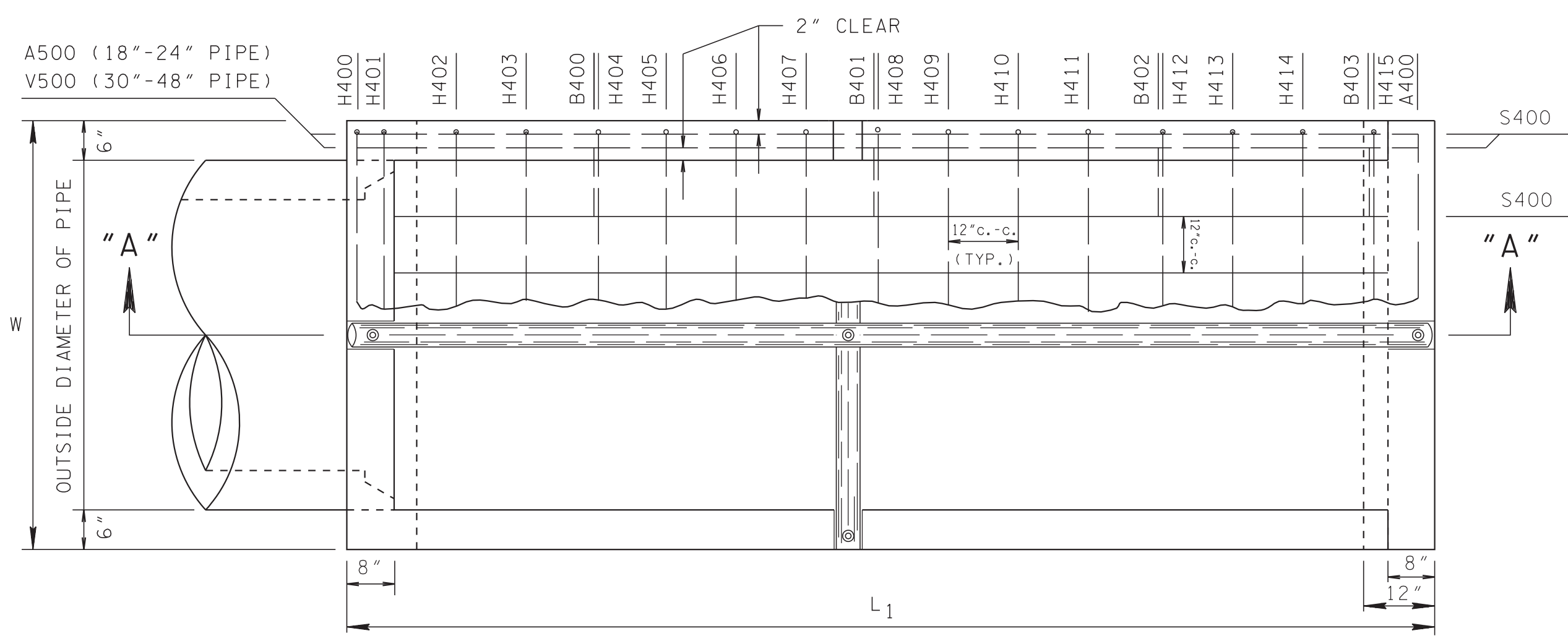


REV. 11-6-89: ADDED FOOTNOTE NO. ② UNDER DIMENSIONS AND QUANTITIES FOR ONE ENDWALL.

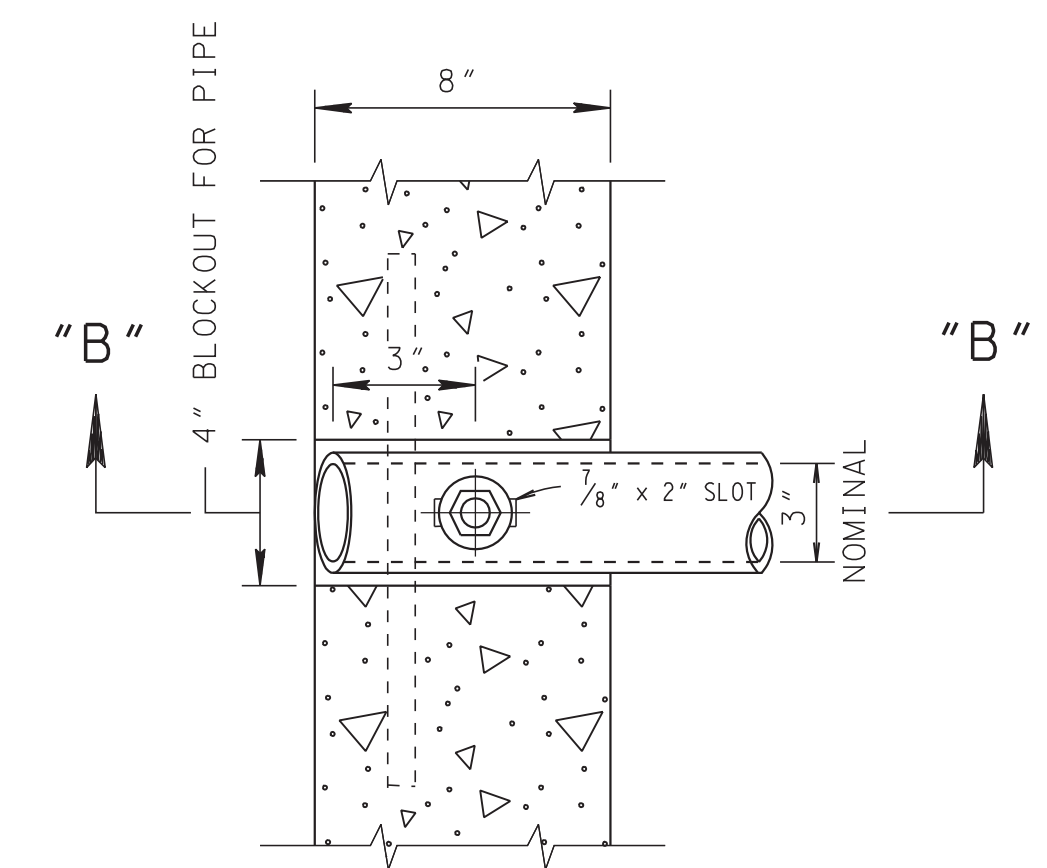
REV. 7-11-91: ADDED CROSSDRAIN ONLY NOTE.

REV. 3-30-00: MODIFIED TOE WALL AND CLASS "A" CONCRETE QUANTITIES.

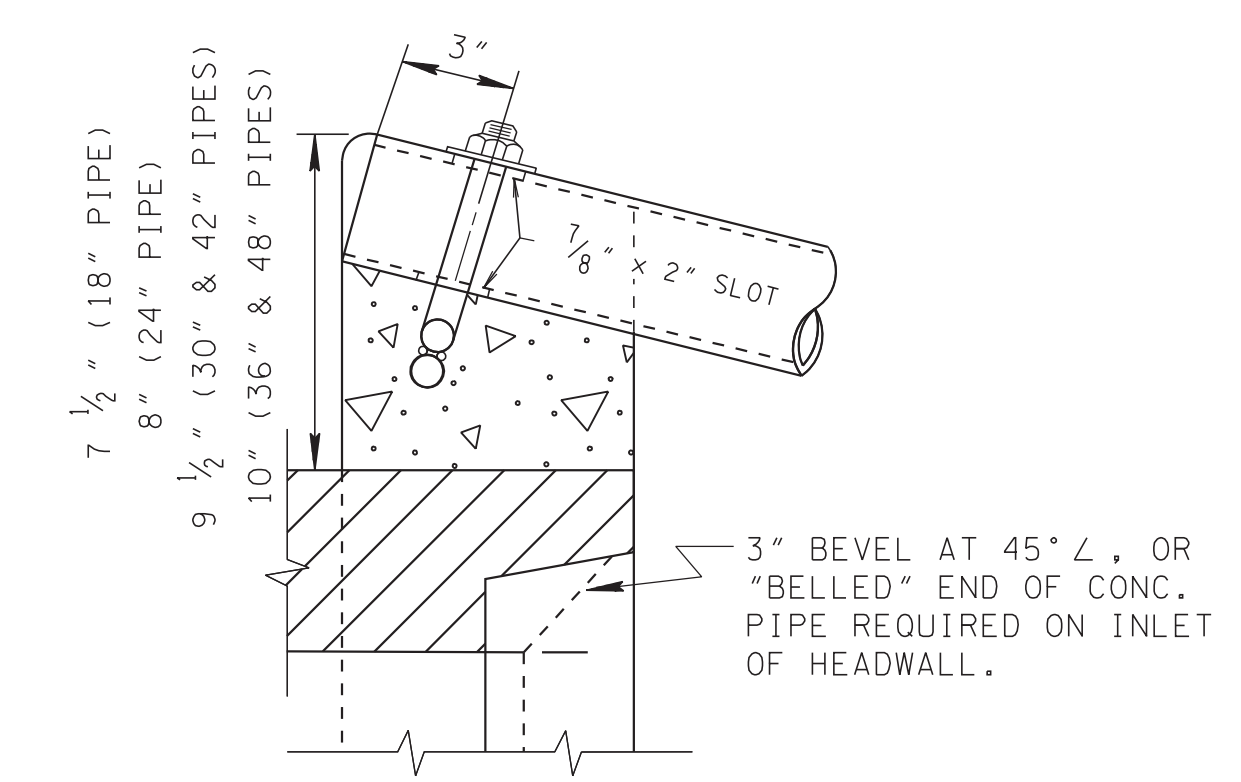
REV. 7-17-07: ADDED SKEWED CONNECTION DETAIL.



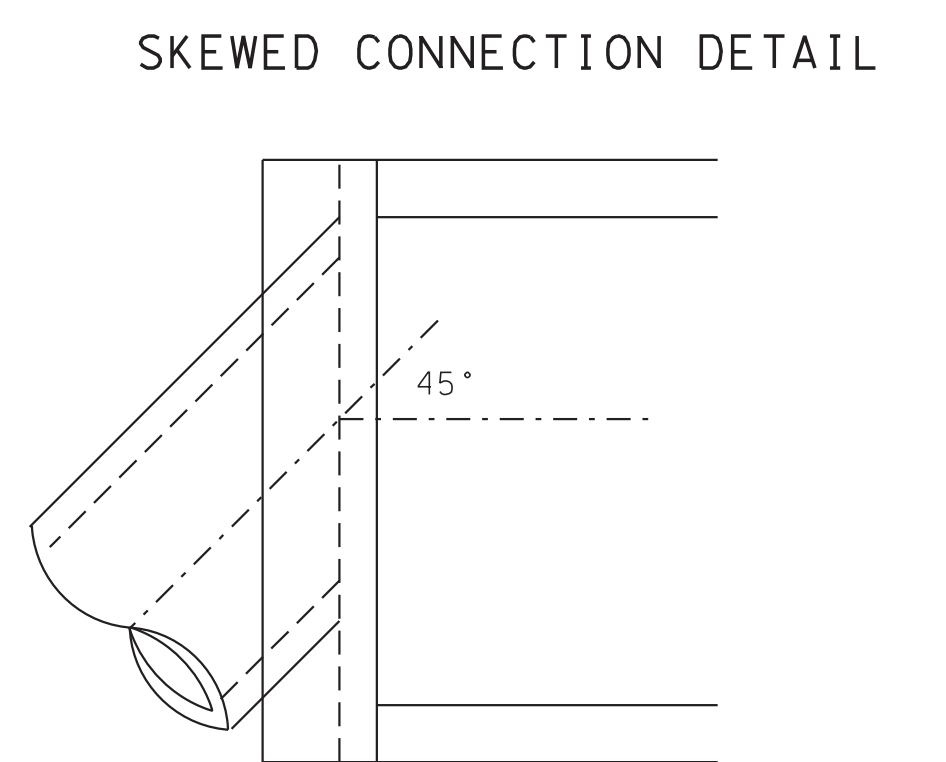
PLAN



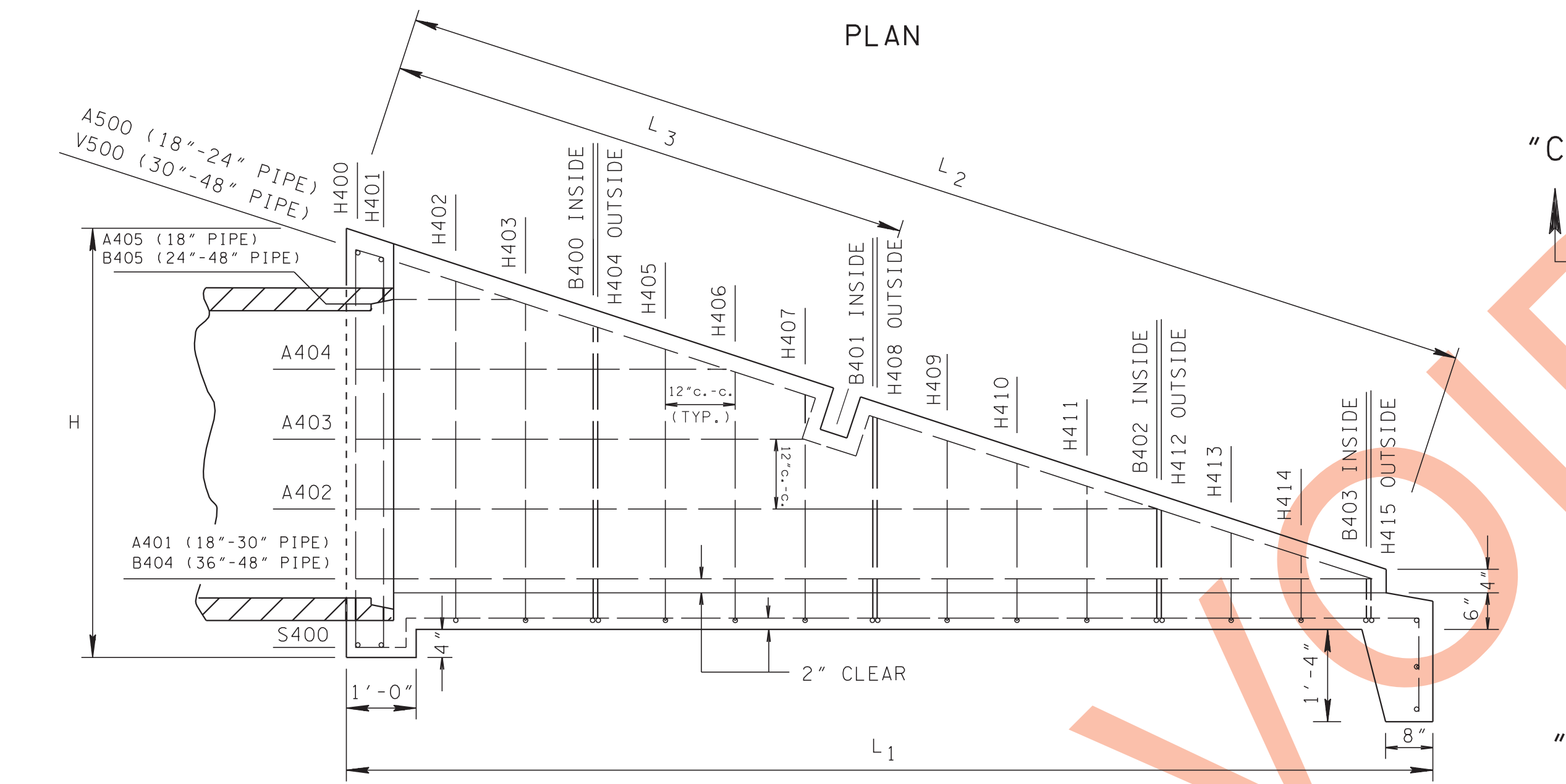
DETAIL PLAN AT HEADWALL



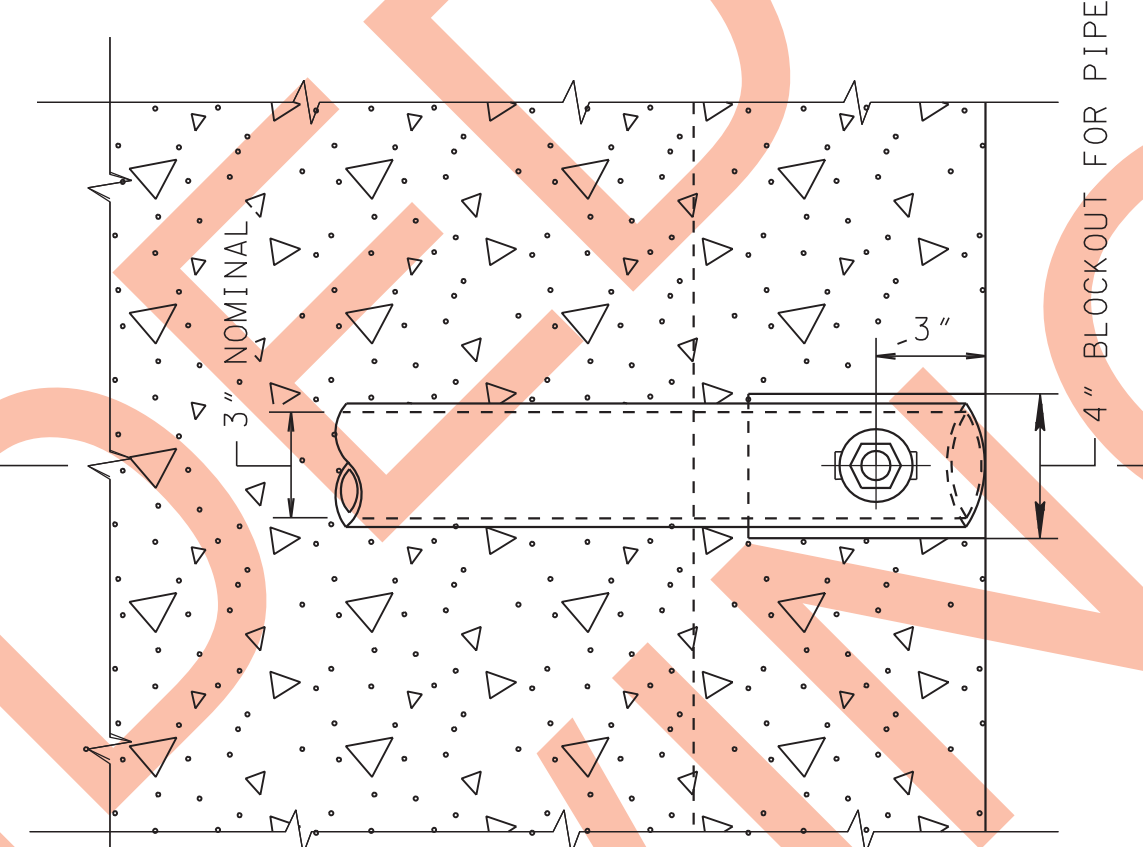
SECTION "B"- "B" THRU HEADWALL



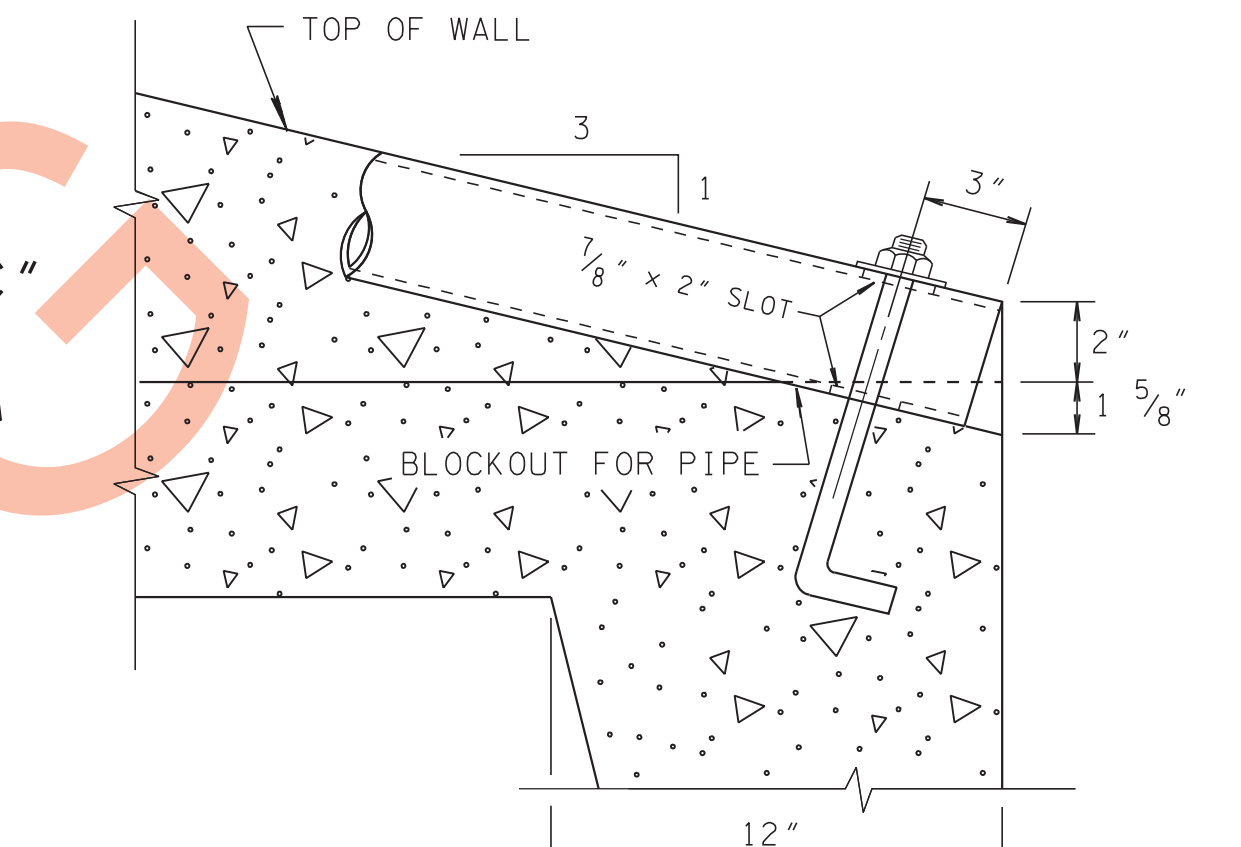
SKewed CONNECTION DETAIL



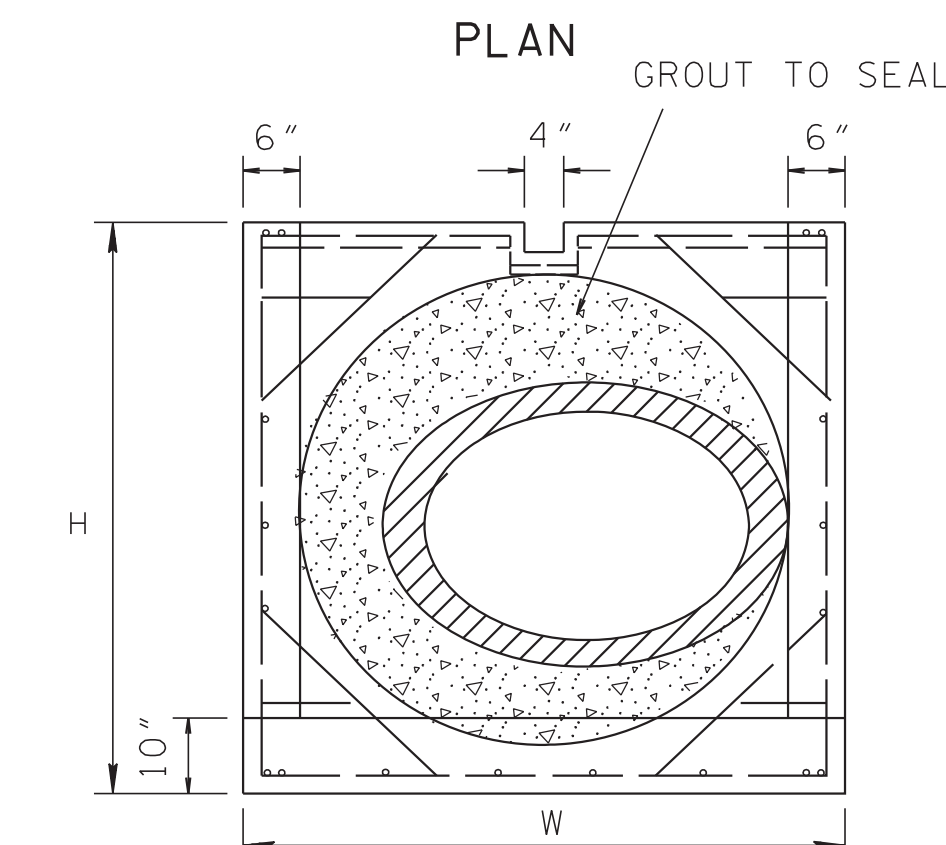
SECTION "A"- "A"



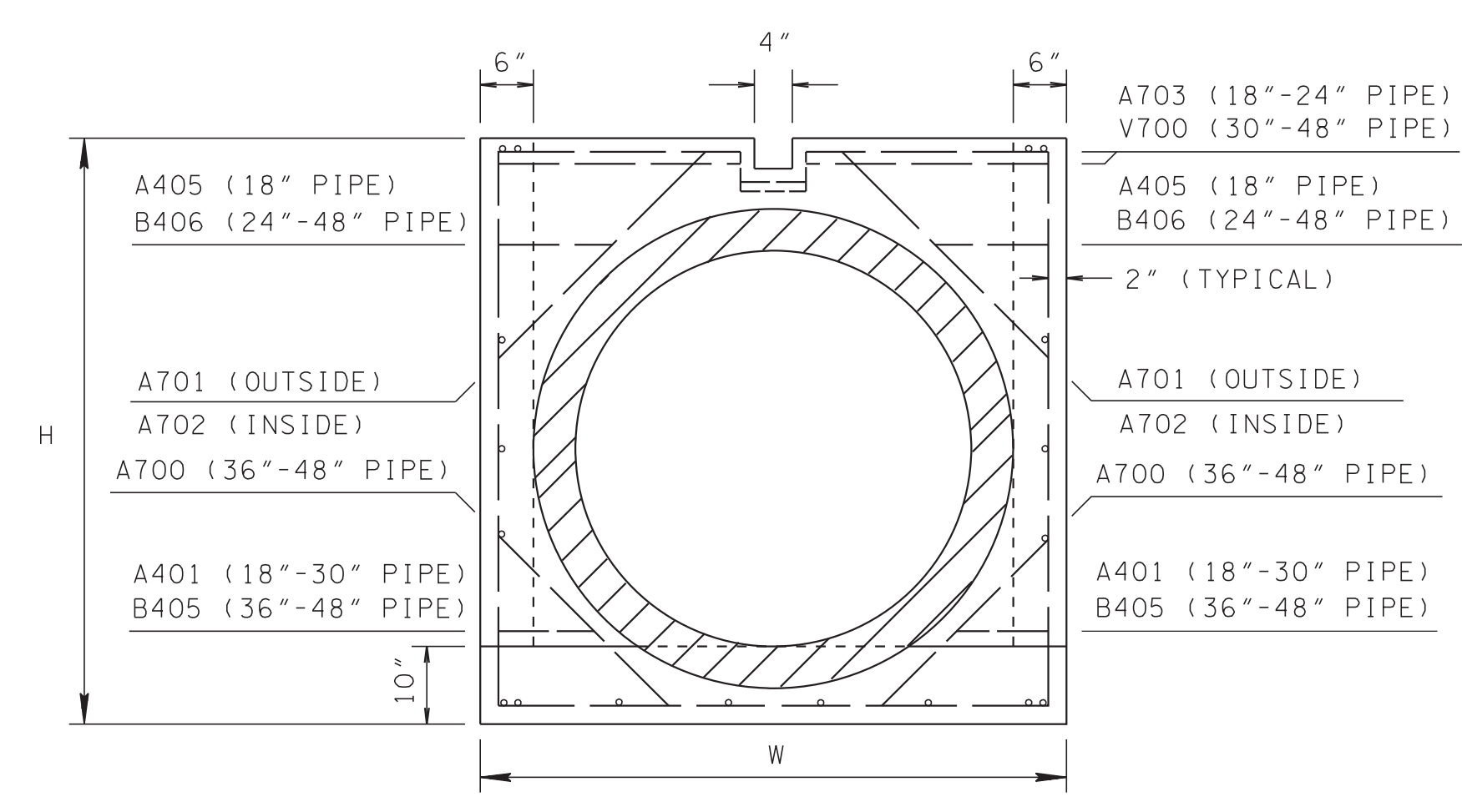
DETAIL PLAN AT TOEWALL



SECTION "C"- "C" THRU TOEWALL

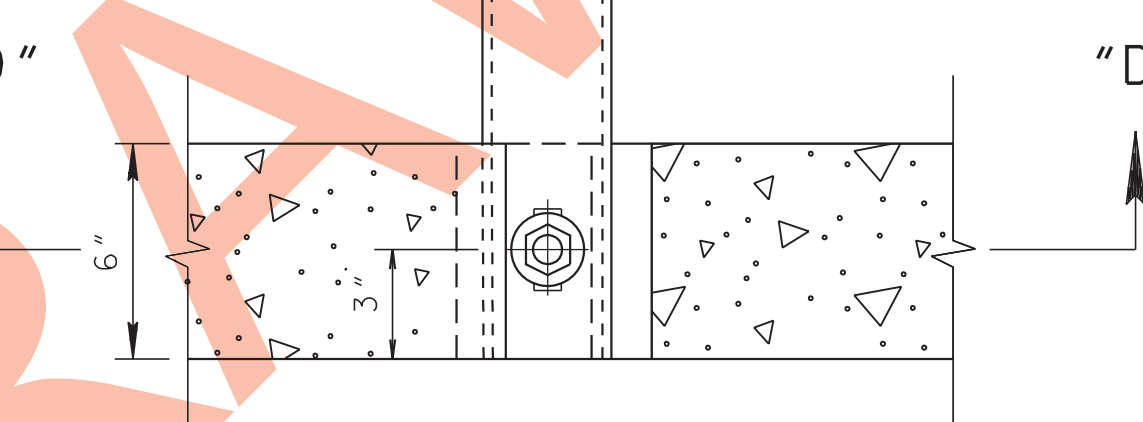


HEADWALL ELEVATION

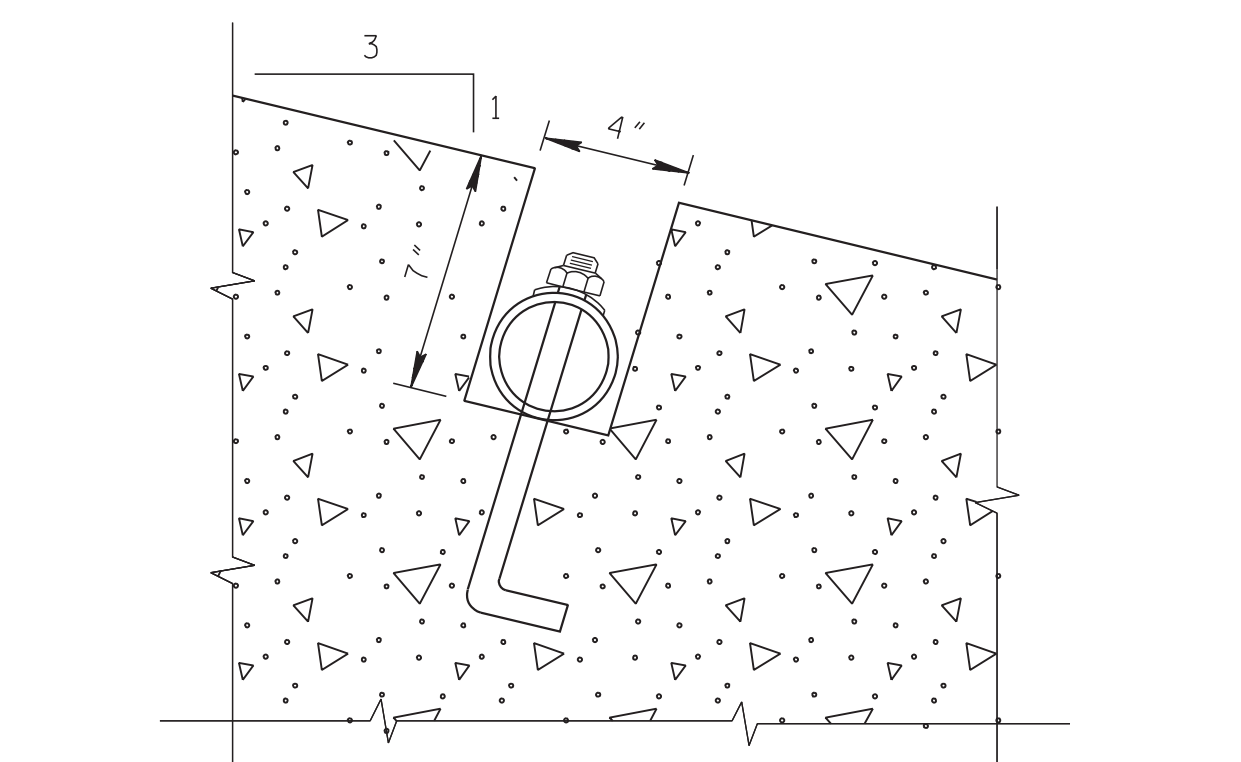


HEADWALL ELEVATION

NOTES
 ① ANCHOR BOLT ASSEMBLY FOR TOEWALL AND WINGWALLS SHALL BE AS SHOWN, EXCEPT WITHOUT REBAR AND LONG SHANK OF BOLT TO BE 11" INSTEAD OF 6 1/2".
 ② BOLTS SHALL NOT EXTEND MORE THAN 1/2" ABOVE TOP OF NUTS.



DETAIL PLAN AT WINGWALL



SECTION "D"- "D" THRU WINGWALL

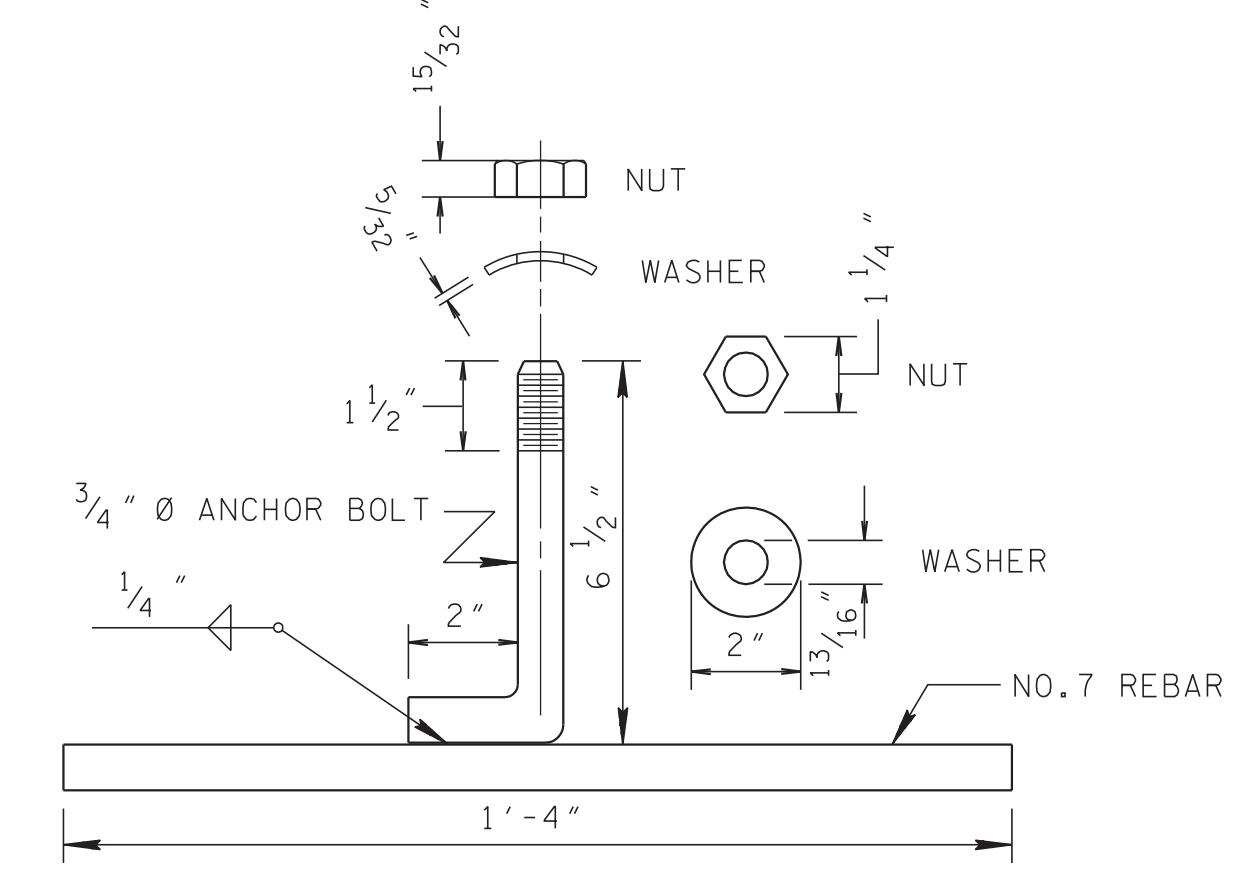
UP SIZED TYPE U CONCRETE END WALL TO BE USED TO ACCOMMODATE THE SKEWED PIPE

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

PIPE CULV. DIA.	DIMENSIONS AND QUANTITIES FOR ONE ENDWALL									
	CONCRETE ENDWALL DIMENSIONS				STRUCTURAL STEEL PIPE DIMENSIONS		ESTIMATED QUANTITIES			
	H	L ₁	L ₂	L ₃	W	LG	WG	CLASS "A" CONCRETE CU. YD.	STEEL BAR REINF. LB.	STRUCT. STEEL LB.
18"	3'-2"	6'-8"	6'-3 1/8"	—	2'-11"	—	—	1.05	132	①
24"	3'-9"	8'-5"	8'-2"	—	3'-6"	—	—	1.52	172	①
30"	4'-5"	10'-5"	10'-3 5/16"	5'-7 3/4"	4'-1"	10'-11"	4'-1"	2.14	232	114
36"	5'-0"	12'-2"	12'-1 7/16"	6'-4 3/4"	4'-8"	12'-9"	4'-8"	2.76	308	132
42"	5'-6"	13'-8"	13'-8 7/16"	7'-4 1/2"	5'-3"	14'-4"	5'-3"	3.42	363	148
48"	6'-1"	15'-5"	15'-6 3/16"	7'-6 7/8"	5'-10"	16'-2"	5'-10"	4.22	440	167

① PIPE GRATE IS NOT REQUIRED FOR 18" OR 24" PIPE CULVERTS.
 ② SEE D-PE-3B(2) FOR BILL OF STEEL.



HEADWALL ANCHOR BOLT ASSEMBLY

TO BE USED ON CROSSDRAINS ONLY AT 90 DEGREE SKEW TO CENTERLINE

MINOR REVISION -- FHWA APPROVAL NOT REQUIRED.

STATE OF TENNESSEE DEPARTMENT OF TRANSPORTATION

CONCRETE ENDWALL TYPE "U" WITH STEEL PIPES GRATE (FOR 18" THRU 48" PIPES) (3:1 SLOPE)

D-PE-3B(1)