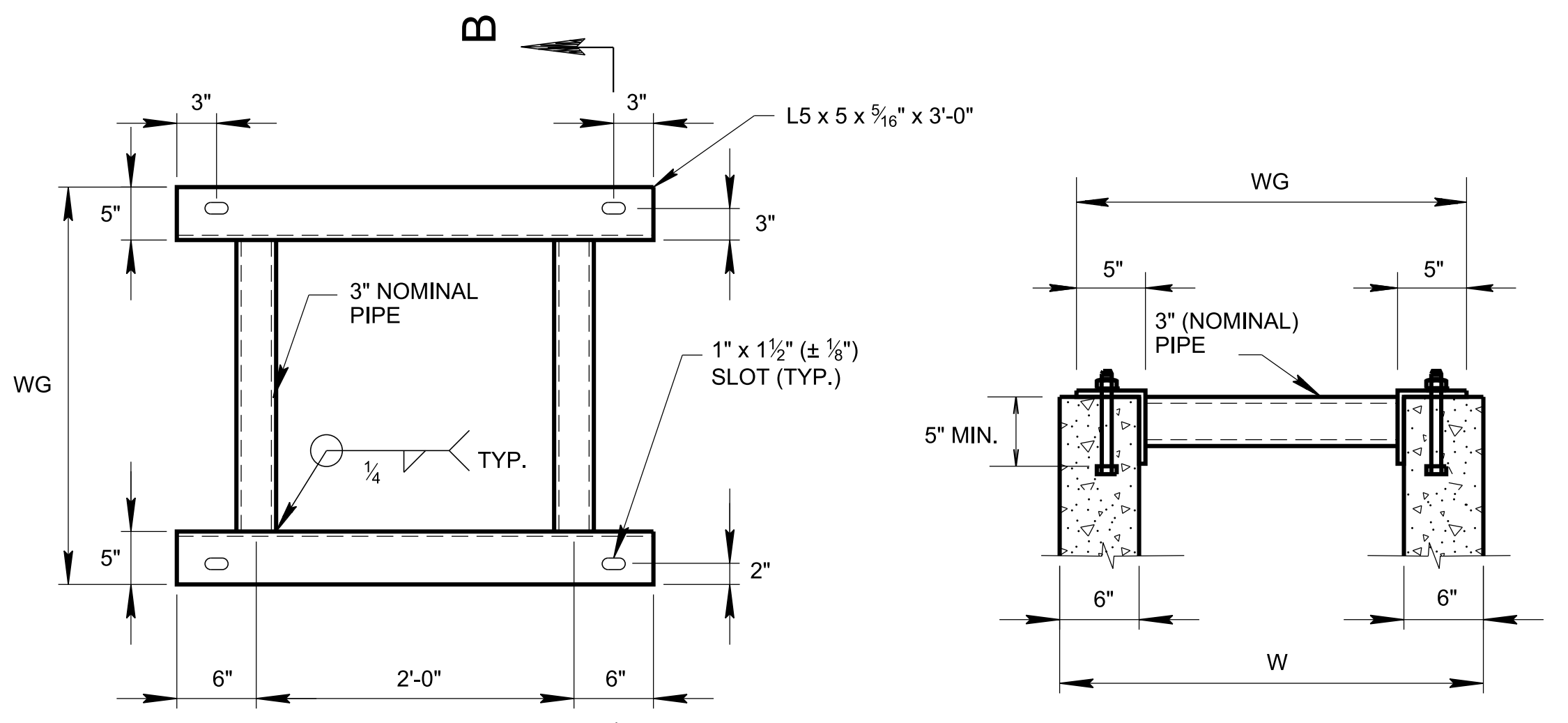
7/5/2023 2:37:39 PM P:\StandDraw\DESIGN STANDARDS\Standards Drawings Library\Standard Roadway Drawings - CURRENT\In Progress\10-101.00 Pipe Culverts and Endwalls IP\101.03 Safety Side Drain Endwalls IP\DSEW\1A-20



PLAN



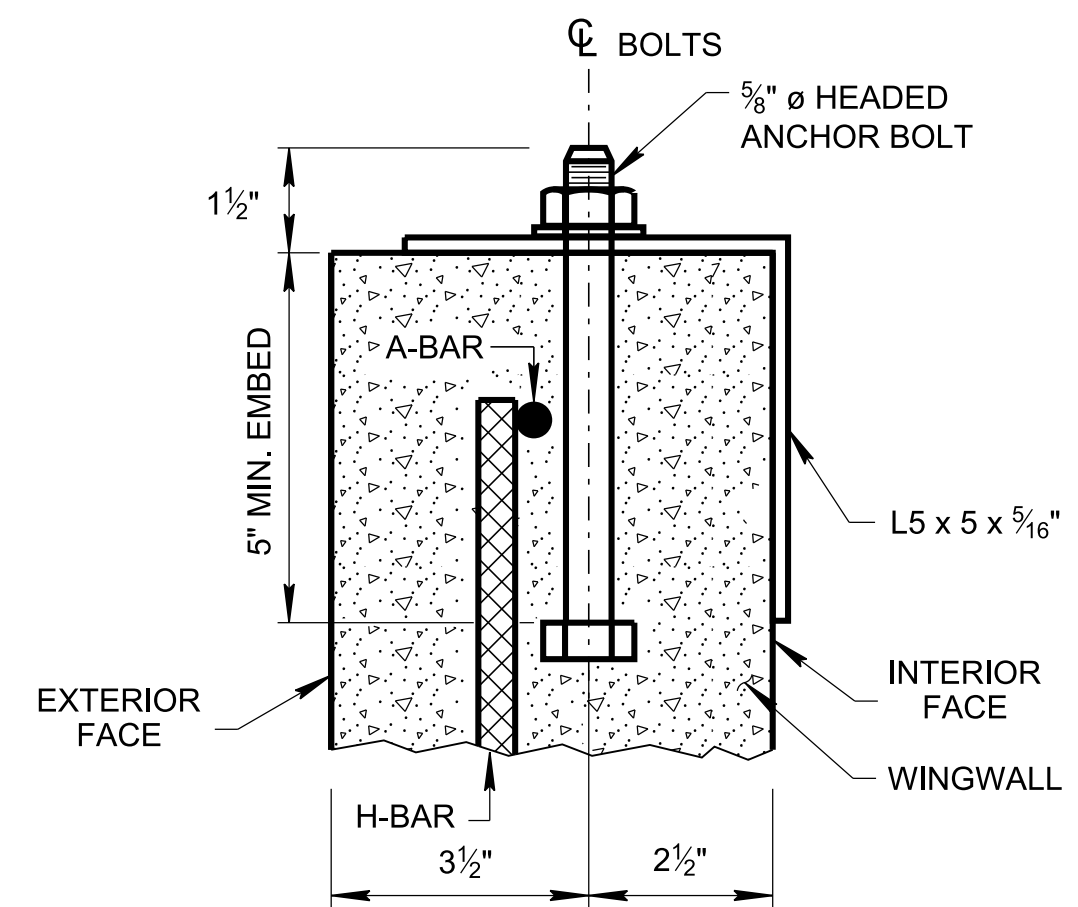
SECTION A-A



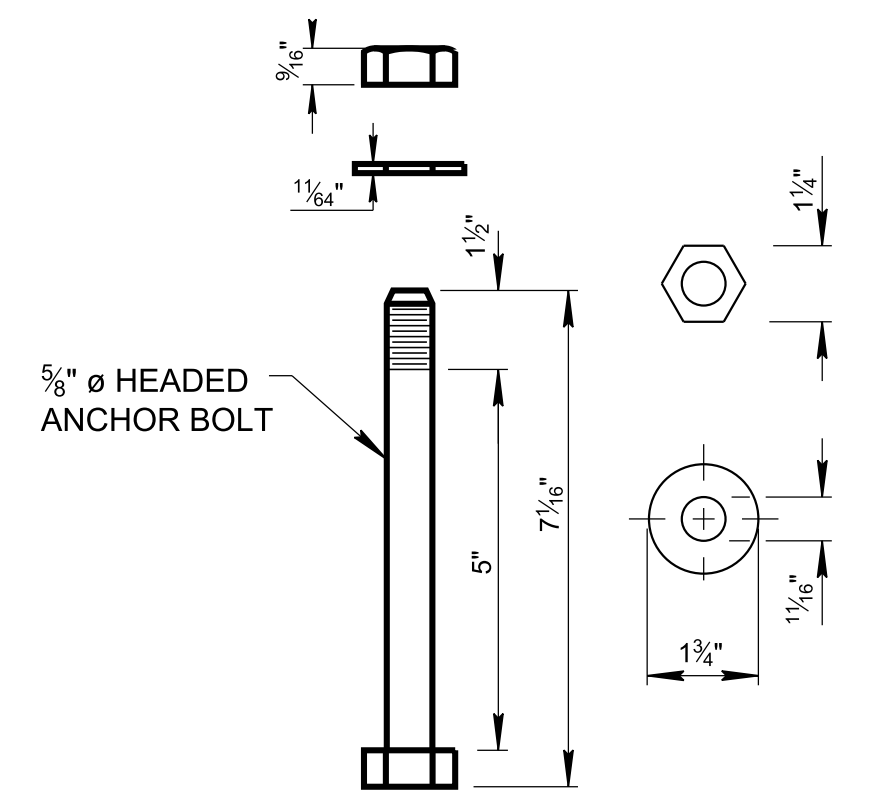
SECTION B-B
SHOWING ANCHOR BOLTS AND PARTIAL WINGWALLS

STEEL PIPE GRATE

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



ANCHOR BOLT ASSEMBLY



ANCHOR BOLT DETAIL

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.

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

GENERAL NOTES

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

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

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

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

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

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED

STATE OF TENNESSEE
STANDARD DRAWING
DEPARTMENT OF TRANSPORTATION

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