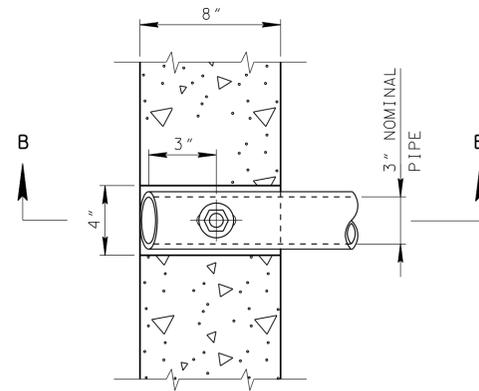
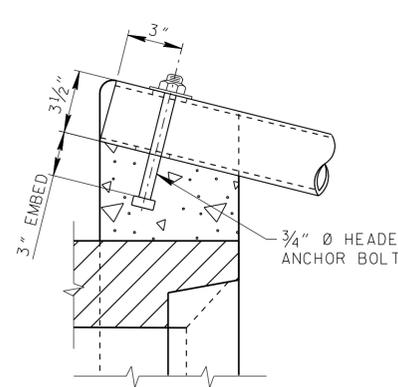


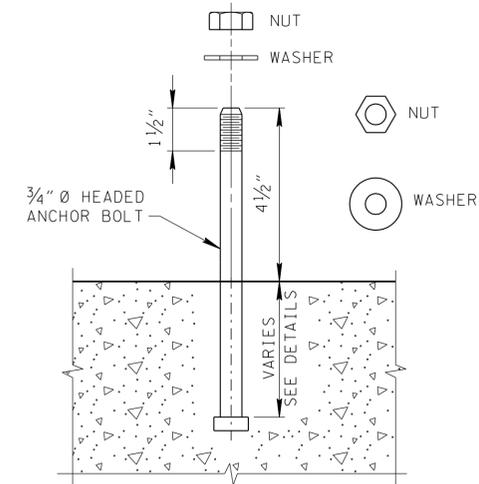
DETAIL PLAN AT WINGWALL



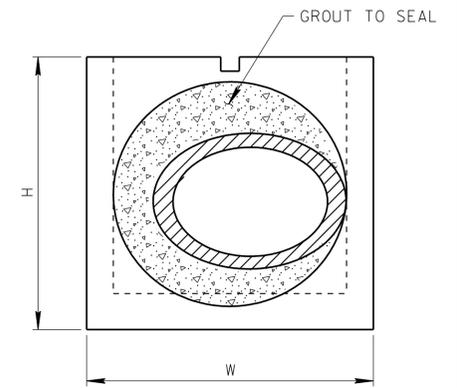
DETAIL PLAN AT HEADWALL



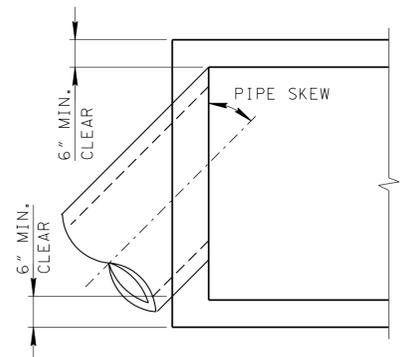
SECTION B-B THRU HEADWALL



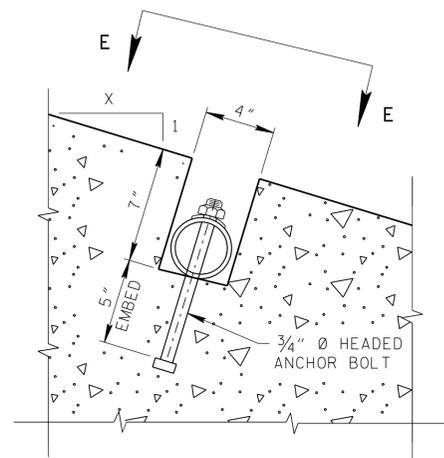
ANCHOR BOLT ASSEMBLY



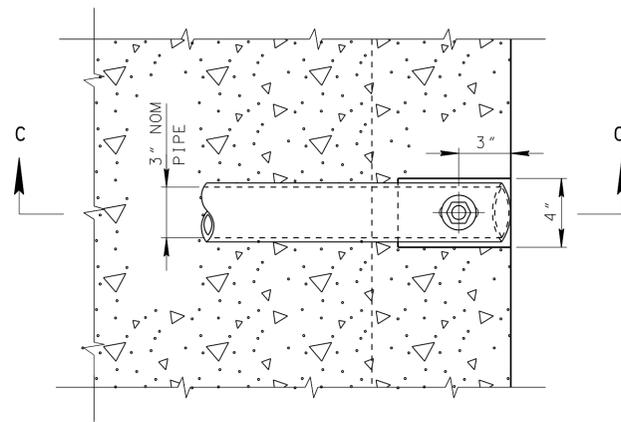
HEADWALL ELEVATION



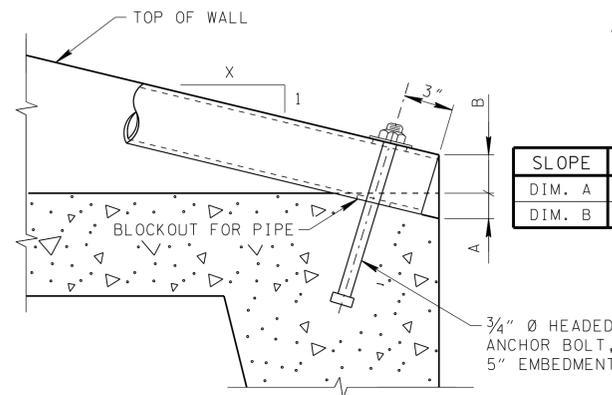
PLAN



SECTION D-D THRU WINGWALL



DETAIL PLAN AT TOEWALL



SECTION C-C THRU TOEWALL

SLOPE	3:1	4:1	6:1
DIM. A	2 3/8"	1 3/8"	1/8"
DIM. B	1 3/8"	2"	2 5/8"

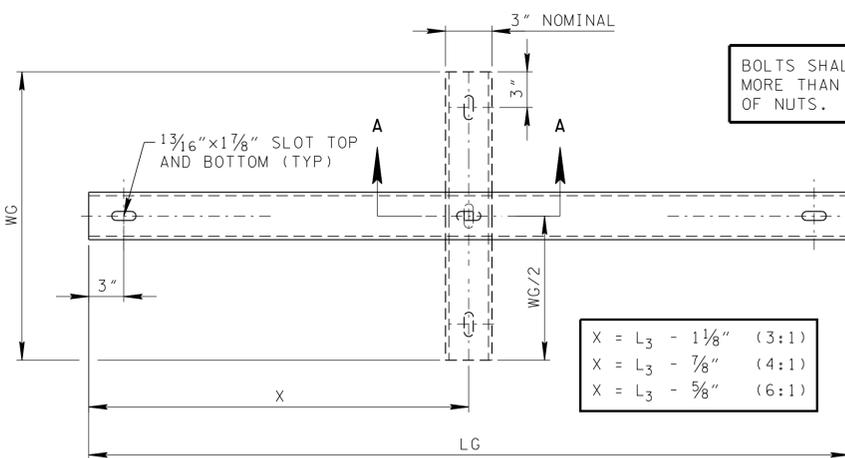
OVERSIZED TYPE "U" CONCRETE END WALL TO BE USED TO ACCOMMODATE THE SKEWED PIPE (ASSUMES CONCRETE PIPE)

PIPE CULV. DIA.	PIPE SKEW		
	75°	60°	45°
18"	24"	24"	30"
24"	30"	36"	42"
30"	36"	42"	48"
36"	42"	48"	*
42"	48"	*	*
48"	*	*	*

* EXCEEDS 48" TYPE "U" ENDWALL OPENING

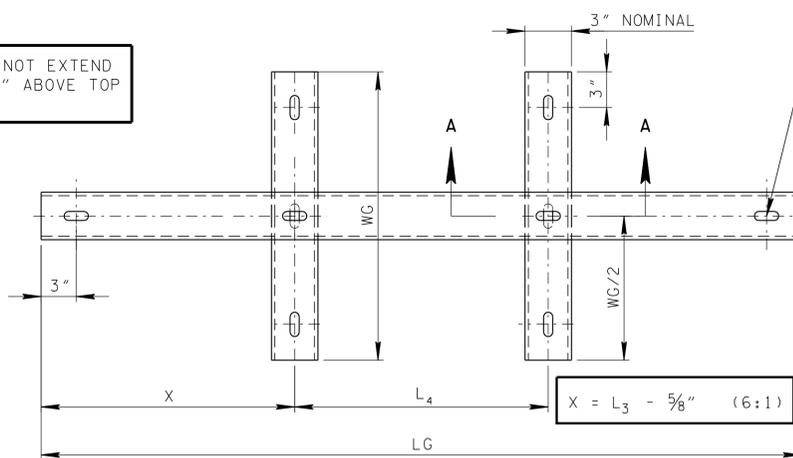
SKewed CONNECTION DETAIL

NOTE: TABLE VALUES PROVIDED ARE APPROXIMATE ENGINEER SHALL VERIFY MINIMUM CLEARANCES



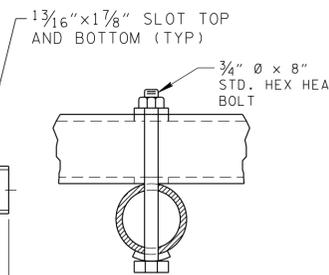
30" AND 36" PIPE (3:1, 4:1 AND 6:1 SLOPES)
42" AND 48" PIPE (3:1 AND 4:1 SLOPES)

X = L ₃ - 1 1/8"	(3:1)
X = L ₃ - 7/8"	(4:1)
X = L ₃ - 5/8"	(6:1)



42" AND 48" PIPE (6:1 SLOPE)

X = L ₃ - 5/8"	(6:1)
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SECTION A-A

GENERAL NOTES

- THE MATERIAL AND PAINTING FOR STRUCTURAL STEEL GRATE SHALL CONFORM TO THE FOLLOWING SPECIFICATIONS:
 - STEEL PIPE ASTM A53, TYPE E, GRADE B, SCHEDULE 40.
 - THE GRATE SHALL BE PAINTED BLACK, FEDERAL SPECIFICATION TT-E-489J, AFTER FABRICATION.
- 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
- THE COST OF FURNISHING BOLTS, NUTS AND WASHERS, INCLUDING ALL MATERIALS, LABOR AND INCIDENTALS NECESSARY TO COMPLETE THE INSTALLATION, SHALL BE INCLUDED IN THE PRICE BID FOR THE PIPE ENDWALL.
- PAYMENT WILL BE MADE UNDER: ITEM NO. 611-07.03, STRUCTURAL STEEL (PIPE ENDWALLS)----LB.

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 3/4" DIAMETER ANCHORS IS 10,000 POUNDS.

PIPE CULV. DIA.	ALL SLOPES	3:1	4:1	6:1
	WG	LG	LG	LG
30"	4'-1"	10'-10 3/8"	14'-0 1/8"	20'-4 3/4"
36"	4'-8"	12'-8 3/4"	16'-5"	23'-11 3/8"
42"	5'-3"	14'-3 3/4"	18'-5 3/4"	26'-11 7/8"
48"	5'-10"	16'-1 1/8"	20'-10 5/8"	30'-6 3/8"

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

PIPE GRATE & SKEWED CONNECTION DETAILS FOR "U" ENDWALLS

(FOR 3:1, 4:1 & 6:1 SLOPES)