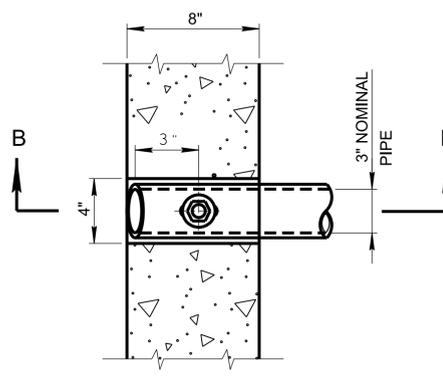
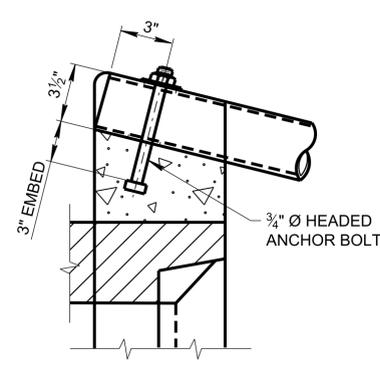


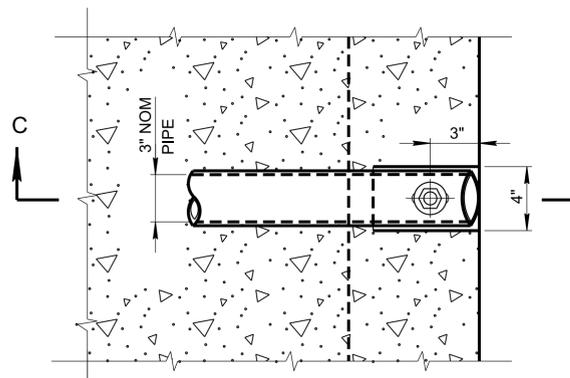
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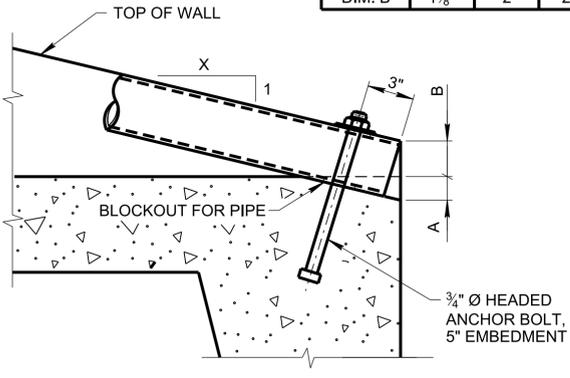
DETAIL PLAN AT HEADWALL



SECTION B-B THRU HEADWALL

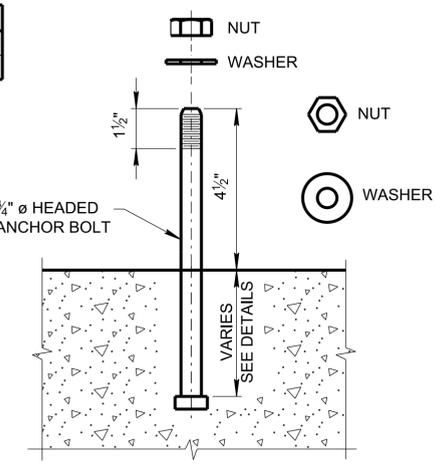


DETAIL PLAN AT TOEWALL



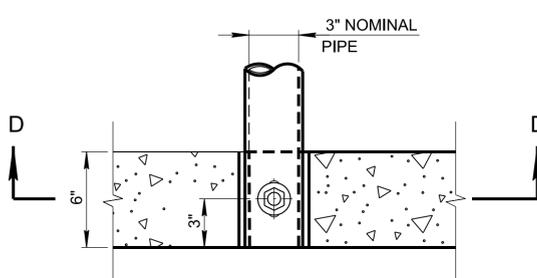
SECTION C-C THRU TOEWALL

SLOPE	3:1	4:1	6:1
DIM. A	2 3/8"	1 5/8"	7/8"
DIM. B	1 3/8"	2"	2 5/8"

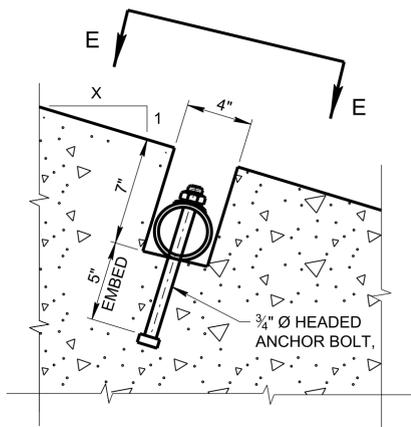


ANCHOR BOLT ASSEMBLY

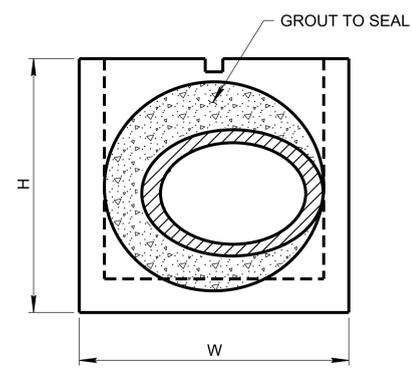
- REV.11-01-13: UPDATED NOTE (A)
- REV. 06-28-19: RENAMED AND REDREW SHEET.
- REV. 03-04-21: REVISED GENERAL NOTE (A)



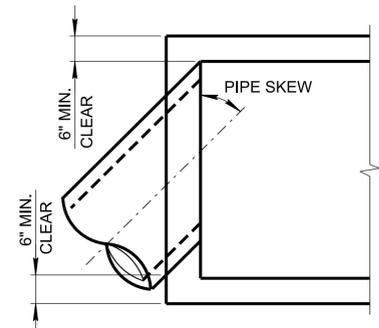
DETAIL PLAN AT WINGWALL



SECTION D-D THRU WINGWALL



HEADWALL ELEVATION



PLAN

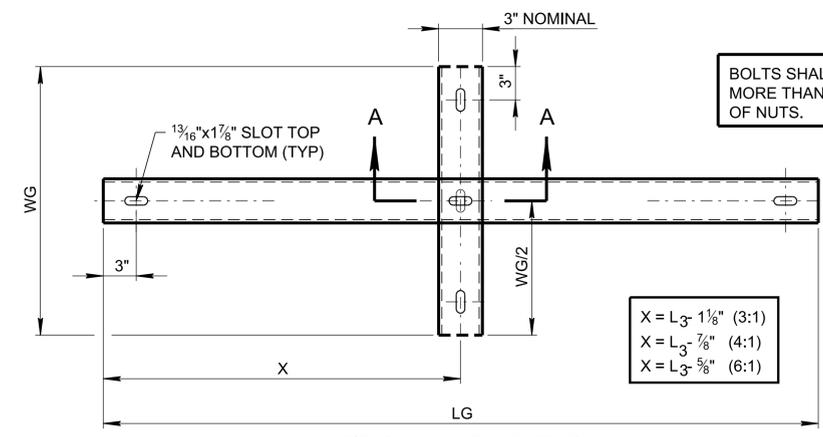
**OVERSIZED TYPE "U" CONCRETE END WALL TO BE USED TO ACCOMMODATE THE SKEWED PIPE (ASSUMES CONCRETE PIPE)**

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

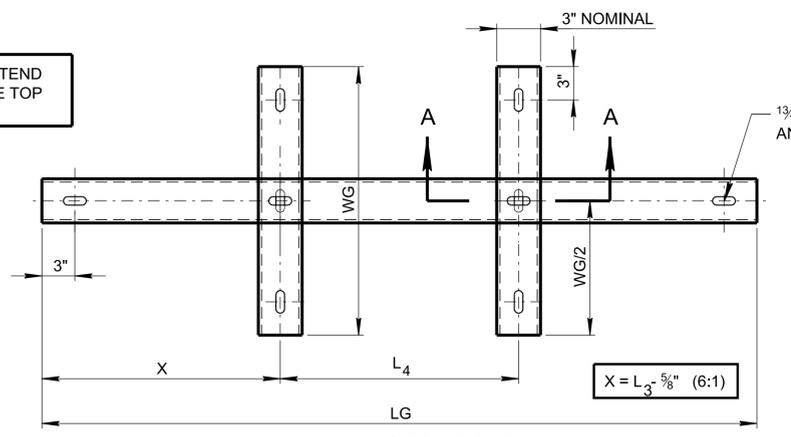
**SKewed CONNECTION DETAIL**

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



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

X = L<sub>3</sub> - 5/8" (6:1)

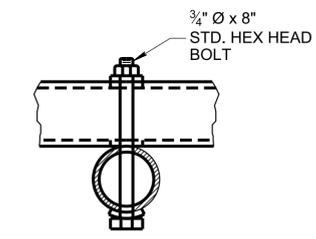
**STEEL PIPE GRATE PLANS**

FOR L<sub>3</sub> AND L<sub>4</sub> DIMENSIONS SEE STD. DWGS. D-PE-30A THROUGH D-PE-48A

**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 5/8"	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 7/8"	20'-10 5/8"	30'-6 3/8"



SECTION A-A

**GENERAL NOTES**

(A) THE MATERIAL AND PAINTING FOR STRUCTURAL STEEL GRATE SHALL CONFORM TO THE FOLLOWING SPECIFICATIONS:  
STEEL PIPE, ASTM A53 GRADE B, SCHEDULE 40 OR ASTM A500 GRADE B AND SHALL BE GALVANIZED.

(B) 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.

(C) 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.

(D) PIPE GRATE TO BE INCLUDED IN THE PRICE OF THE ENDWALL.

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED

STATE OF TENNESSEE  
STANDARD DRAWING  
DEPARTMENT OF TRANSPORTATION

TYPE "U"  
CROSS DRAIN ENDWALL  
DETAILS,  
PIPE GRATE &  
SKEWED CONNECTION