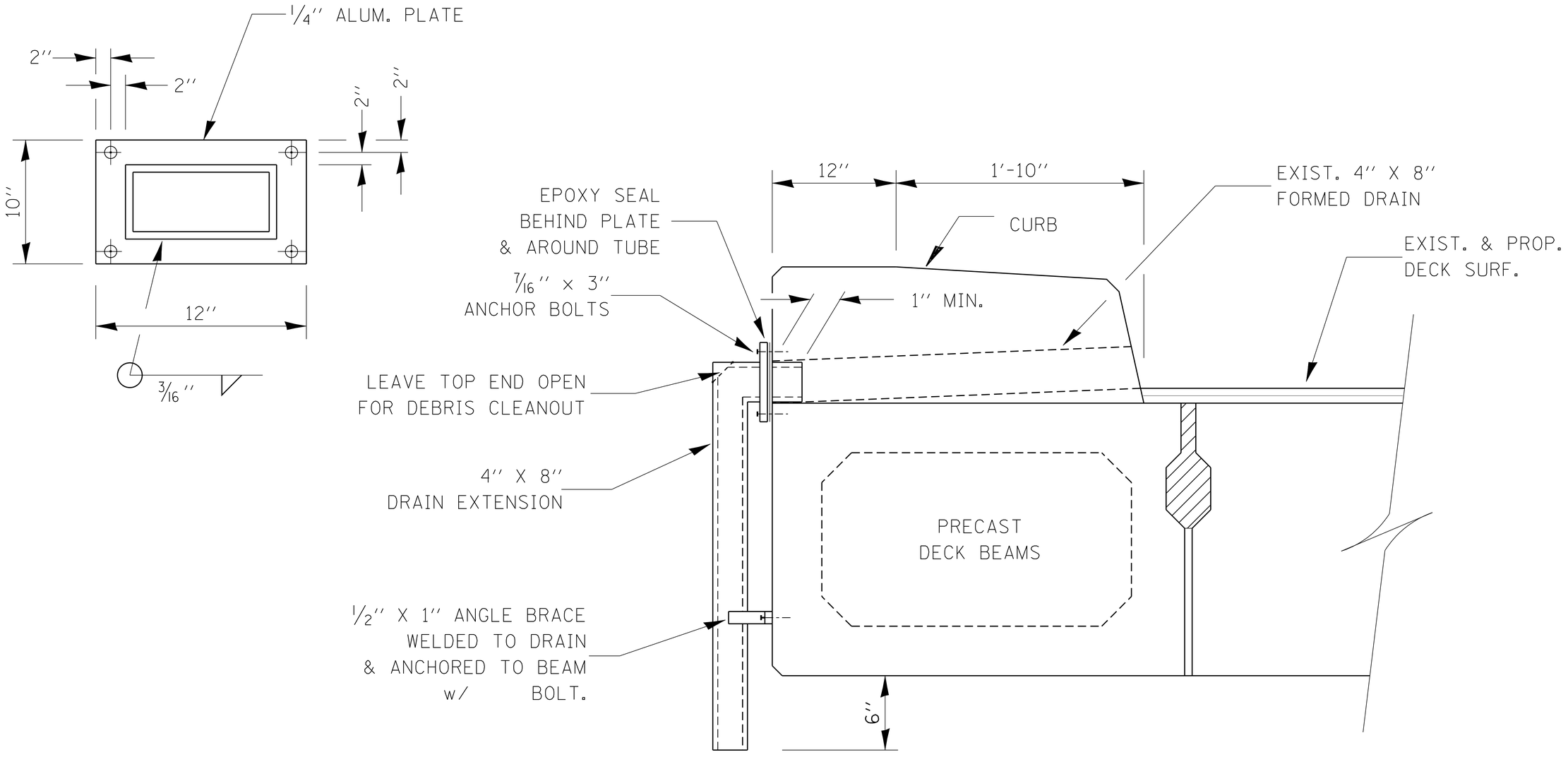
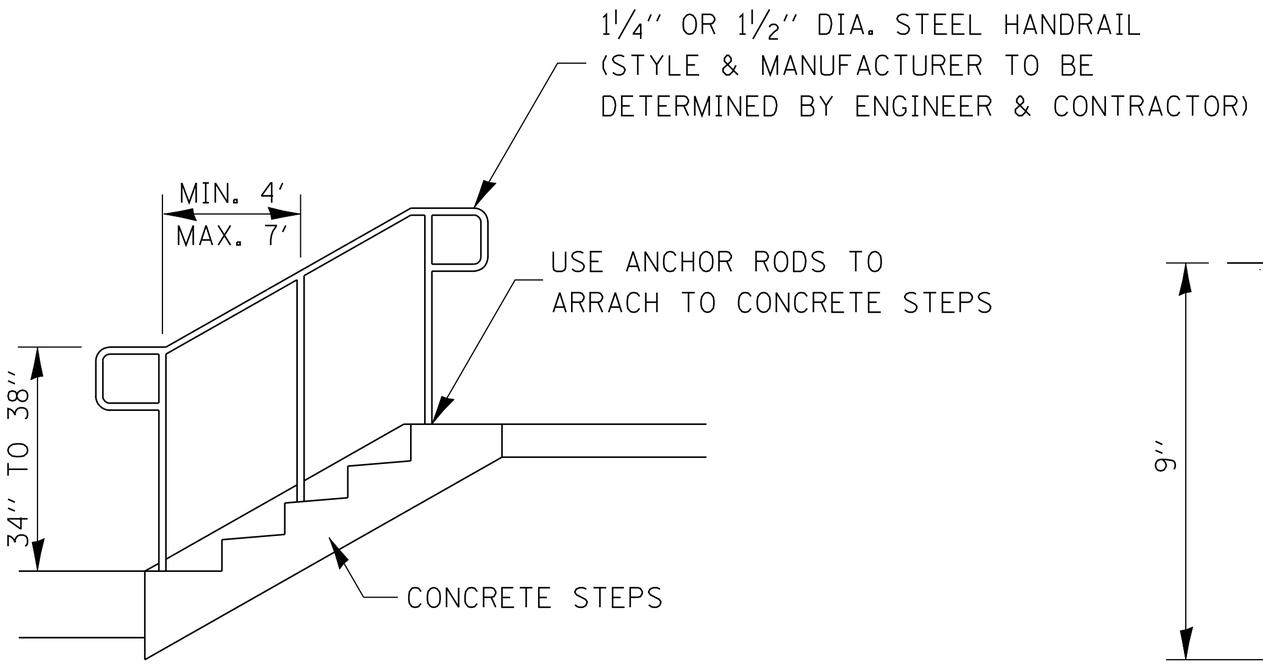
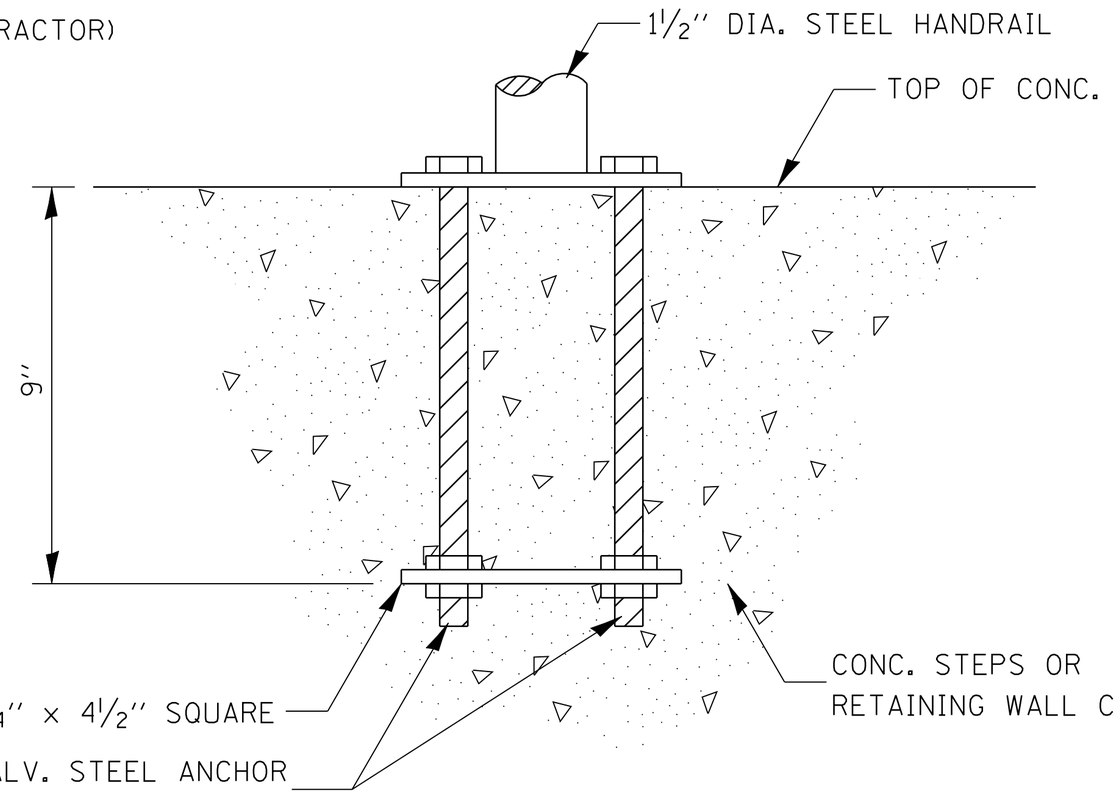


DECK DRAIN EXTENSIONS

503–1

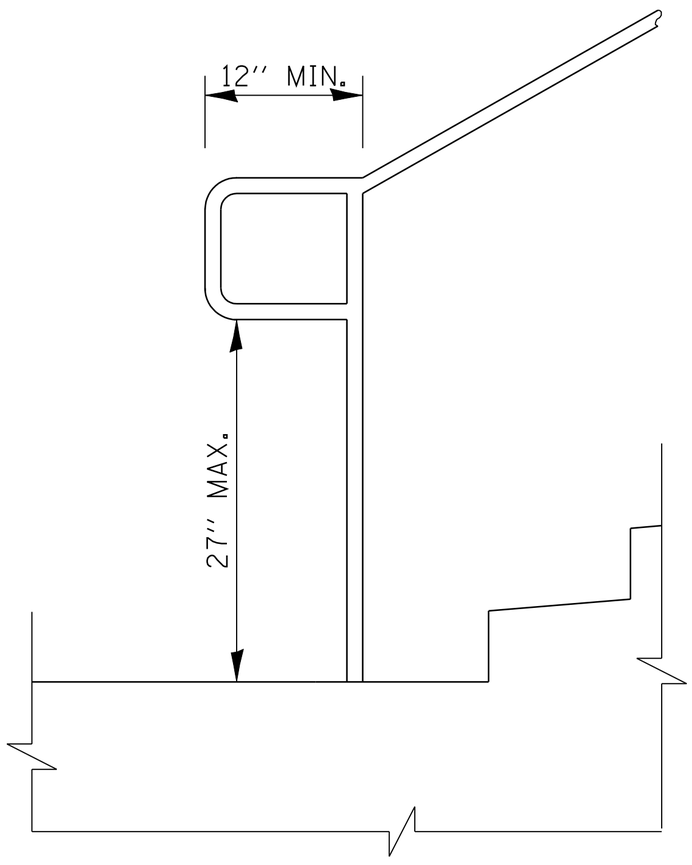


HANDRAIL FOR CONCRETE STEPS

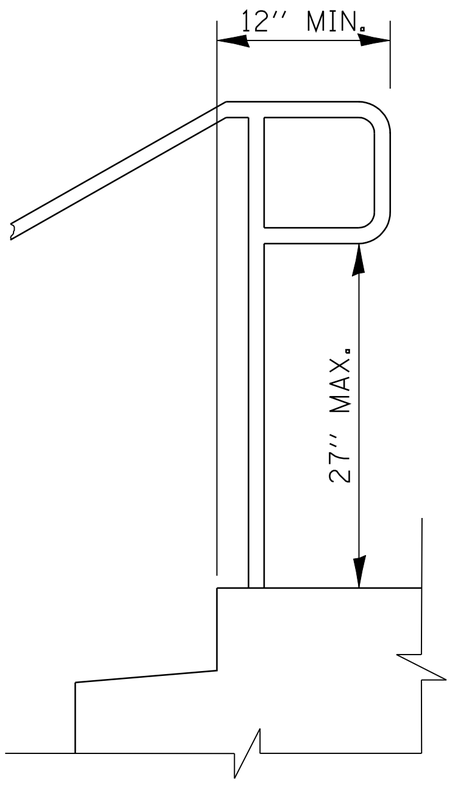


ANCHOR ROD DETAIL

(INCLUDED IN THE COST OF HAND OR SAFETY RAIL)



EXTENSION AT BOTTOM OF RUN DETAIL



EXTENSION AT TOP OF RUN DETAIL

NOTES:

STAIRWAYS SHALL HAVE CONTINUOUS HANDRAILS BOTH SIDES OF ALL STAIRS.

THE INSIDE HANDRAIL ON SWITCHBACK OR DOGLEG STAIRS SHALL ALWAY BE CONTINUOUS.

GRIPPING SURFACES SHALL BE UNINTERRUPTED BY NEWEL POSTS, OTHER CONSTRUCTION ELEMENTS, OR OBSTRUCTIONS.

ENDS OF HANDRAIL SHALL BE EITHER ROUNDED OR RETURNED SMOOTHLY TO FLOOR, WALL, OR POST.

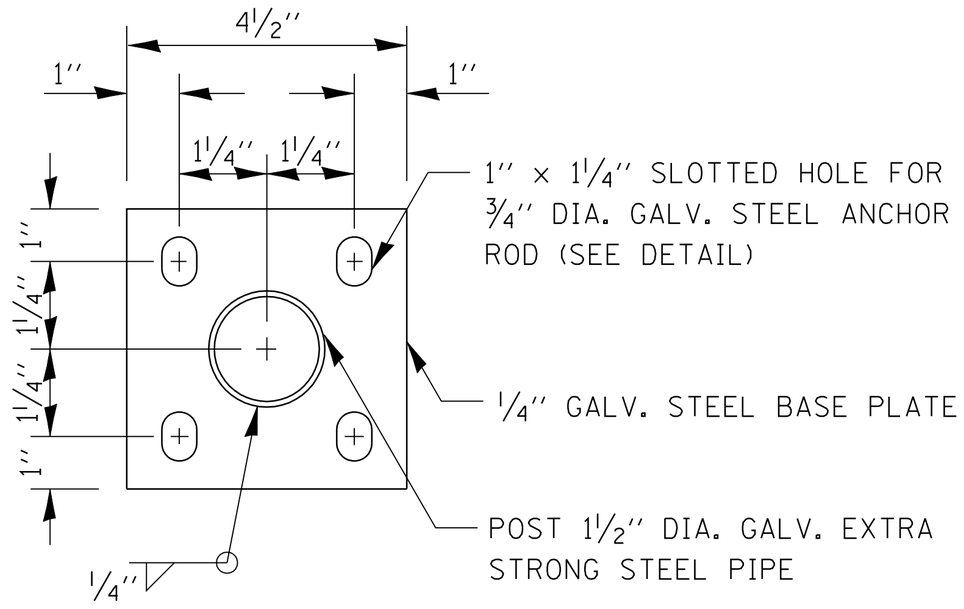
HAND & SAFETY RAILS SHALL NOT ROTATE WITHIN THEIR FITTINGS.

THE CLEAR SPACES BETWEEN HANDRAILS AND ANY WALL SHALL BE 1½''.

HANDRAIL SHALL CONFORM TO SECTION 509 WITH THE EXCEPTION THAT ALL PIPE AND CONNECTIONS SHALL BE WELDED GALVANIZED OR ALUMINUM ACCORDING TO ARTICLE 1006.27, 1006.30, OR 1006.34.

THE DIAMETER OF THE GRIPPING SURFACE OF THE HANDRAIL SHALL BE 1¼'' TO 1½''.

THIS WORK SHALL BE PAID FOR AT THE CONTRACT UNIT PRICE PER FOOT FOR PIPE HANDRAIL.

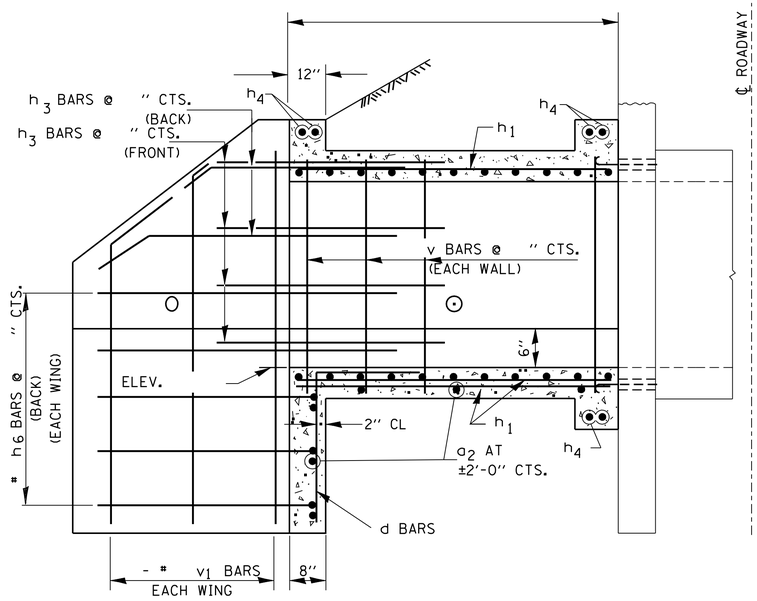


POST CASE PLATE DETAIL

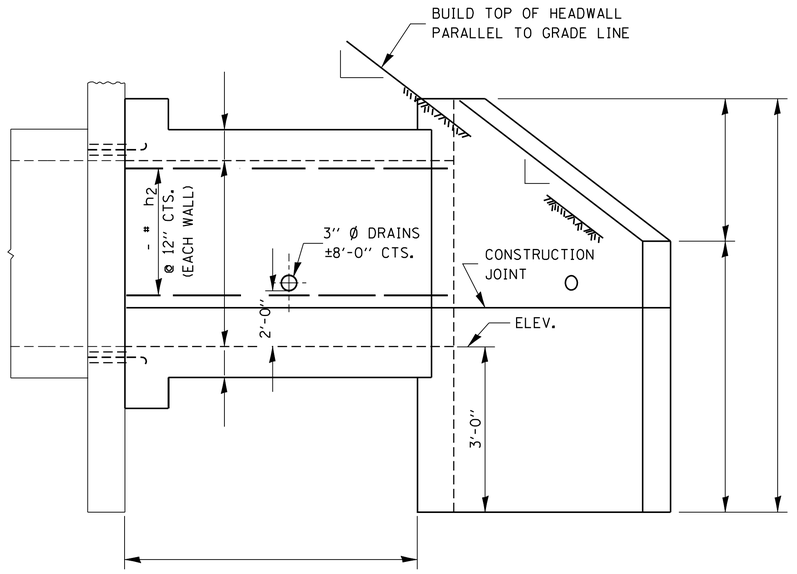
(INCLUDED IN THE COST OF HAND OR SAFETY RAIL)

PIPE HANDRAILS FOR STEPS

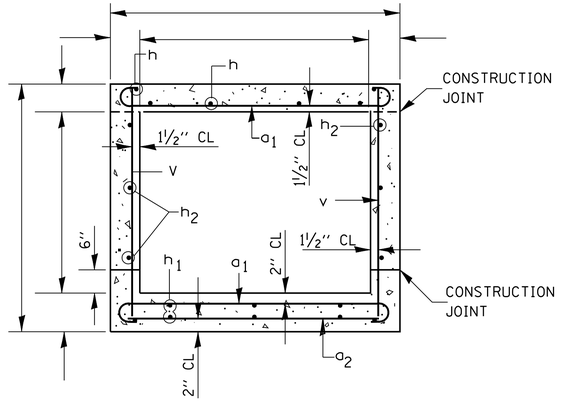
509–1



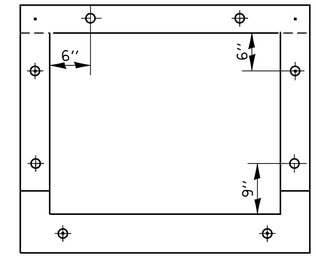
HALF LONG SECTION



HALF ELEVATION



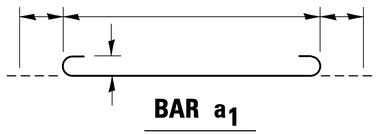
SECTION THRU BARREL



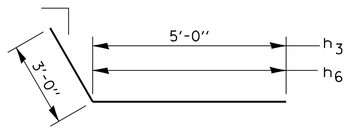
SIDEWALLS . . . . . @ " CTS.
TOP & BOTTOM . . @ " CTS.

EXPANSION BOLT LOCATION

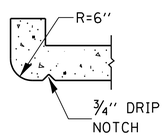
NOTE: EPANSION BOLTS SHALL CONSIST OF SELF DRILLING EXPANSION SHIELD AND ¾" DIAMETER HOOKED BOLTS. HOOKED BOLTS SHALL EXTEND A MINIMUM OF 9" INTO NEW CONCRETE.
MINIMUM CERTIFIED PROOF LOAD = 4,080 LBS.



BAR a_1

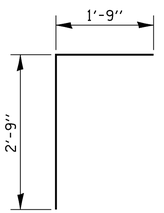


BARS h_3 & h_6



SECTION THRU HEADWALL

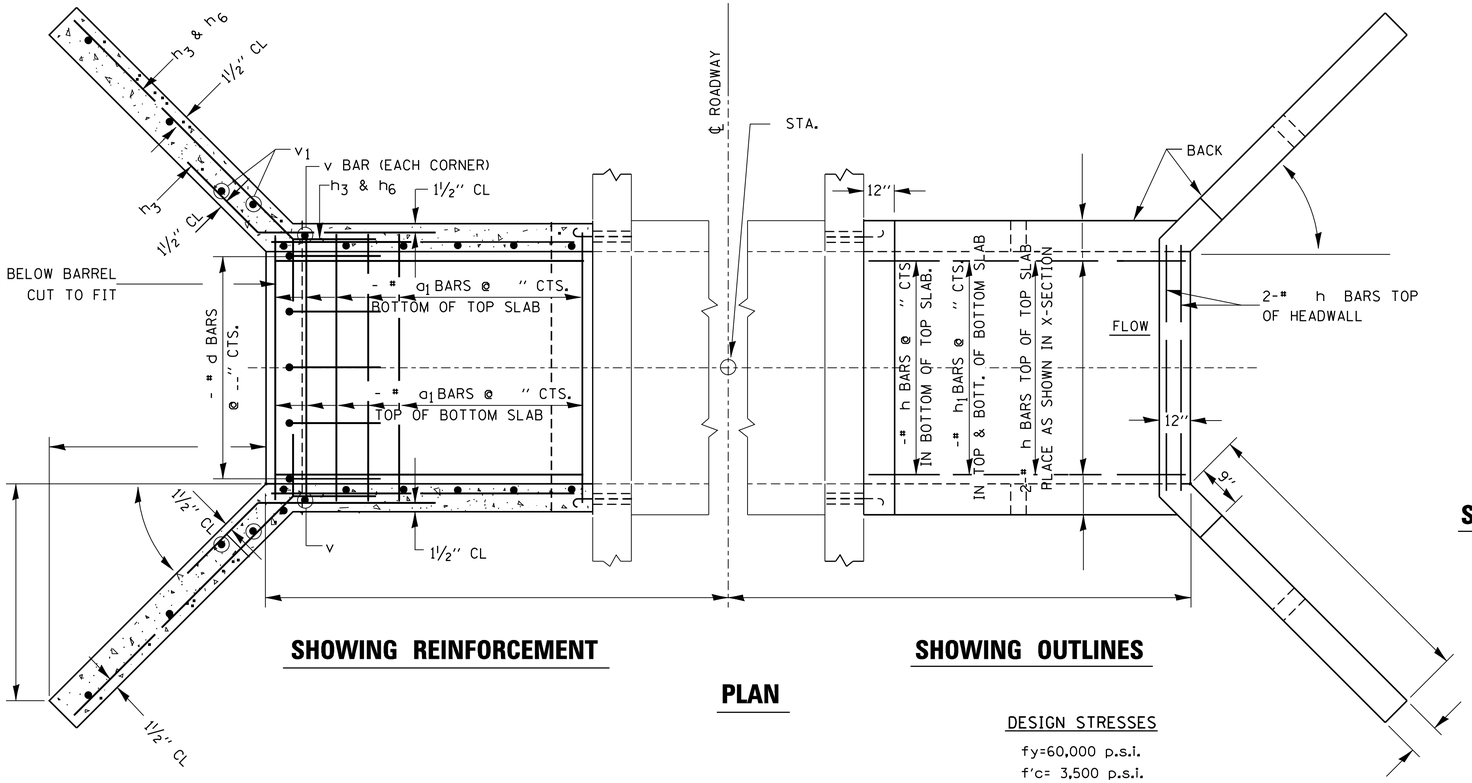
(UP STREAM END ONLY)



BAR d

BILL OF MATERIALS

BAR	NUMBER	SIZE	LENGTH
a_1			
a_2			
a_3			
d			
h			
h_1			
h_2			
h_3			
h_4			
h_6			
v			
v_1			
v_2			
CONCRETE BOX CULVERTS		CU. YDS.	
REINFORCEMENT BARS		LBS.	
EXPANSION BOLTS		EACH	



SHOWING REINFORCEMENT

SHOWING OUTLINES

PLAN

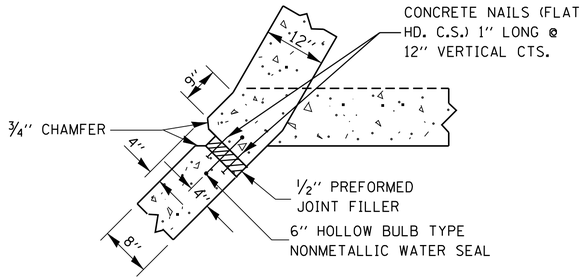
DESIGN STRESSES

fy=60,000 p.s.i.
f'c= 3,500 p.s.i.

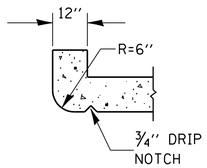
LOADING HS 20-44 & ALT.

GENERAL NOTES

CLASS SI CONCRETE SHALL BE USED THROUGHOUT.
AT LEAST SIX FEET OF BARREL SHALL BE POURED MONOLITHICALLY WITH WINGWALLS.
EXPOSED EDGES SHALL BE BEVELED ¾".
FOR BACKFILLING AND EMBANKMENTS SEE STANDARD SPECIFICATIONS.
TILT HOOK OF a_1 BARS, IF NECESSARY, TO OBTAIN 1½" MINIMUM CLEARANCE AT TOP OF HOOK.
REINFORCEMENT BARS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-31, M-42, ORM-53, GRADE 60.

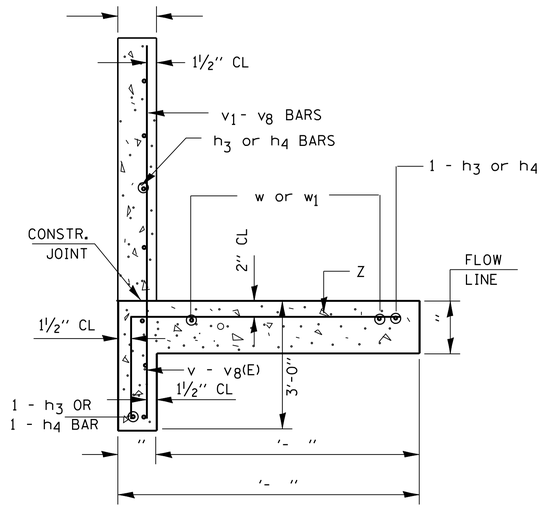


CORNER DETAIL



SECTION THRU HEADWALL

(UP STREAM END ONLY)



SECTION "A–A"

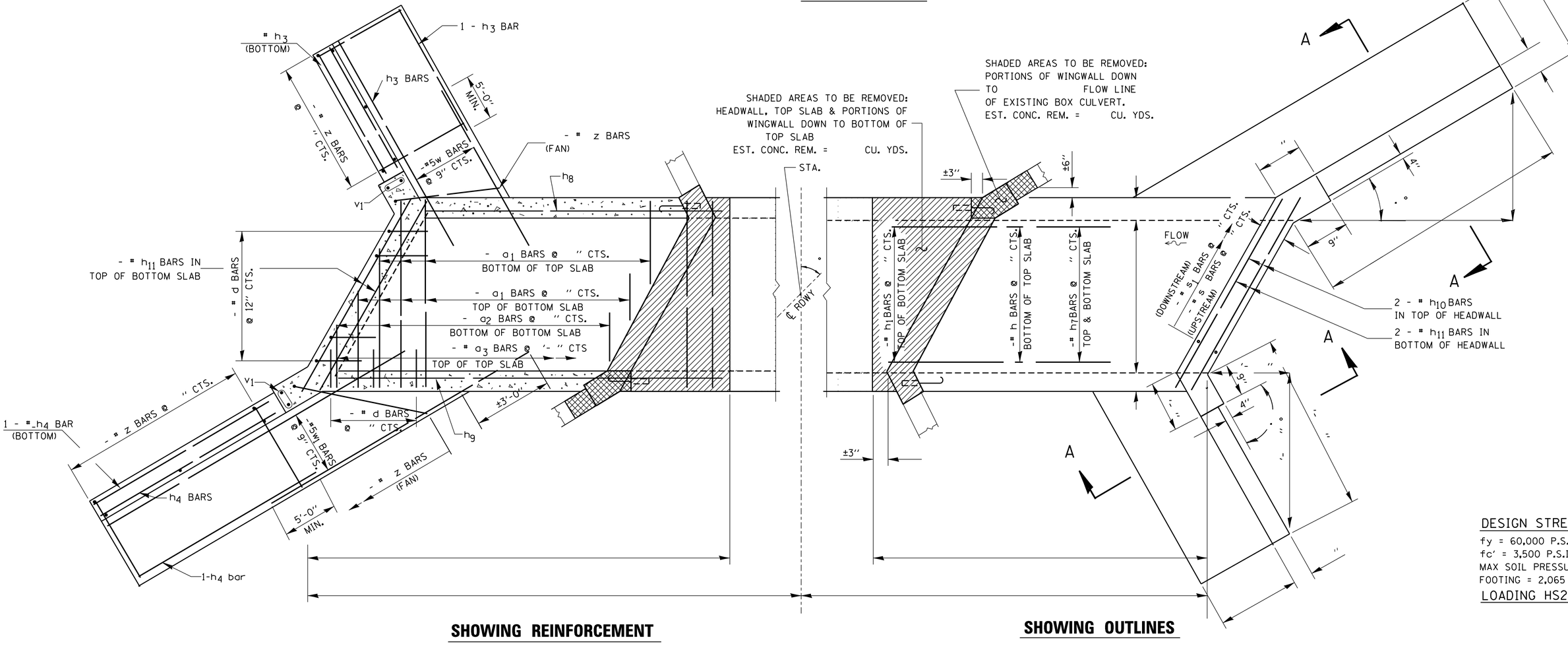
GENERAL NOTES

CLASS SI CONCRETE SHALL BE USED THROUGHOUT.
EXPOSED EDGES SHALL BE BEVELED ¾''.
FOR BACKFILLING AND EMBANKMENTS SEE STANDARD SPECIFICATIONS.
REINFORCEMENT BARS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-31, M-43, OR M-53, GRADE 60.
NONMETALLIC WATER SEAL USED IN WINGWALL JOINTS SHALL EXTEND FROM THE TOP OF THE FOOTING TO WITHIN 6'' OF THE TOP OF THE HEADWALL.
BARS INDICATED THUS 12x4-#5 ECT. INDICATES 12 LINES OF BARS WITH 4 LENGTHS PER LINE.

NOTE:
a BARS IN SKEW PORTION OF SLAB SHALL BE ORDERED FULL LENGTH & CUT TO FIT. BALANCE OF BAR TO BE USED IN OPPOSITE END OF CULVERT.

SHADED AREAS TO BE REMOVED:
HEADWALL, TOP SLAB & PORTIONS OF WINGWALL DOWN TO BOTTOM OF TOP SLAB
EST. CONC. REM. = CU. YDS.

SHADED AREAS TO BE REMOVED:
PORTIONS OF WINGWALL DOWN TO FLOW LINE
OF EXISTING BOX CULVERT.
EST. CONC. REM. = CU. YDS.



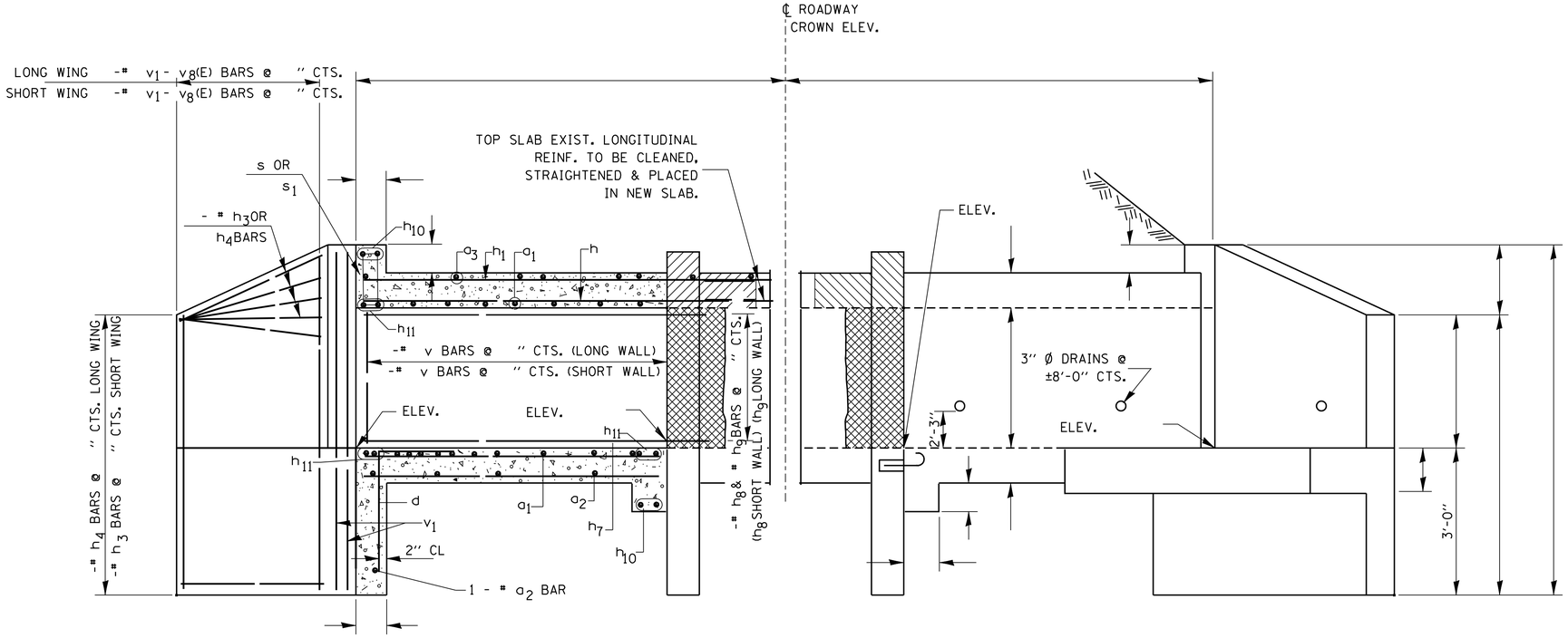
SHOWING REINFORCEMENT

SHOWING OUTLINES

PLAN

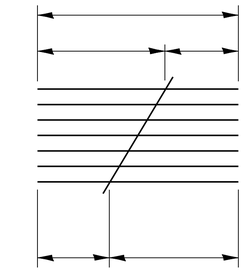
DESIGN STRESSES
fy = 60,000 P.S.I.
fc' = 3,500 P.S.I
MAX SOIL PRESSURE UNDER FOOTING = 2,065 P.S.F.
LOADING HS20-44

540–2A



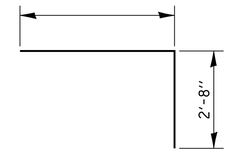
HALF LONG SECTION

HALF ELEVATION

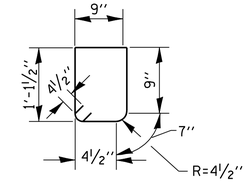


BAR CUTTING DIAGRAM

BARS h & h1

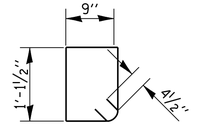


BAR z



BAR s

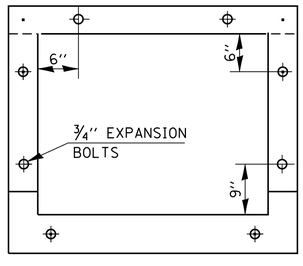
(UPSTREAM)



BAR s1

(DOWNSTREAM)

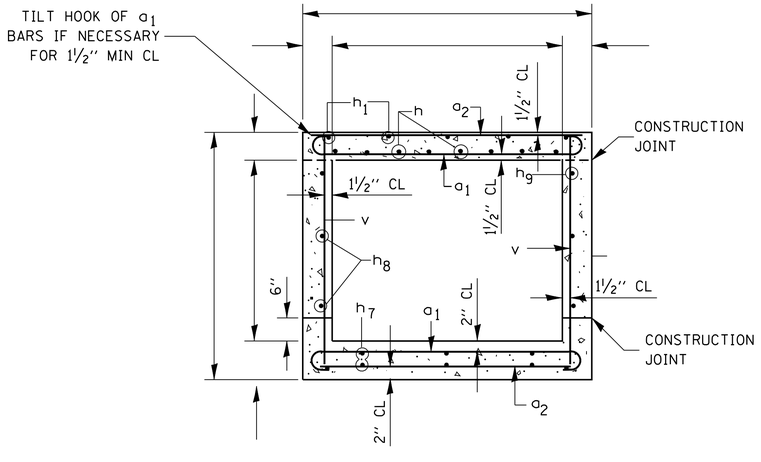
DIMENSIONS AT RT. ∠'S TO ℄ ROADWAY



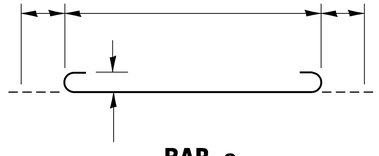
SIDEWALLS @ '' CTS.
TOP & BOTTOM @ '' CTS.

EXPANSION BOLT LOCATION

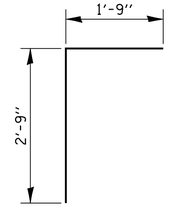
NOTE: EXPANSION BOLTS SHALL CONSIST OF SELF DRILL EXPANSION SHIELDS AND ¾'' DIAMETER HOOKED BOLTS. HOOKED BOLTS SHALL EXTEND A MINIMUM OF 9'' INTO NEW CONCRETE.
MINIMUM CERTIFIED PROOF LOAD = 4,080 LBS.



SECTION THRU BARREL



BAR a1



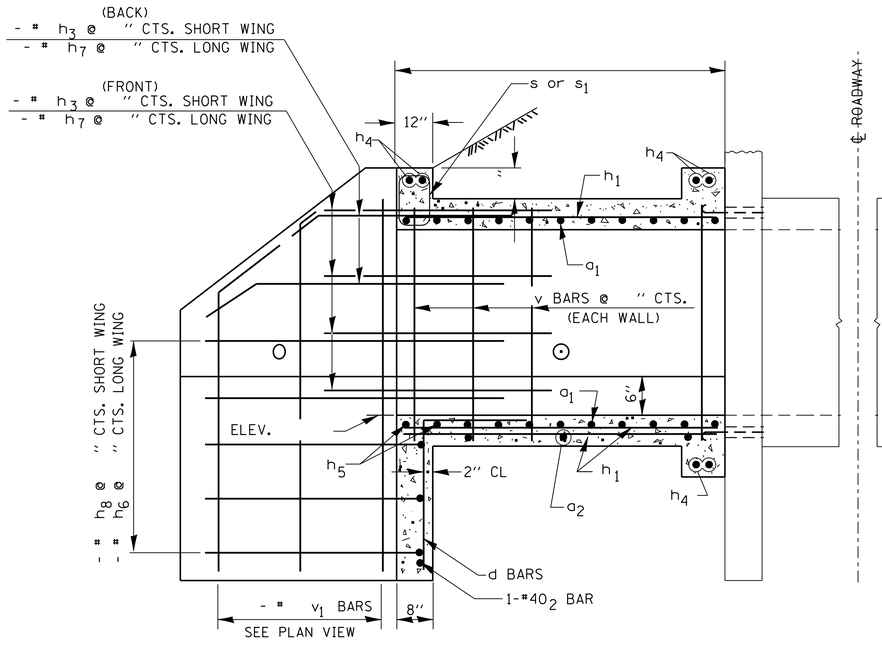
BAR d

BILL OF MATERIAL

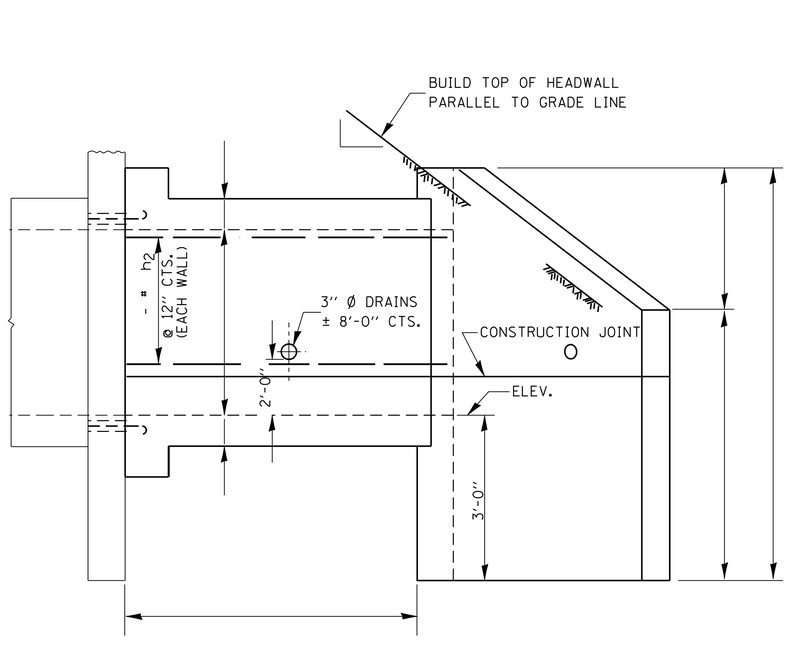
BAR	NO.	SIZE	LENGTH
a1			
a2		#4	
a3			
d			
h			
h1			
h3			
h4			
h5			
h6			
h7			
h8			
h9			
h10		#6	
h11			
s			
s1			
v			
v1(E)			
v2(E)			
v3(E)			
v4(E)			
v5(E)			
v6(E)			
v7(E)			
v8(E)			
w		#5	
w1		#5	
z			

CONCRETE BOX CULVERTS	CU. YD.	
REINFORCEMENT BARS	LBS.	
REIN. BARS (EPOXY CTD.)	LBS.	
CONCRETE REMOVAL	CU. YD.	
EXPANSION BOLTS	EACH	

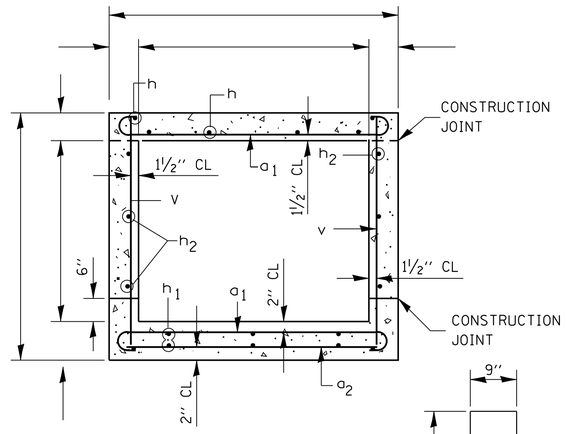
540–2B



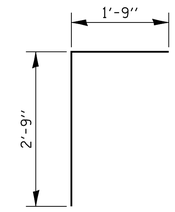
HALF LONG SECTION



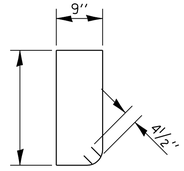
HALF ELEVATION



SECTION THRU BARREL

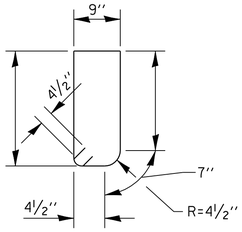


BAR d



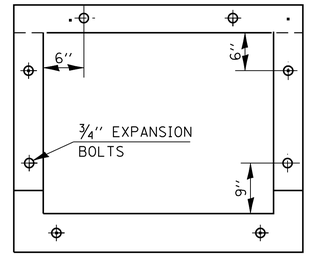
BAR s_1

(DOWNSTREAM)



BAR s

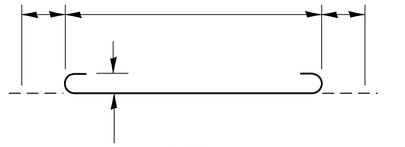
(UPSTREAM)



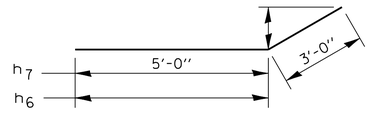
SIDEWALLS @ " CTS.
TOP & BOTTOM @ " CTS.

EXPANSION BOLT LOCATION

NOTE: EXPANSION BOLTS SHALL CONSIST OF SELF DRILL EXPANSION SHIELDS AND ¾" DIAMETER HOOKED BOLTS. HOOKED BOLTS SHALL EXTEND A MINIMUM OF 9" INTO NEW CONCRETE. MINIMUM CERTIFIED PROOF LOAD = 4,080 LBS.



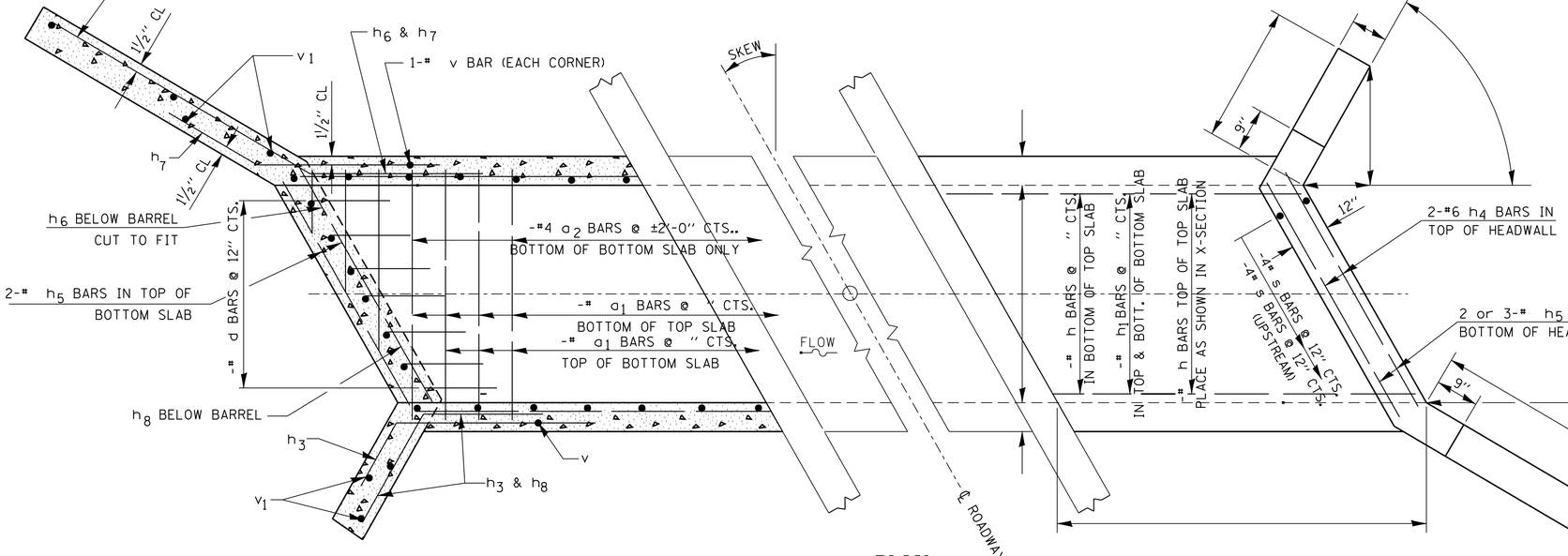
BAR a_1



BARS h_6 & h_7

SECTION THRU HEADWALL

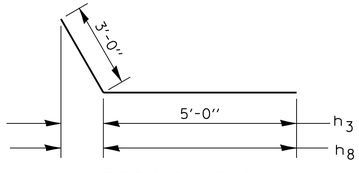
(UP STREAM END ONLY)



SHOWING REINFORCEMENT

PLAN

SHOWING OUTLINES



BARS h_3 & h_8

GENERAL NOTES

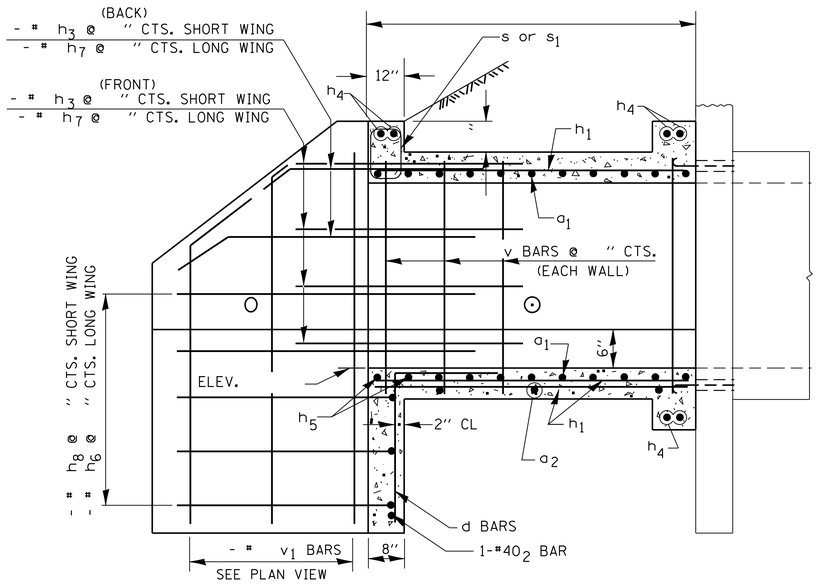
CLASS SI CONCRETE SHALL BE USED THROUGHOUT.
AT LEAST SIX FEET OF BARREL SHALL BE POURED MONOLITHICALLY WITH WINGWALLS.
EXPOSED EDGES SHALL BE BEVELED ¾".
FOR BACKFILING AND EMBANKMENTS SEE STANDARD SPECIFICATIONS.
TILT HOOK OF a_1 BARS, IF NECESSARY, TO OBTAIN 1½" MINIMUM CLEARANCE AT THE TOP OF HOOK.
REINFORCEMENT BARS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-31, M-42 OR M-53, GRADE 60.

DESIGN STRESSES
fy= 60,000 P.S.I.
fc'= 3,500 P.S.I.

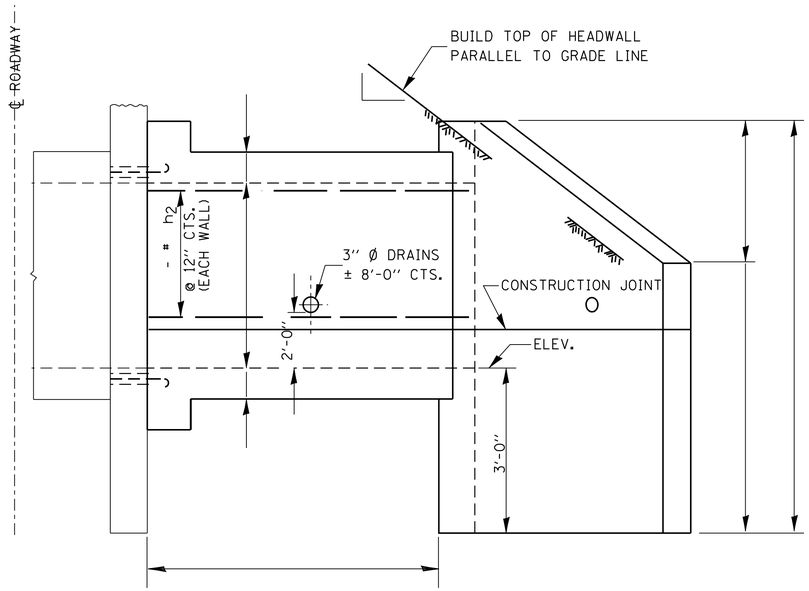
LOADING HS 20-44 & ALT.

BILL OF MATERIALS

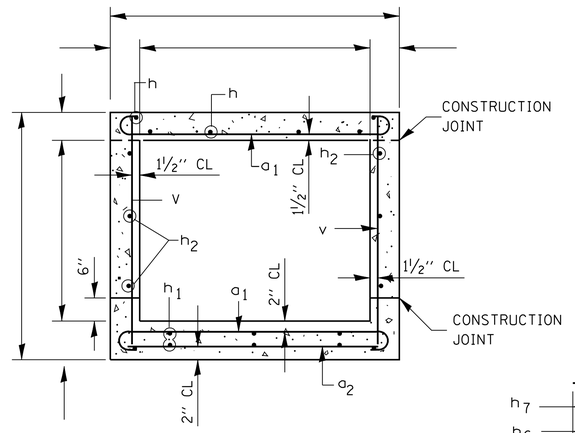
BAR	NUMBER	SIZE	LENGTH
a_1			
a_2		#4	
d			
h			
h_1			
h_2			
h_3			
h_4		#6	
h_5			
h_6			
h_7			
h_8			
v			
v_1			
s		#4	
s_1		#4	
CONC. BOX CULV.		CU. YDS.	
REINFORCEMENT BARS		LBS.	
EXPANSION BOLTS		EACH	



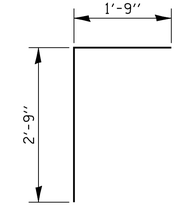
HALF LONG SECTION



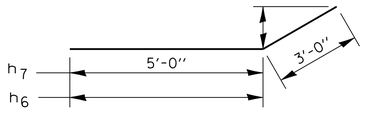
HALF ELEVATION



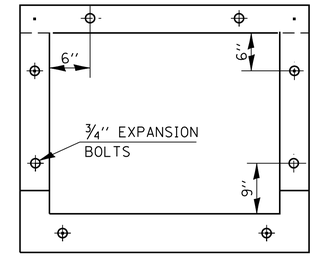
SECTION THRU BARREL



BAR d



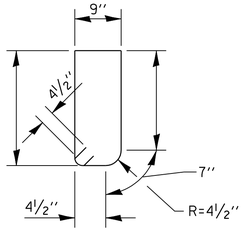
BARS h6 & h7



SIDEWALLS @ " CTS.
TOP & BOTTOM @ " CTS.

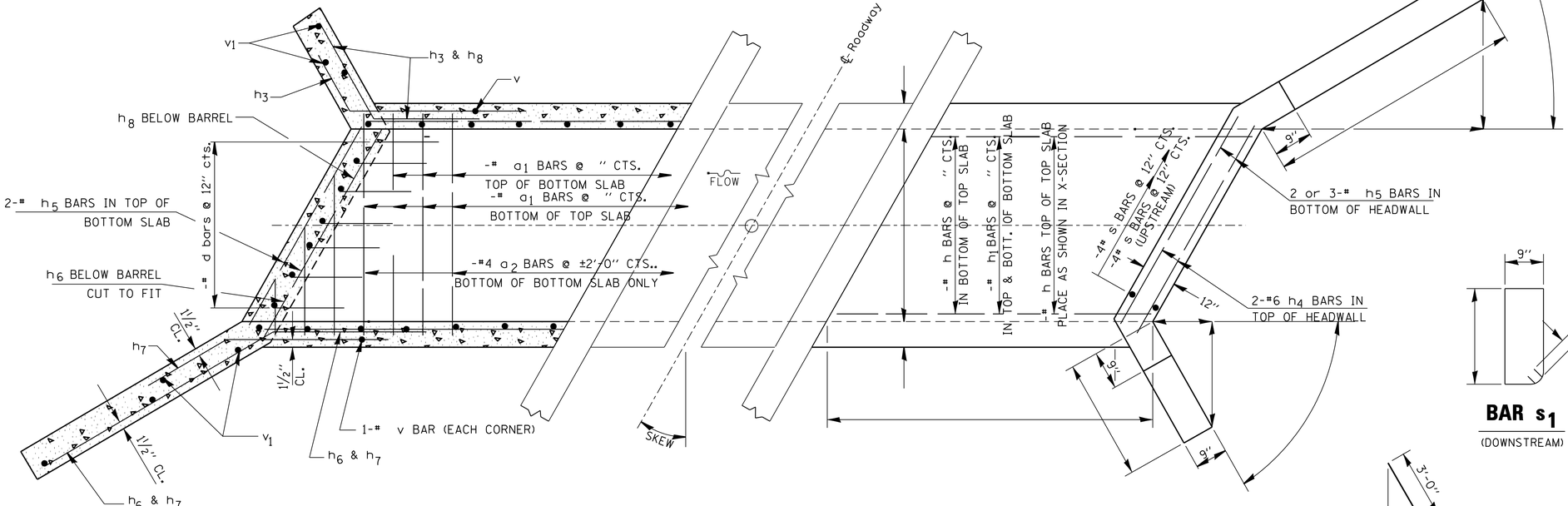
EXPANSION BOLT LOCATION

NOTE: EXPANSION BOLTS SHALL CONSIST OF SELF DRILL EXPANSION SHIELDS AND ¾" DIAMETER HOOKED BOLTS. HOOKED BOLTS SHALL EXTEND A MINIMUM OF 9" INTO NEW CONCRETE.
MINIMUM CERTIFIED PROOF LOAD = 4,080 LBS.



BAR s

(UPSTREAM)



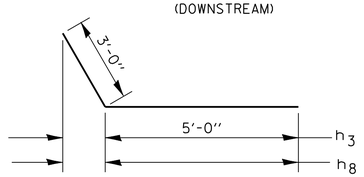
SHOWING REINFORCEMENT

PLAN

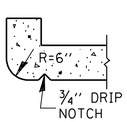
SHOWING OUTLINES

BAR s1

(DOWNSTREAM)



BARS h3 & h8



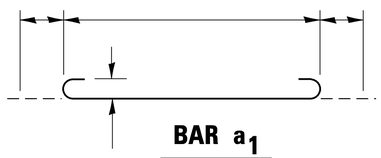
SECTION THRU HEADWALL

(Up Stream End Only)

GENERAL NOTES

Class SI Concrete shall be used throughout.
At least six feet of Barrel shall be poured monolithically with wingwalls.
Exposed edges shall be beveled ¾".
For backfilling and embankments see Standard Specifications.
Tilt hook of a_1 bars, if necessary, to obtain 1½" minimum clearance at top of hook.

Reinforcement Bars shall conform to the requirements of AASHTO M-31, M-42 or M-53, Grade 60.



BAR a1

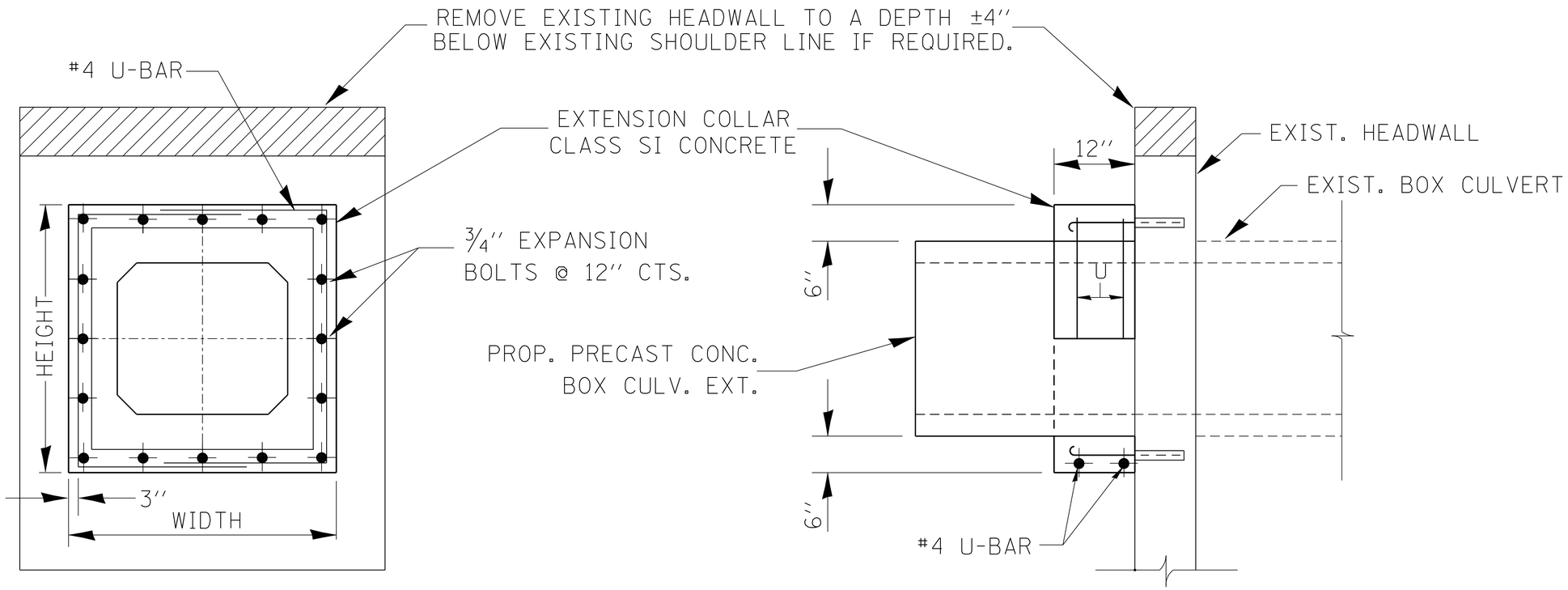
DESIGN STRESSES

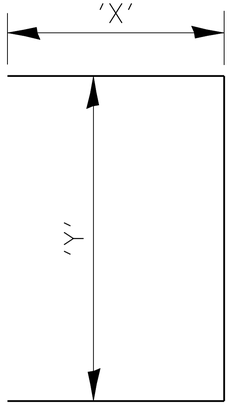
fy= 60,000 P.S.I.
fc'= 3,500 P.S.I.

LOADING HS 20-44 & ALT.

BILL OF MATERIALS

BAR	NUMBER	SIZE	LENGTH
a_1			
a_2		#4	
d			
h			
h_1			
h_2			
h_3			
h_4		#6	
h_5			
h_6			
h_7			
h_8			
v			
v_1			
s		#4	
s_1		#4	
CONC. BOX CULV.		CU. YDS.	
REINFORCEMENT BARS		LBS.	
EXPANSION BOLTS		EACH	



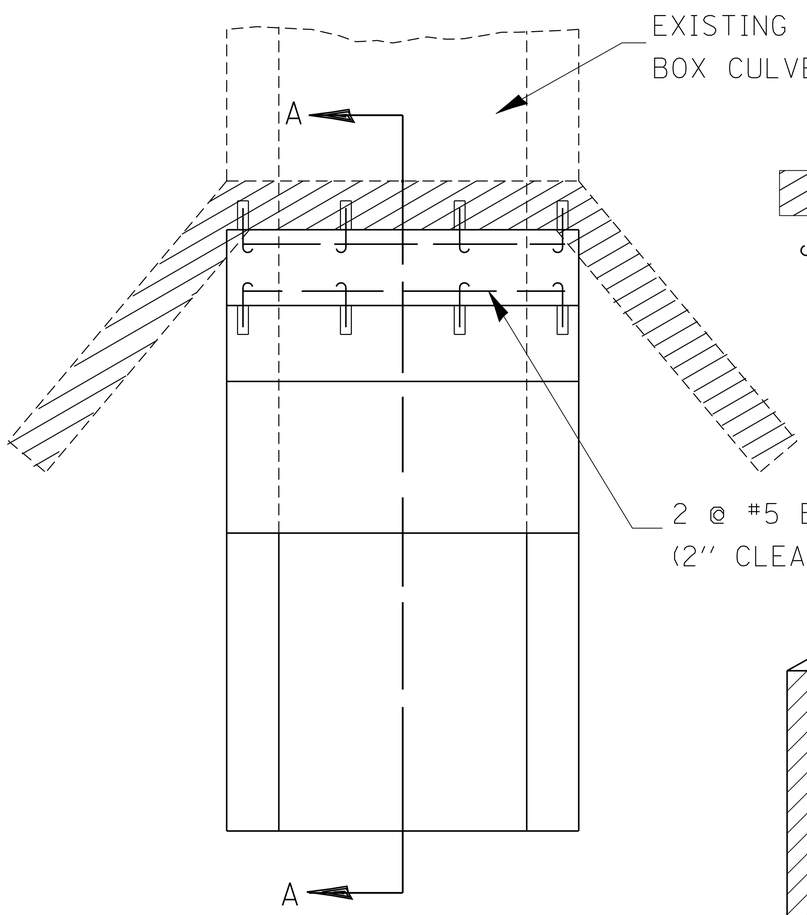


U-BAR

EXPANSION BOLTS SHALL CONSIST OF SELF DRILLING EXPANSION SHIELDS AND ¾'' DIA. HOOKED BOLTS. HOOKED BOLTS SHALL EXTEND A MINIMUM OF 9'' INTO NEW CONCRETE. BOLTS SHALL BE DRILLED IN THE CENTER OF THE EXISTING BOX CULVERT BARREL WALLS.
MINIMUM CERTIFIRED PROOF LOAD = 4,080 LBS.

							QUANTITIES ARE FOR ONE SIDE ONLY		
LOCATION	EXISTING CULVERT SIZE	PRECAST CULVERT EXTENSION	EXTENSION COLLAR		U-BAR		CONC. COLLAR	REINFORCEMENT BARS	¾'' DIA. EXPANSION BOLTS
			WIDTH	HEIGHT	'X'	'Y'			
	FT. x FT.	FT. x FT.	IN.	IN.	IN.	IN.	CU. YD.	POUND	EACH

COLLAR DETAIL (PRECAST BOX CULVERT EXTENSION OF BOX CULVERT)

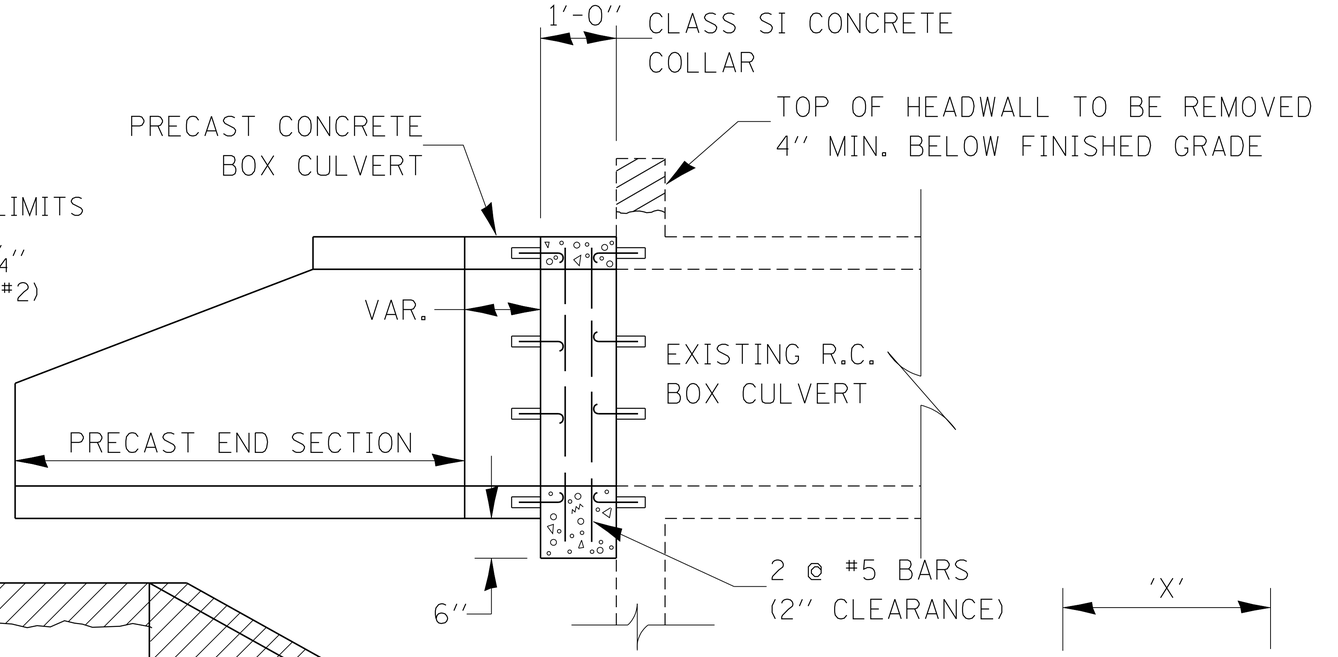


PLAN VIEW

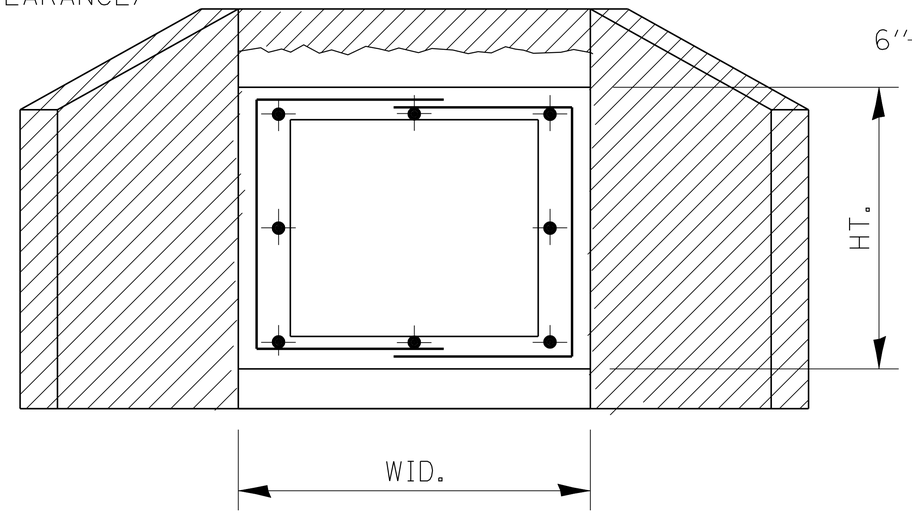
LEGEND

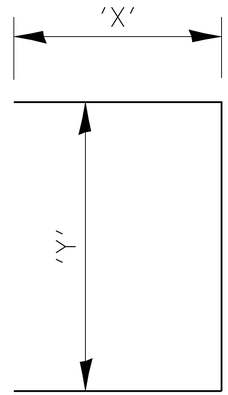
CONCRETE REMOVAL LIMITS

EXPANSION BOLTS, 3/4''
(SEE GENERAL NOTE #2)



SECTION A-A





U-BAR

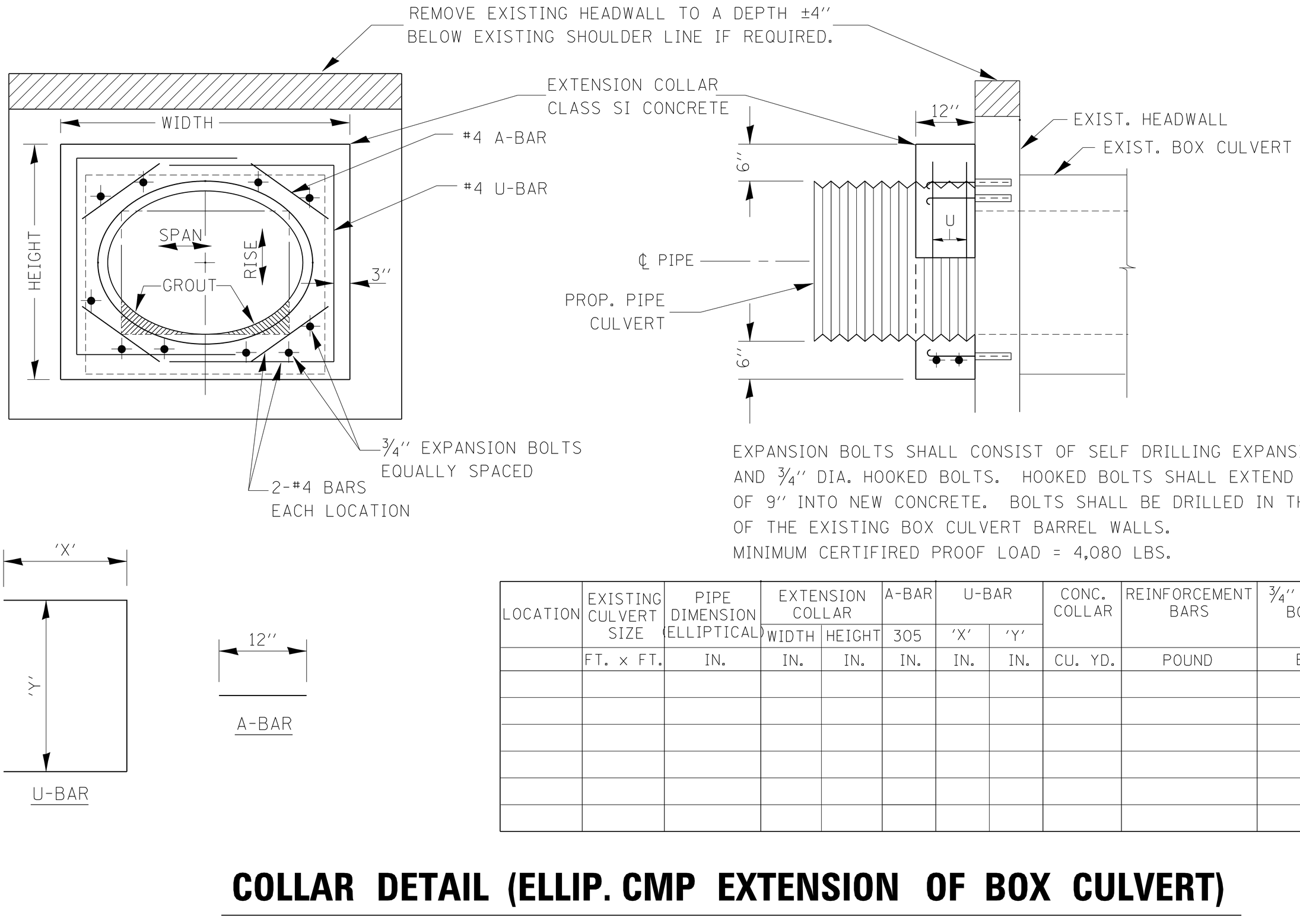
LOCATION	EXISTING CULVERT SIZE	PRECAST CULV. EXTENSION	U-BAR		CONC. COLLAR	REINFORCEMENT BARS	3/4'' DIA. EXPANSION BOLTS
			'X'	'Y'			
	FT. x FT.	IN.	IN.	IN.	CU. YD.	POUND	EACH

GENERAL NOTES

1.) CLASS SI CONCRETE SHALL BE USED THROUGHOUT. THE INSIDE DIMENSIONS OF THE CLASS SI CONCRETE COLLAR SHALL BE THE SAME AS THE NEW PRECAST CONCRETE BOX CULVERT.

2.) EXPANSION BOLTS SHALL CONSIST OF SELF DRILLING EXPANSION SHIELDS AND 3/4'' HOOKED BOLTS. HOOKED BOLTS SHALL EXTEND A MINIMUM OF 9'' INTO NEW CONCRETE. BOLTS SHALL BE PLACED IN EACH CORNER AND AT 18'' MAXIMUM CENTERS. MINIMUM CERTIFIED PROOF LOADING = 4,080 LBS.

COLLAR DETAIL (PRECAST BOX CULVERT EXTENSION OF BOX CULVERT)



EXPANSION BOLTS SHALL CONSIST OF SELF DRILLING EXPANSION SHIELDS AND ¾'' DIA. HOOKED BOLTS. HOOKED BOLTS SHALL EXTEND A MINIMUM OF 9'' INTO NEW CONCRETE. BOLTS SHALL BE DRILLED IN THE CENTER OF THE EXISTING BOX CULVERT BARREL WALLS.
MINIMUM CERTIFIRED PROOF LOAD = 4,080 LBS.

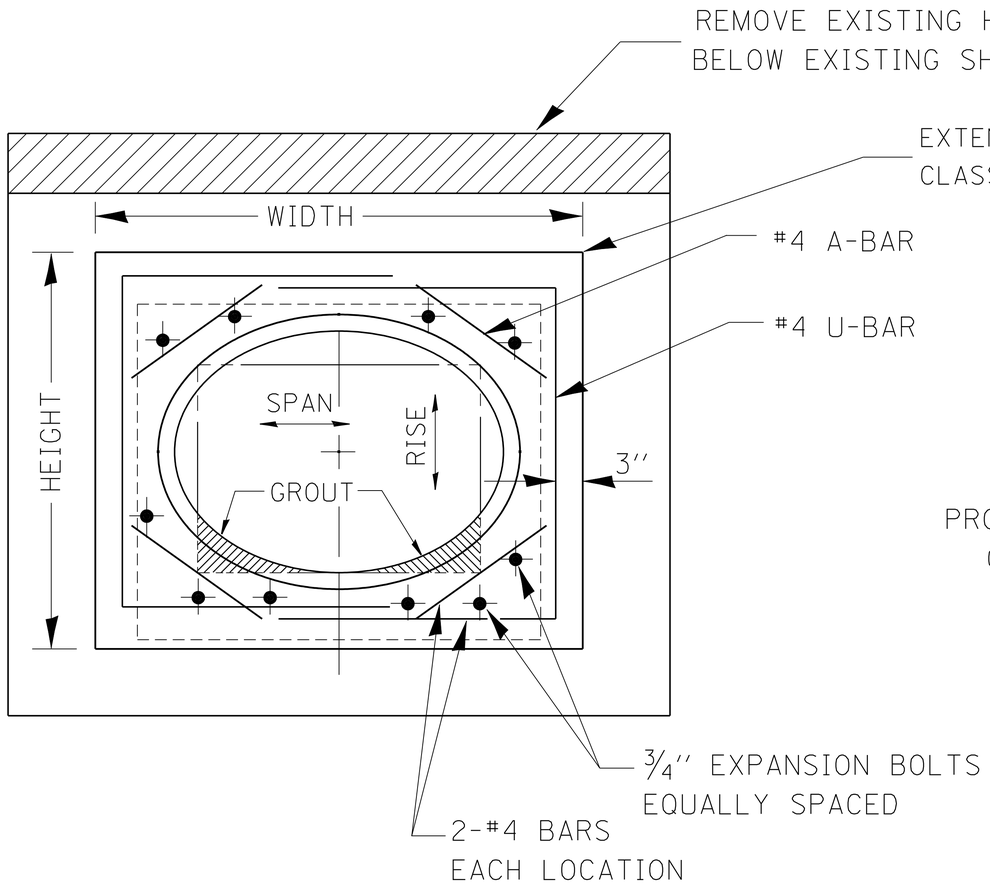
U-BAR

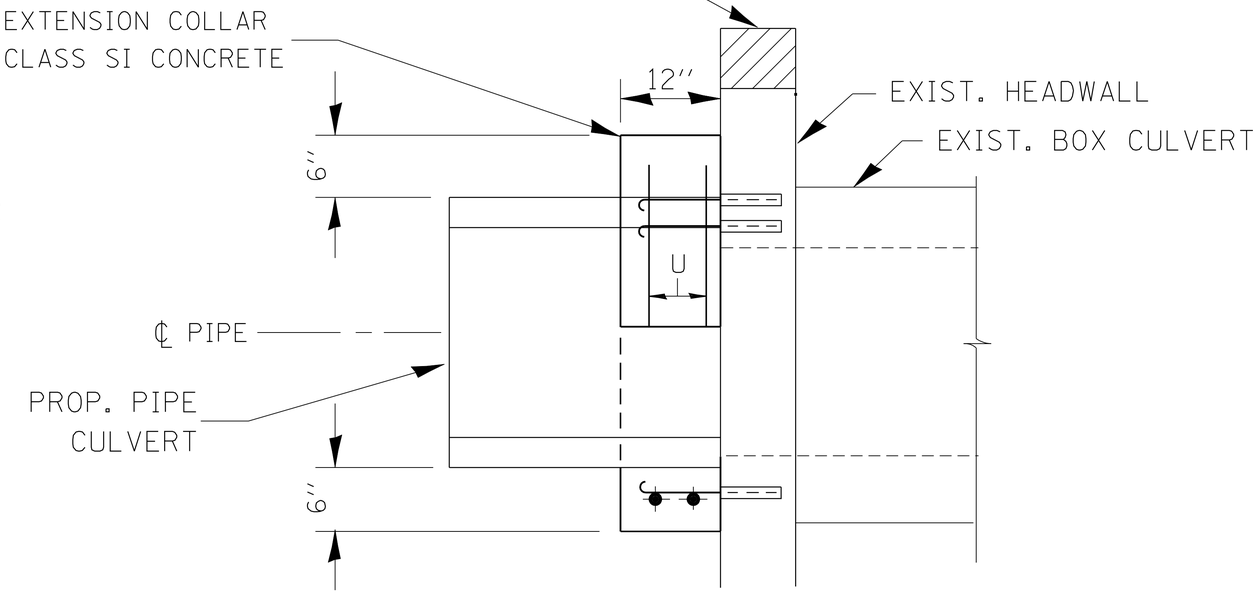
A-BAR

LOCATION	EXISTING CULVERT SIZE	PIPE DIMENSION (ELLIPTICAL)	EXTENSION COLLAR		A-BAR	U-BAR		CONC. COLLAR	REINFORCEMENT BARS	¾'' EXPAN BOLTS
			WIDTH	HEIGHT	305	'X'	'Y'			
	FT. × FT.	IN.	IN.	IN.	IN.	IN.	IN.	CU. YD.	POUND	EACH

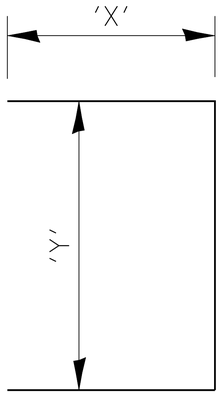
COLLAR DETAIL (ELLIP. CMP EXTENSION OF BOX CULVERT)

540–7

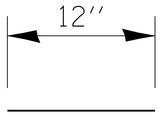




EXPANSION BOLTS SHALL CONSIST OF SELF DRILLING EXPANSION SHIELDS AND ¾'' DIA. HOOKED BOLTS. HOOKED BOLTS SHALL EXTEND A MINIMUM OF 9'' INTO NEW CONCRETE. BOLTS SHALL BE DRILLED IN THE CENTER OF THE EXISTING BOX CULVERT BARREL WALLS.
MINIMUM CERTIFIRED PROOF LOAD = 4,080 LBS.



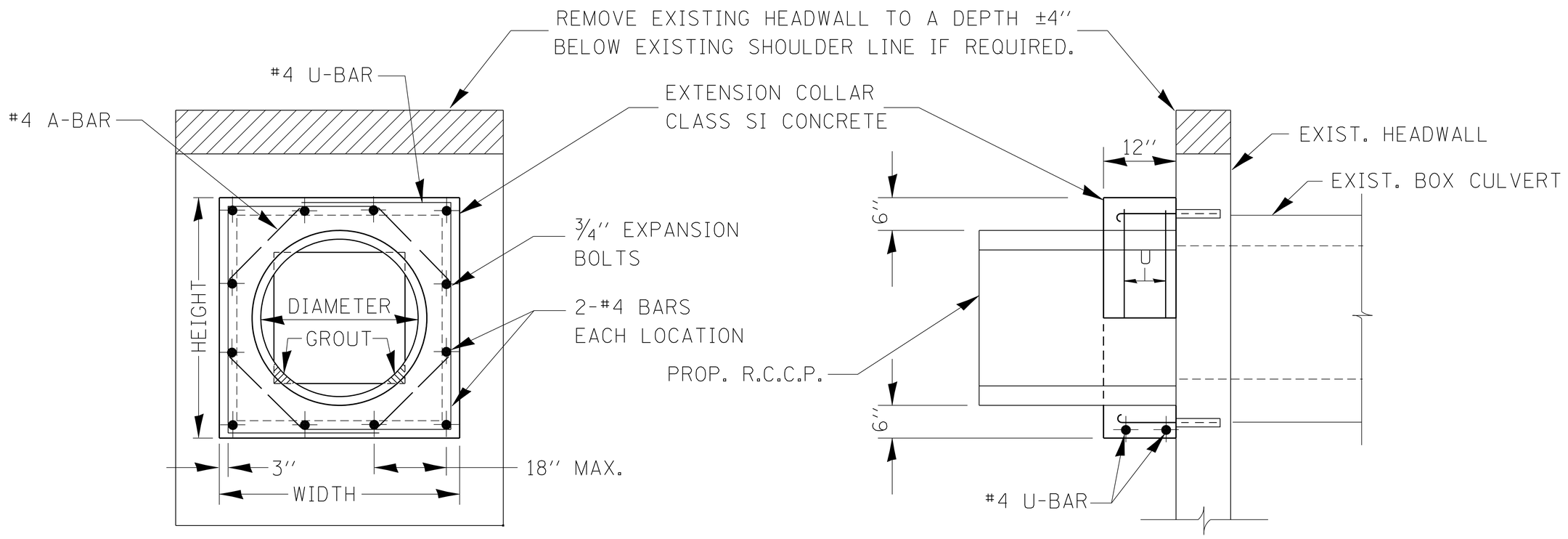
U-BAR



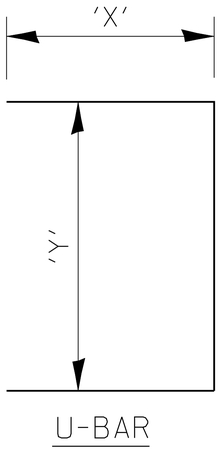
A-BAR

LOCATION	EXISTING CULVERT SIZE	PIPE DIMENSION (ELLIPTICAL)	EXTENSION COLLAR		A-BAR	U-BAR		CONC. COLLAR	REINFORCEMENT BARS	¾'' EXPAN BOLTS
			WIDTH	HEIGHT	305	'X'	'Y'			
	FT. x FT.	IN.	IN.	IN.	IN.	IN.	IN.	CU. YD.	POUND	EACH

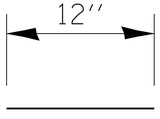
COLLAR DETAIL (ELLIP. CONC. EXTENSION OF BOX CULVERT)



EXPANSION BOLTS SHALL CONSIST OF SELF DRILLING EXPANSION SHIELDS AND ¾'' DIA. HOOKED BOLTS. HOOKED BOLTS SHALL EXTEND A MINIMUM OF 9'' INTO NEW CONCRETE. BOLTS SHALL BE DRILLED IN THE CENTER OF THE EXISTING BOX CULVERT BARREL WALLS.
MINIMUM CERTIFIRED PROOF LOAD = 4,080 LBS.



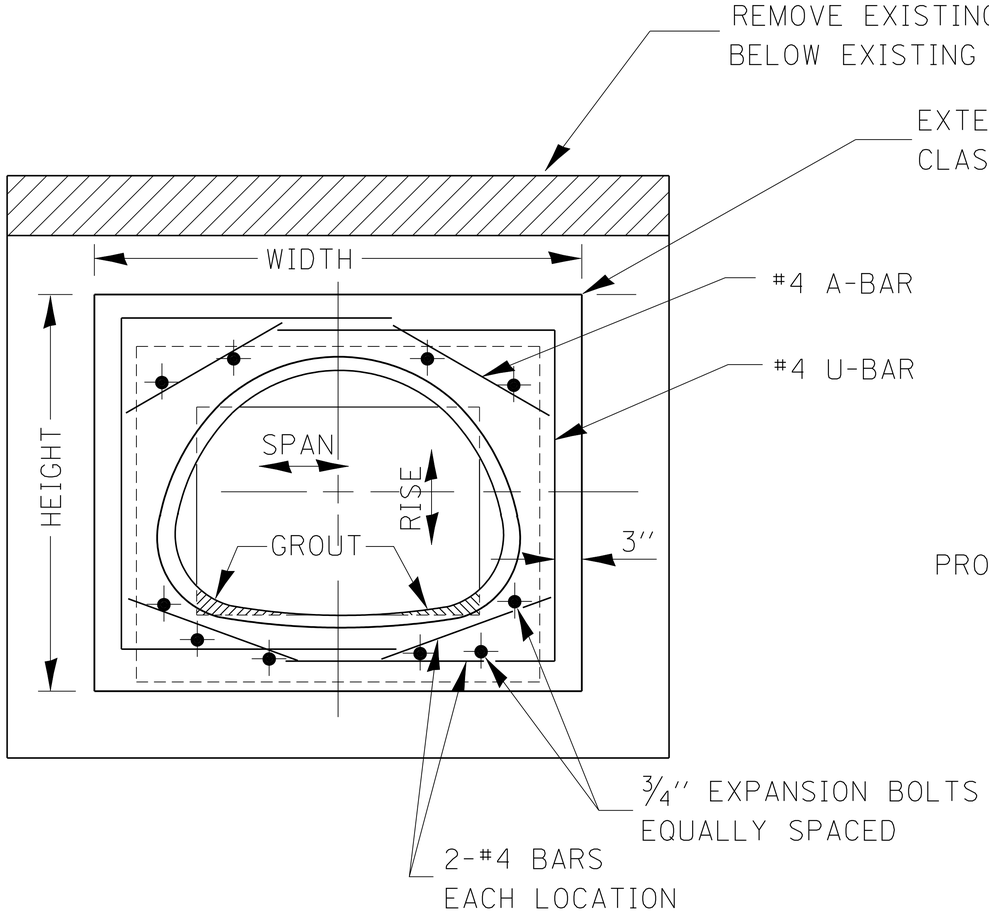
U-BAR

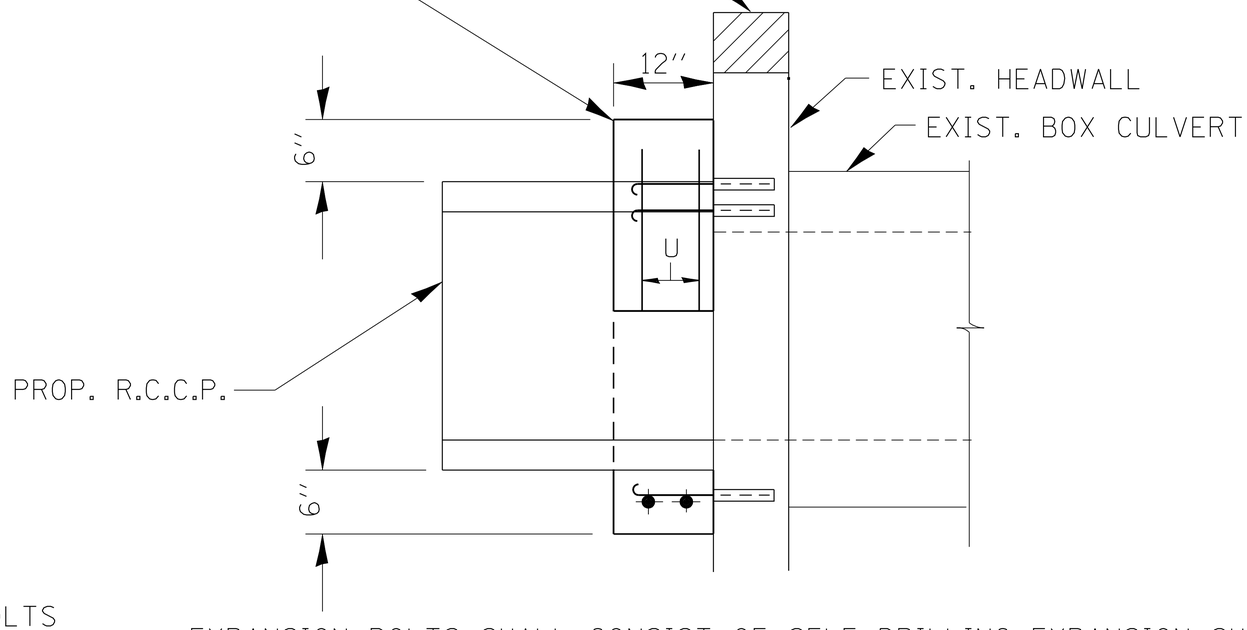


A-BAR

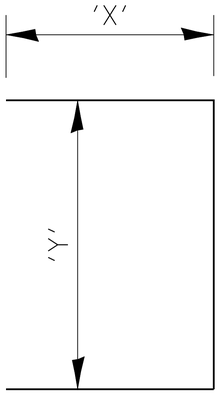
LOCATION	EXISTING CULVERT SIZE	PIPE DIMENSION	PIPE AREA	EXTENSION COLLAR		A-BAR	U-BAR		QUANTITIES ARE FOR ONE SIDE ONLY		
				WIDTH	HEIGHT	305	'X'	'Y'	CLASS SI CONC. COLLAR	REINFORCEMENT BARS	¾'' DIA. EXPANSION BOLTS
	FT. x FT.	DIA. IN.	SQ. FT.	IN.	IN.	IN.	IN.	IN.	CU. YD.	POUND	EACH

COLLAR DETAIL (R.C.C.P. EXTENSION OF BOX CULVERT)

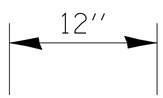




EXPANSION BOLTS SHALL CONSIST OF SELF DRILLING EXPANSION SHIELDS AND ¾'' DIA. HOOKED BOLTS. HOOKED BOLTS SHALL EXTEND A MINIMUM OF 9'' INTO NEW CONCRETE. BOLTS SHALL BE DRILLED IN THE CENTER OF THE EXISTING BOX CULVERT BARREL WALLS.
MINIMUM CERTIFIRED PROOF LOAD = 4,080 LBS.



U-BAR

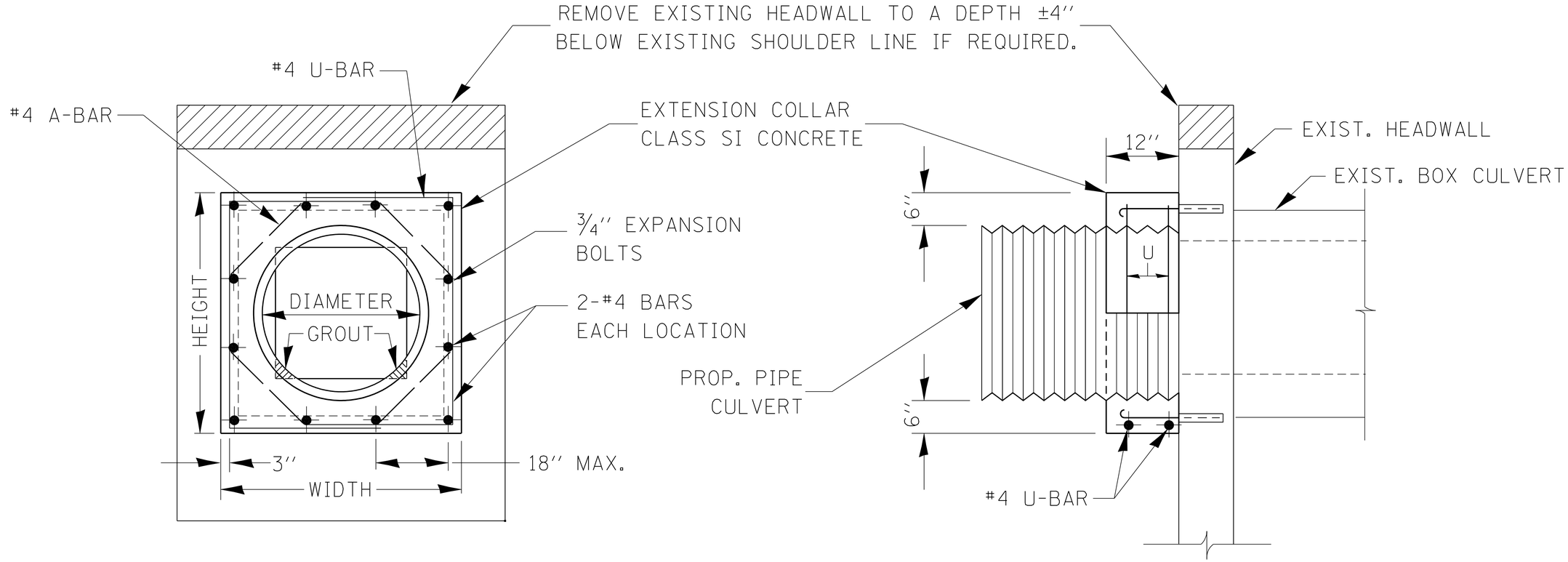


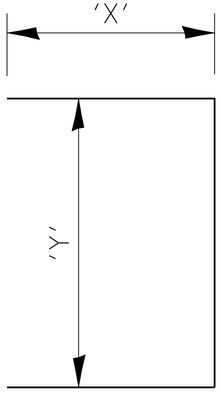
A-BAR

LOCATION	EXISTING CULVERT SIZE	PIPE DIMENSION			PIPE AREA	EXTENSION COLLAR		A-BAR	U-BAR		QUANTITIES ARE FOR ONE SIDE ONLY		
		SPAN	RISE	EQUIV.		WIDTH	HEIGHT	380	'X'	'Y'	CLASS SI CONC. COLLAR	REINFORCEMENT BARS	3/4'' DIA. EXPANSION BOLTS
	FT. x FT.	IN.	IN.	IN.	SQ. FT.	IN.	IN.	IN.	IN.	IN.	CU. YD.	POUND	EACH

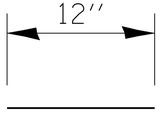
COLLAR DETAIL (A.D.E. R.C.C.P. EXTENSION OF BOX CULVERT)

540–10





U-BAR

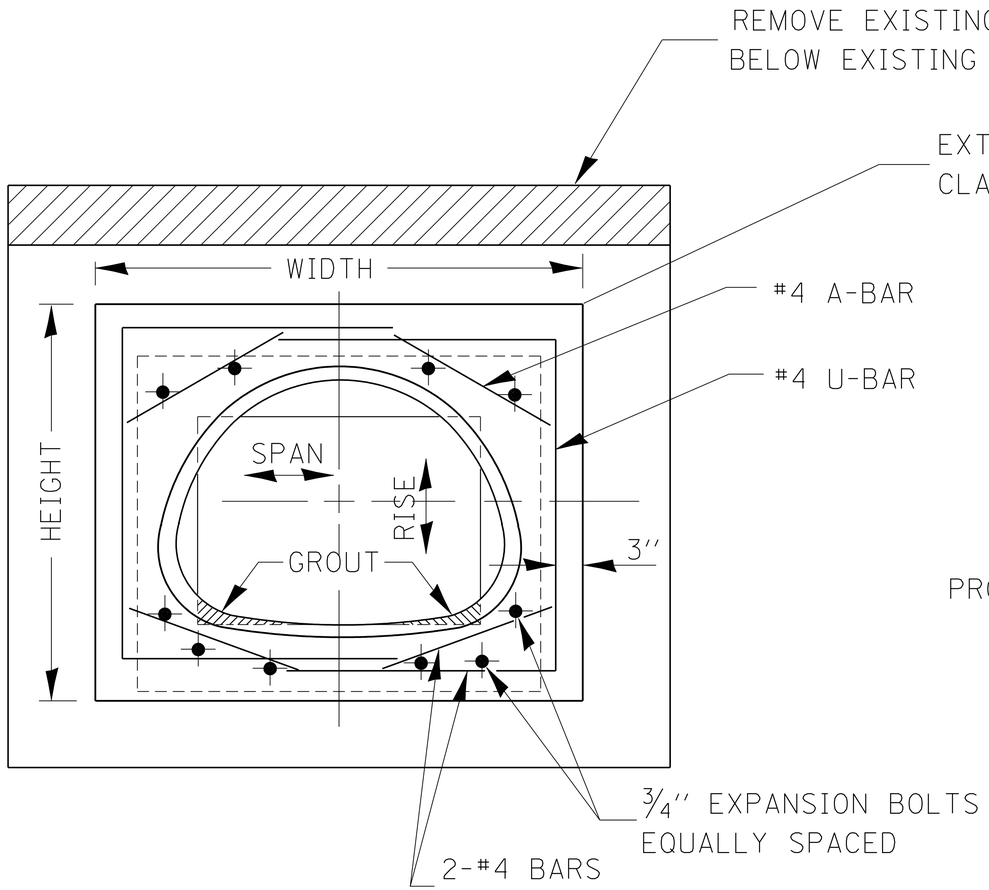


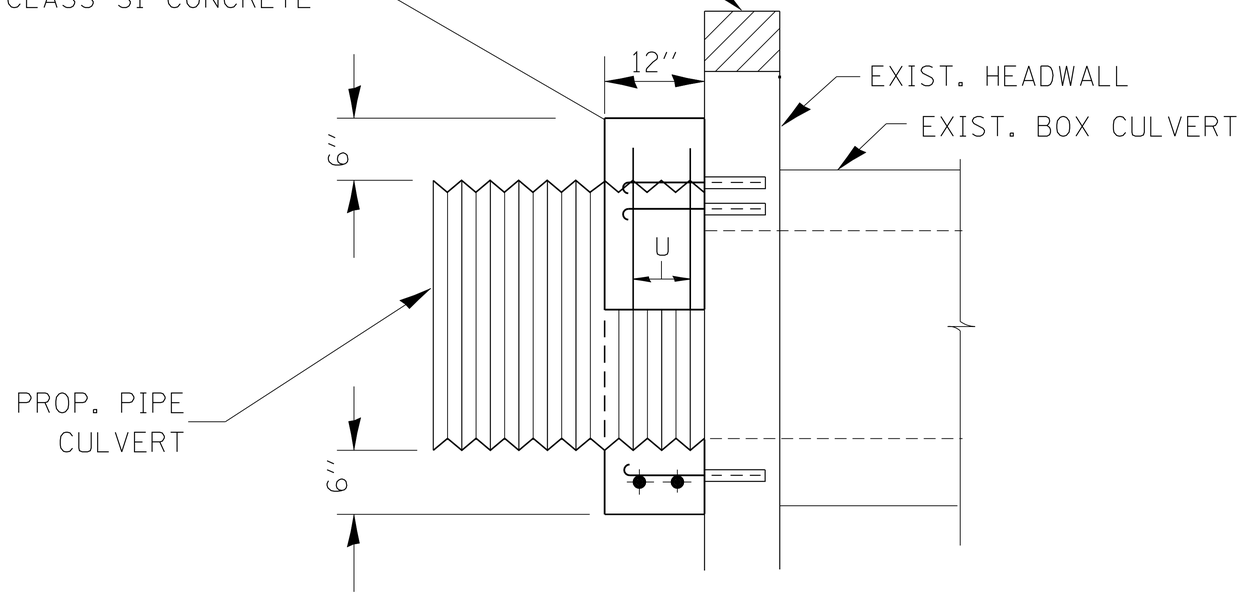
A-BAR

EXPANSION BOLTS SHALL CONSIST OF SELF DRILLING EXPANSION SHIELDS AND ¾'' DIA. HOOKED BOLTS. HOOKED BOLTS SHALL EXTEND A MINIMUM OF 9'' INTO NEW CONCRETE. BOLTS SHALL BE DRILLED IN THE CENTER OF THE EXISTING BOX CULVERT BARREL WALLS.
MINIMUM CERTIFIRED PROOF LOAD = 4,080 LBS.

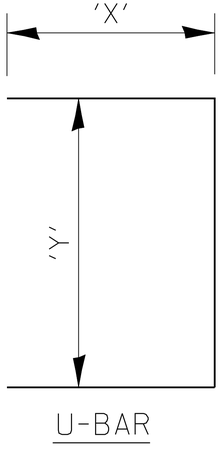
									QUANTITIES ARE FOR ONE SIDE ONLY		
LOCATION	EXISTING CULVERT SIZE	PIPE DIMENSION	PIPE AREA	EXTENSION COLLAR		A-BAR	U-BAR		CLASS SI CONC. COLLAR	REINFORCEMENT BARS	¾'' DIA. EXPANSION BOLTS
				WIDTH	HEIGHT	305	'X'	'Y'			
	FT. x FT.	DIA. IN.	SQ. FT.	IN.	IN.	IN.	IN.	IN.	CU. YD.	POUND	EACH

COLLAR DETAIL (CMP EXTENSION OF BOX CULVERT)

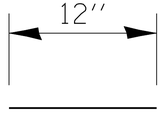




EXPANSION BOLTS SHALL CONSIST OF SELF DRILLING EXPANSION SHIELDS AND ¾'' DIA. HOOKED BOLTS. HOOKED BOLTS SHALL EXTEND A MINIMUM OF 9'' INTO NEW CONCRETE. BOLTS SHALL BE DRILLED IN THE CENTER OF THE EXISTING BOX CULVERT BARREL WALLS.
MINIMUM CERTIFIRED PROOF LOAD = 4,080 LBS.



U-BAR

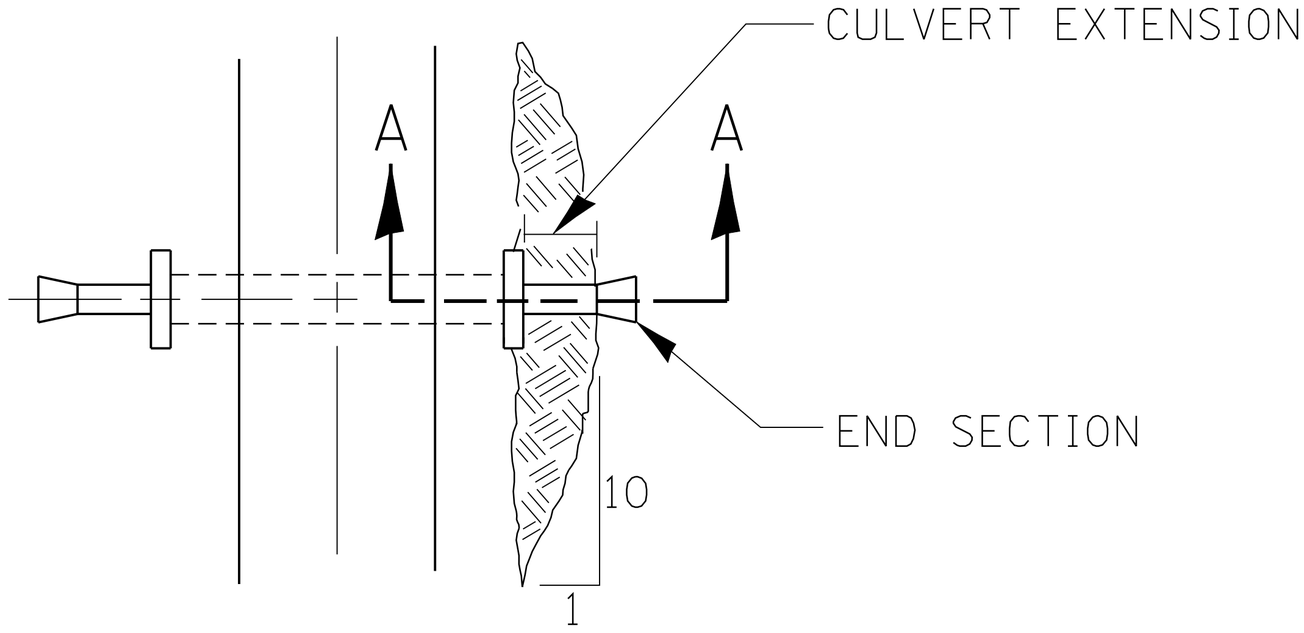


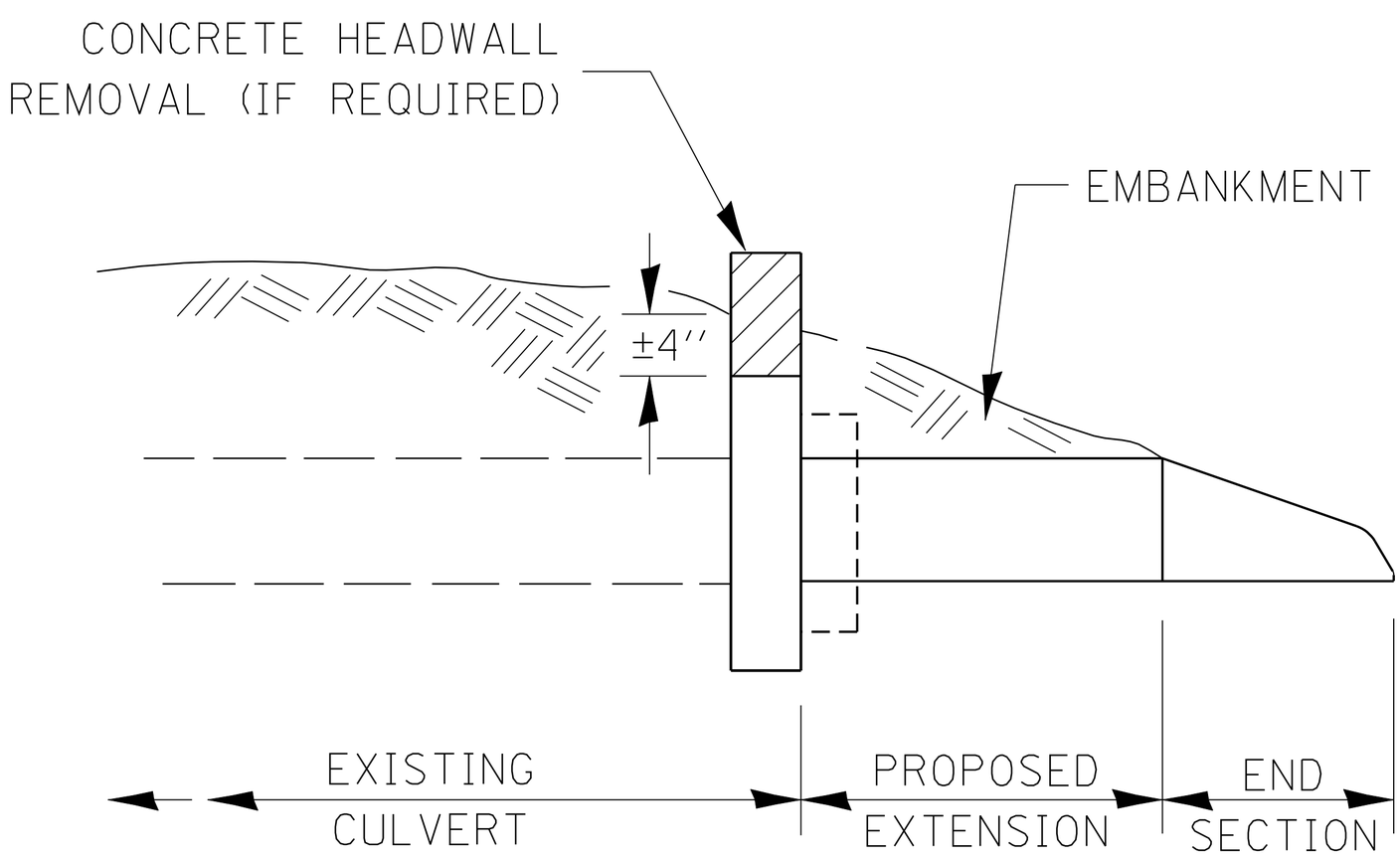
A-BAR

LOCATION	EXISTING CULVERT SIZE	PIPE DIMENSION			PIPE AREA	EXTENSION COLLAR		A-BAR	U-BAR		QUANTITIES ARE FOR ONE SIDE ONLY		
		SPAN	RISE	EQUIV.		WIDTH	HEIGHT	380	'X'	'Y'	CLASS SI CONC. COLLAR	REINFORCEMENT BARS	¾'' DIA. EXPANSION BOLTS
	FT. x FT.	IN.	IN.	IN.	SQ. FT.	IN.	IN.	IN.	IN.	IN.	CU. YD.	POUND	EACH

COLLAR DETAIL (A.D.E. CMP EXTENSION OF BOX CULVERT)

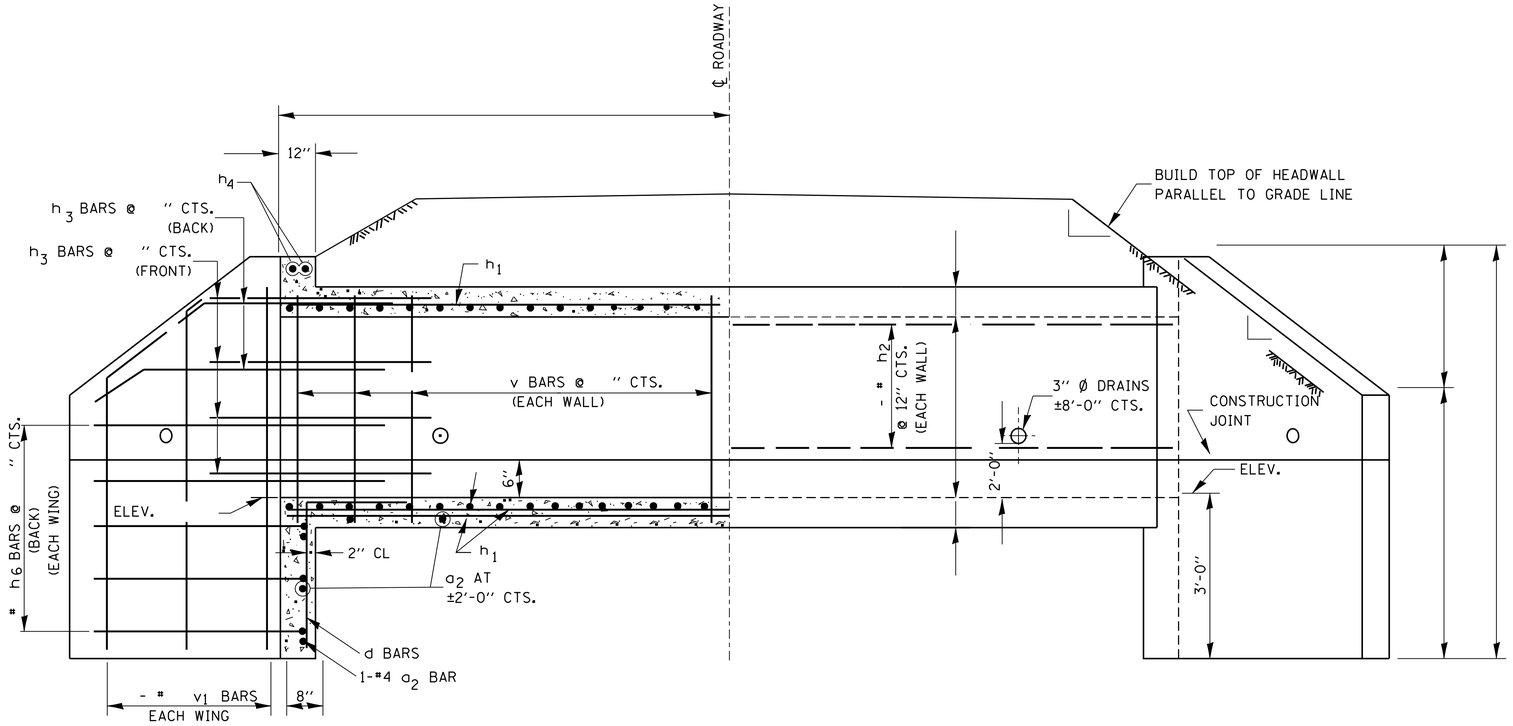
540–12





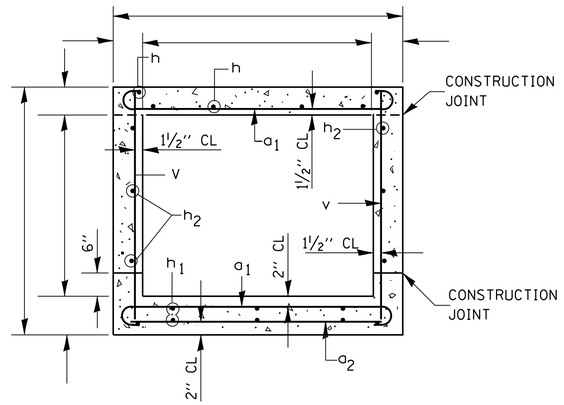
SECTION A-A

PLAN AT CULVERT EXTENSIONS

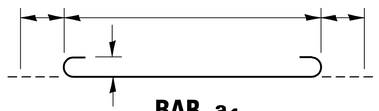


HALF LONG SECTION

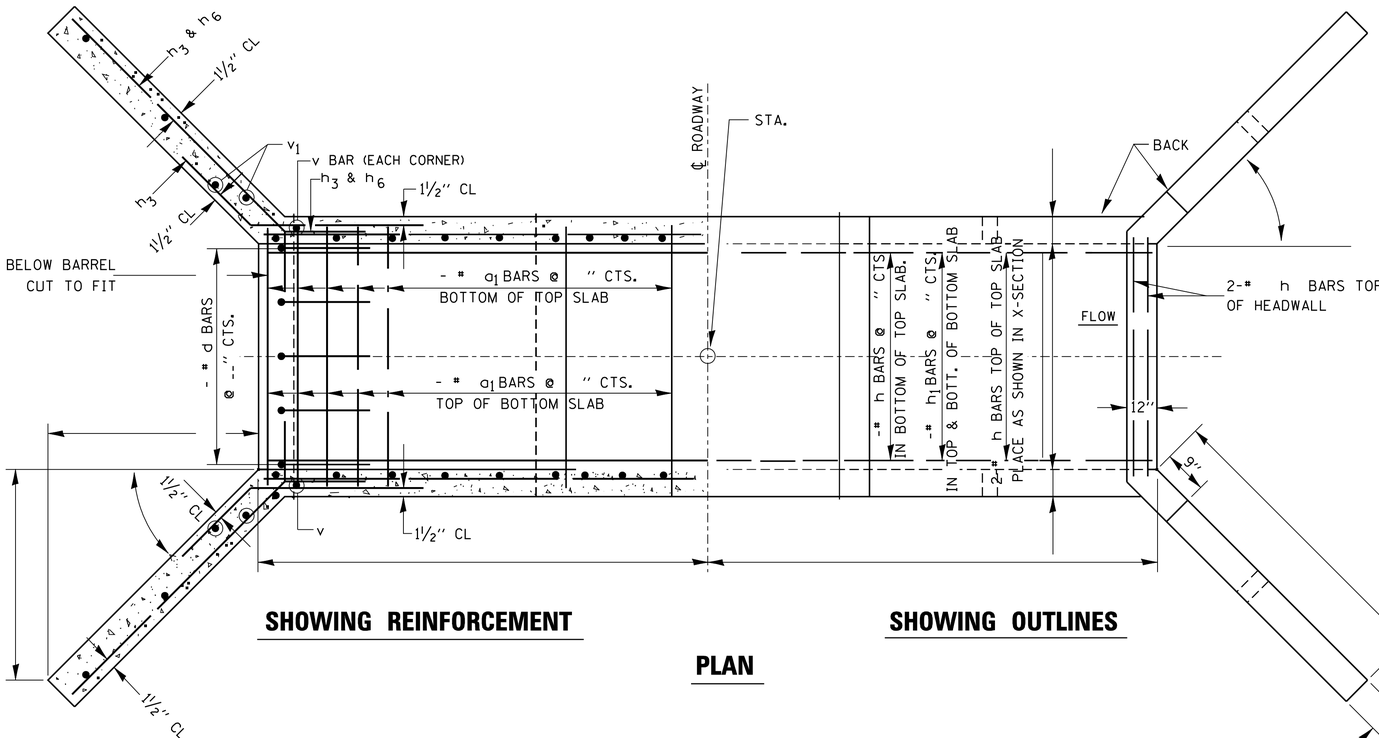
HALF ELEVATION



SECTION THRU BARREL



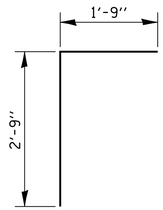
BAR a_1



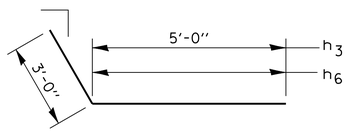
SHOWING REINFORCEMENT

SHOWING OUTLINES

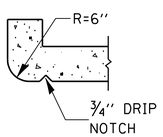
PLAN



BAR d



BARS h_3 & h_6



SECTION THRU HEADWALL

(UP STREAM END ONLY)

BILL OF MATERIALS

BAR	NUMBER	SIZE	LENGTH
a_1			
a_2			
a_3			
d			
h			
h_1			
h_2			
h_3			
h_4			
h_6			
v			
v_1			
v_2			
CONC. BOX CULV.		CU. YDS.	
REINFORCEMENT BARS		LBS.	

GENERAL NOTES

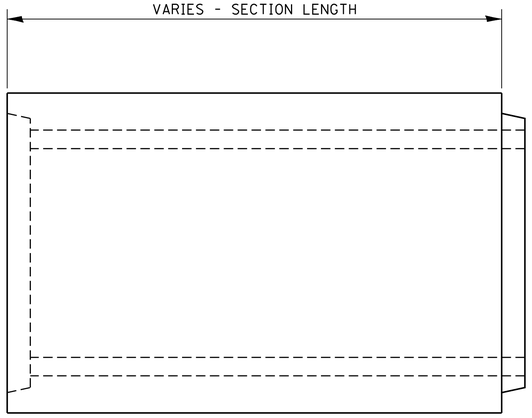
DESIGN STRESSES

fy=60,000 p.s.i.

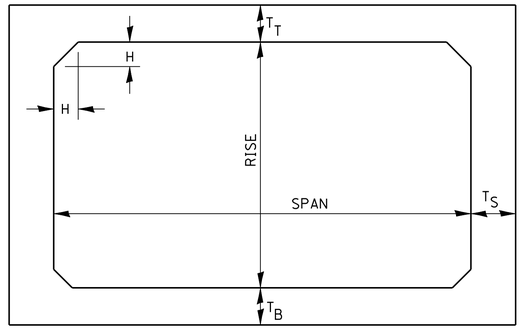
f'c= 3,500 p.s.i.

LOADING HS 20-44 & ALT.

CLASS SI CONCRETE SHALL BE USED THROUGHOUT.
AT LEAST SIX FEET OF BARREL SHALL BE POURED MONLITHICALLY WITH WINGWALLS.
EXPOSED EDGES SHALL BE BECELED ¾''.
FOR BACKFILLING AND EMBANKMENTS SEE STANDARD SPECIFICATIONS.
TILT HOOK OF a_1 BARS, IF NECESSARY, TO OBTAIN 1½'' MINIMUM CLEARANCE AT TOP OF HOOK.



ELEVATION



NOTE: THE HAUNCH DIMENSION H, IS EQUAL TO THE WALL THICKNESS T_S.

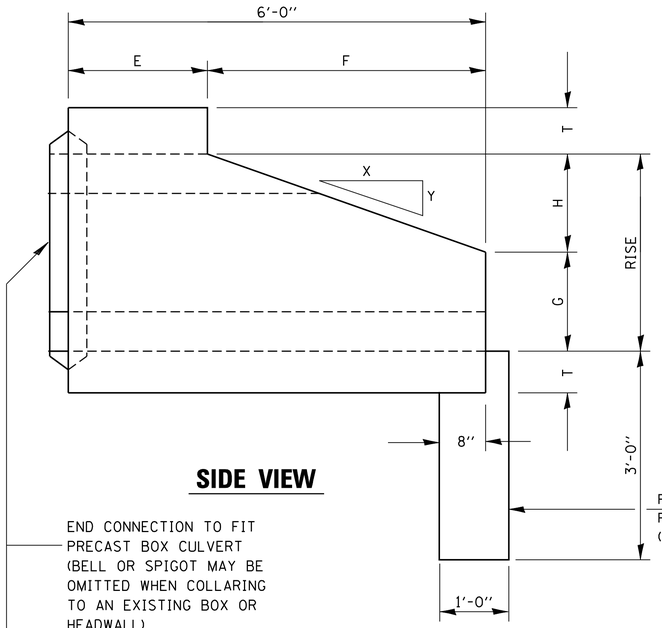
TYPICAL BOX SECTION

SPAN, FEET	T_T, INCHES		T_B, INCHES		T_S, INCHES	
	M 259	M 273	M 259	M 273	M 259	M 273
3	4	7	4	6	4	4
4	5	7½	5	6	5	5
5	6	8	6	7	6	6
6	7	8	7	7	7	7
7	8	8	8	8	8	8
8	8	8	8	8	8	8
9	9	9	9	9	9	9
10	10	10	10	10	10	10
11	11	11	11	11	11	11
12	12	12	12	12	12	12

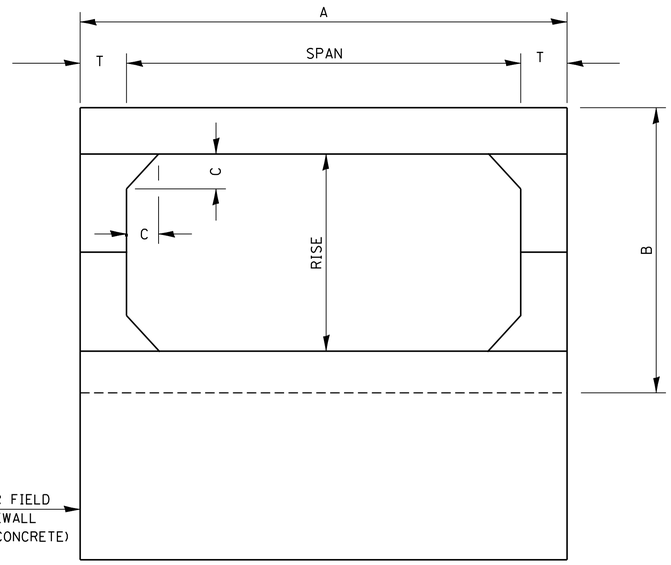
TYPICAL THICKNESSES

GENERAL NOTES:

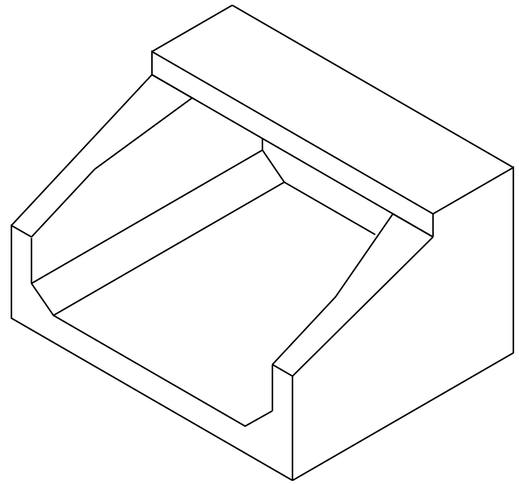
MINIMUM COVER FOR BOX CULVERTS SHALL BE 6″.



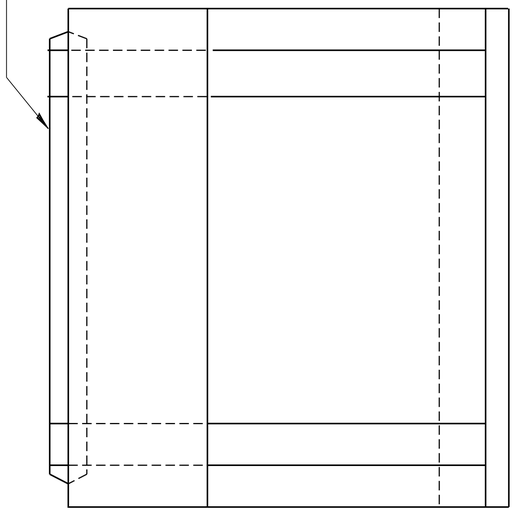
SIDE VIEW



END VIEW

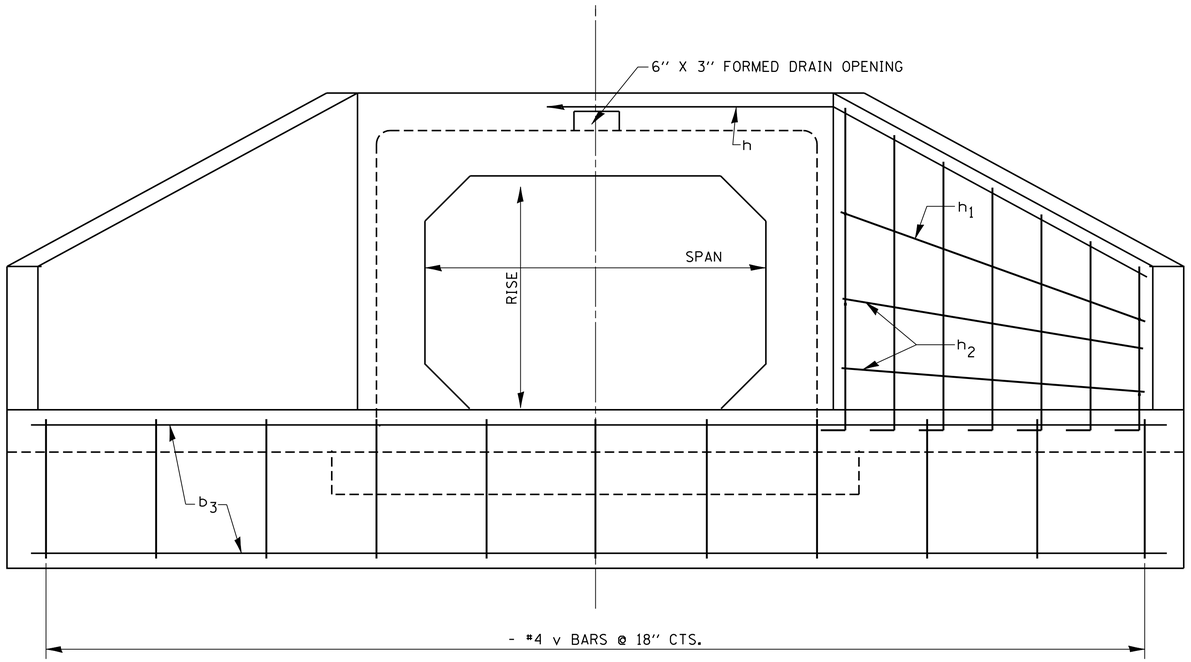


ISOMETRIC VIEW

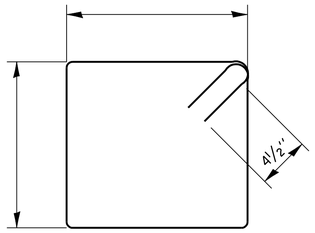


PLAN

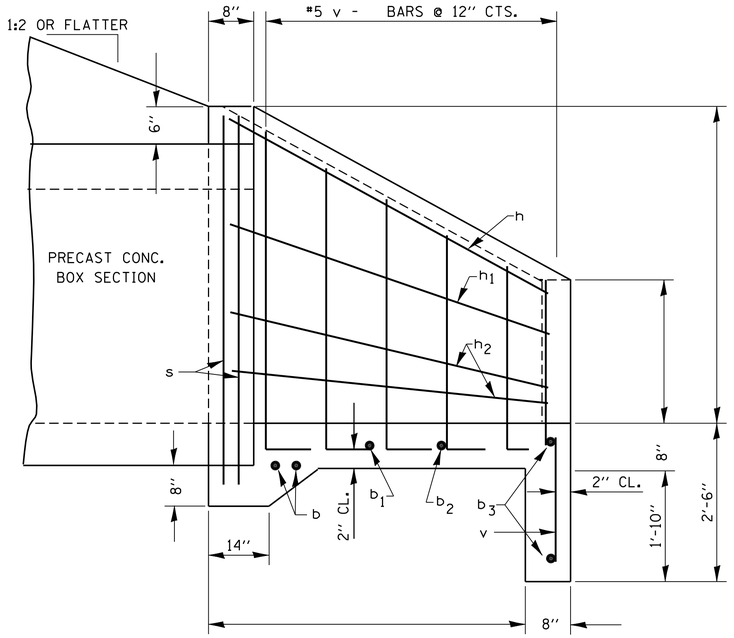
SPAN X RISE	T (INCHES)	A (FT.-IN.)	B (FT.-IN.)	C (INCHES)	E (FT.-IN.)	F (FT.-IN.)	G (FT.-IN.)	H (FT.-IN.)	SLOPE
2' X 2'	4	2 - 8	2 - 8	4	3 - 0	3 - 0	1 - 0	1 - 0	3 : 1
3' X 2'	4	3 - 8	2 - 8	4	3 - 0	3 - 0	1 - 0	1 - 0	3 : 1
3' X 3'	4	3 - 8	3 - 8	4	2 - 0	4 - 0	1 - 8	1 - 4	3 : 1
4' X 2'	5	4 - 10	2 - 10	5	3 - 0	3 - 0	1 - 0	1 - 0	3 : 1
4' X 3'	5	4 - 10	3 - 10	5	2 - 0	4 - 0	1 - 8	1 - 4	3 : 1
4' X 4'	5	4 - 10	4 - 10	5	2 - 0	4 - 0	2 - 0	2 - 0	2 : 1
5' X 2'	6	6 - 0	3 - 0	6	3 - 0	3 - 0	1 - 0	1 - 0	3 : 1
5' X 3'	6	6 - 0	4 - 0	6	2 - 0	4 - 0	1 - 8	1 - 4	3 : 1
5' X 4'	6	6 - 0	5 - 0	6	2 - 0	4 - 0	2 - 0	2 - 0	2 : 1
5' X 5'	6	6 - 0	6 - 0	6		4 - 0	3 - 0	2 - 0	2 : 1
6' X 2'	7	7 - 2	3 - 2	7	3 - 0	3 - 0	1 - 0	1 - 0	3 : 1
6' X 3'	7	7 - 2	4 - 2	7	2 - 0	4 - 0	1 - 8	1 - 4	3 : 1
6' X 4'	7	7 - 2	5 - 2	7	2 - 0	4 - 0	2 - 0	2 - 0	2 : 1
6' X 5'	7	7 - 2	6 - 2	7		4 - 0	3 - 0	2 - 0	2 : 1
7' X 3'	8	8 - 4	4 - 4	8		4 - 0	1 - 8	1 - 4	3 : 1
7' X 4'	8	8 - 4	5 - 4	8		4 - 0	2 - 0	2 - 0	2 : 1
7' X 5'	8	8 - 4	6 - 4	8		4 - 0	3 - 0	2 - 0	2 : 1
8' X 3'	8	9 - 4	4 - 4	8		4 - 0	1 - 8	1 - 4	3 : 1
8' X 4'	8	9 - 4	5 - 4	8		4 - 0	2 - 0	2 - 0	2 : 1
8' X 5'	8	9 - 4	6 - 4	8		4 - 0	3 - 0	2 - 0	2 : 1
9' X 3'	9	10 - 6	4 - 6	9		4 - 0	1 - 8	1 - 4	3 : 1
9' X 4'	9	10 - 6	5 - 6	9		4 - 0	2 - 0	2 - 0	2 : 1
9' X 5'	9	10 - 6	6 - 6	9		4 - 0	3 - 0	2 - 0	2 : 1
10' X 4'	10	11 - 8	5 - 9	10		4 - 0	2 - 0	2 - 0	2 : 1
10' X 5'	10	11 - 8	6 - 8	10		4 - 0	3 - 0	2 - 0	2 : 1



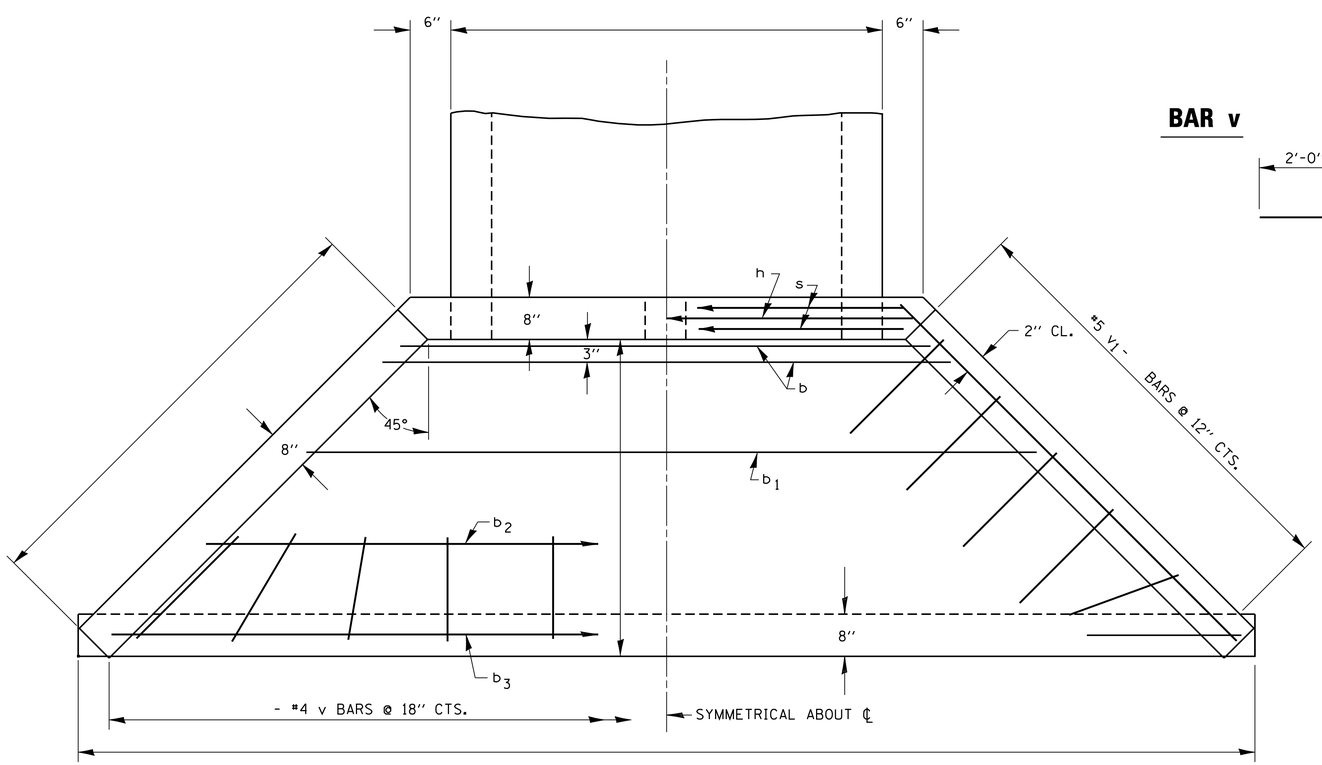
END ELEVATION



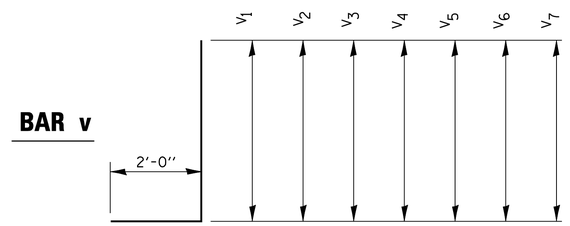
BAR s



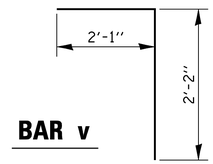
HALF SIDE ELEVATION



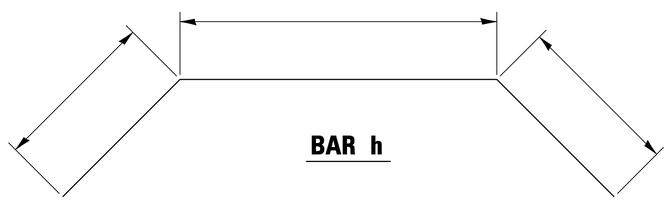
PLAN



BAR v



BAR v



BAR h

GENERAL NOTES

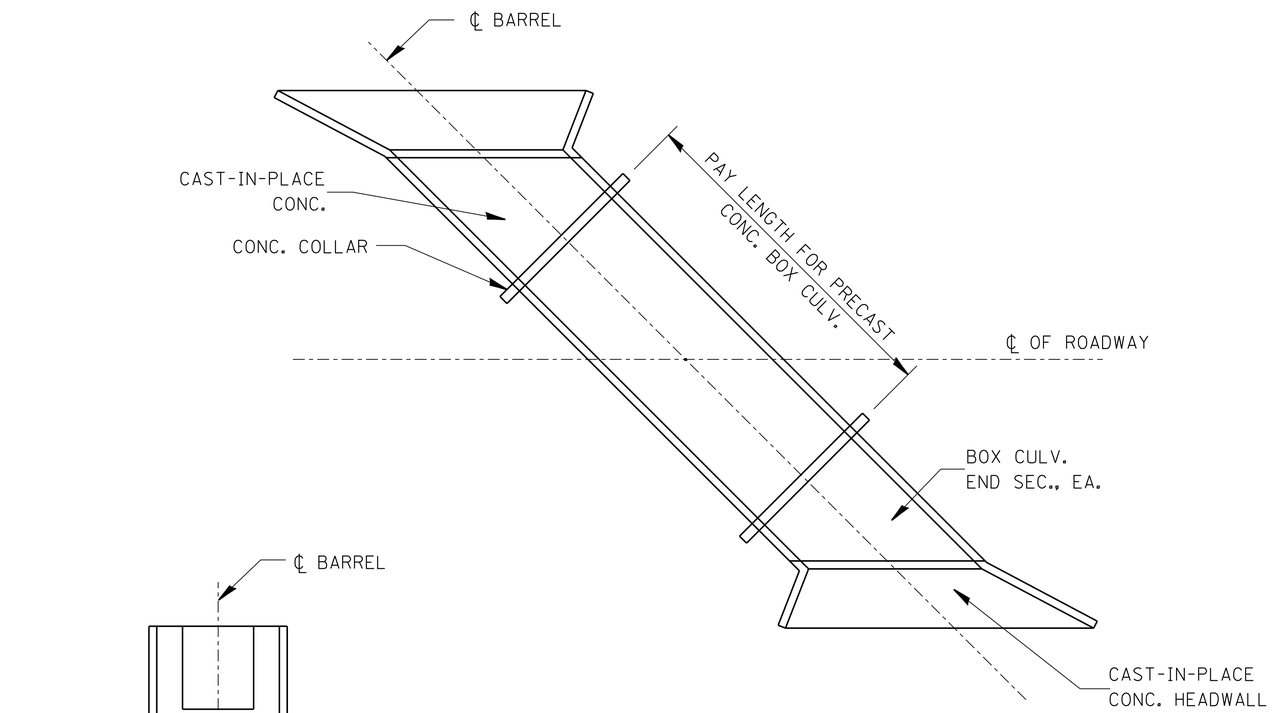
CLASS SI CONCRETE SHALL BE USED THROUGHOUT.
EXPOSED EDGES SHALL BE BEVELED ¾''.
REINFORCEMENT BARS SHALL CONFORM TO THE
REQUIREMENTS OF AASHTO M-31, M-42, OR M-53, GRADE 60.

DESIGNER NOTE:
WHEN RISE 5', V_1 to V_7 SHALL BE EPOXY COATED

BILL OF MATERIAL

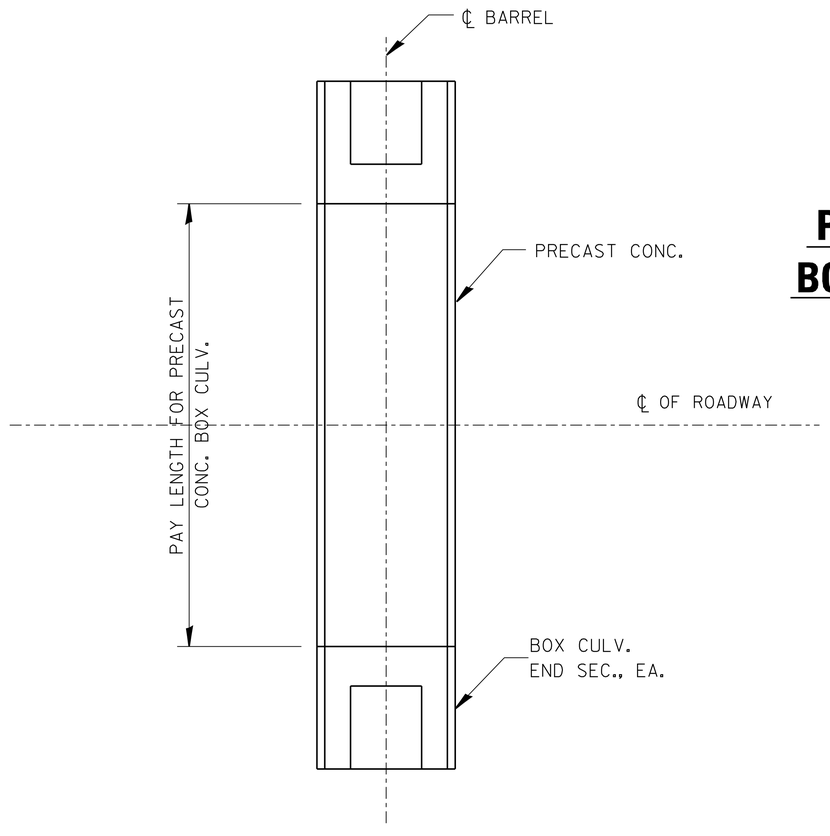
BAR	SIZE	NO.	LENGTH	SHAPE
b	5	2		—
b_1	4	1		—
b_2	4	1		—
b_3	4	2		—
h	5	1		⌒
h_1	4	2		—
h_2	4	4		—
s	4	2		▭
v	4	-	4'-3''	⌐
v_1	5	2		⌐
v_2	5	2		⌐
v_3	5	2		⌐
v_4	5	2		⌐
v_5	5	2		⌐
v_6	5	2		⌐
v_7	5	2		⌐
CONCRETE HEADWALLS			C.Y.	
REINFORCEMENT BARS			LBS.	
REIN. BARS (EPOXY CTD.)			LBS.	

TABLE FOR ONE (1) HEADWALL



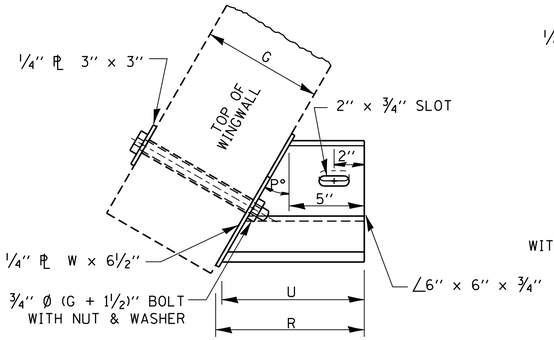
PAY LENGTH FOR PRECAST CONCRETE BOX CULVERT SKEWED WITH ROADWAY

N.T.S.



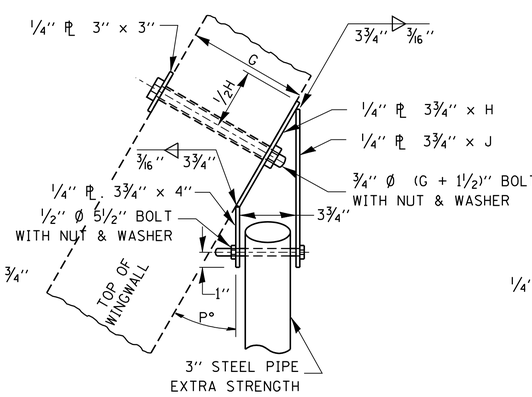
PAY LENGTH FOR PRECAST CONCRETE BOX CULVERT AT RIGHT ANGLES WITH ROADWAY

N.T.S.



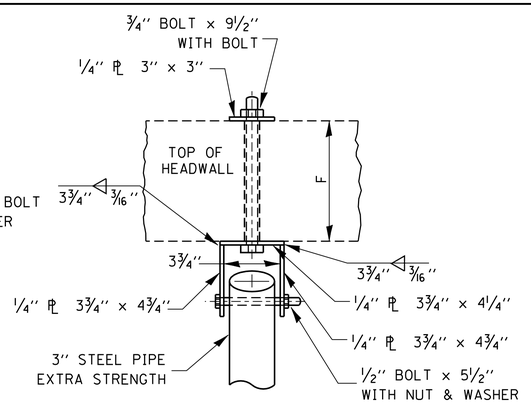
PLAN

END BRACKET ASSEMBLY – LEFT



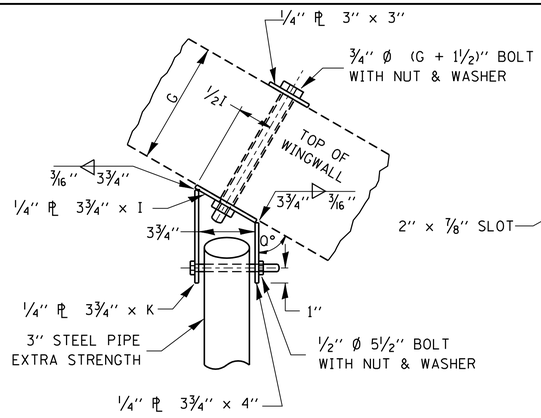
PLAN

WINGWALL BRACKET ASSEMBLY – LEFT



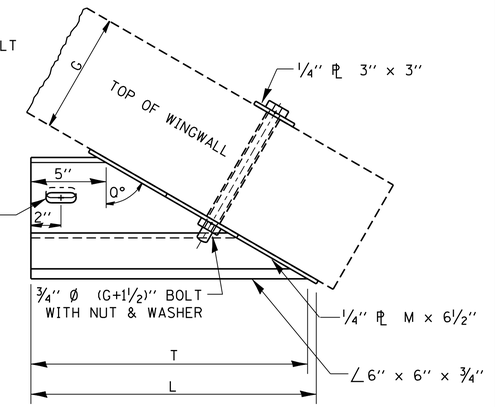
PLAN

HEADWALL BRACKET ASSEMBLY



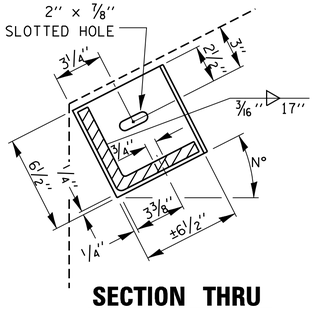
PLAN

WINGWALL BRACKET ASSEMBLY – RIGHT



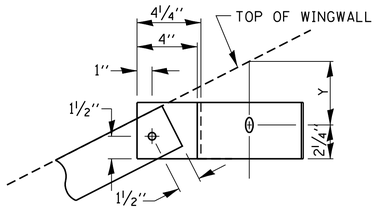
PLAN

END BRACKET ASSEMBLY – RIGHT



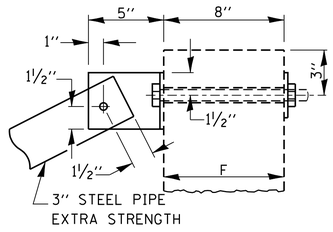
SECTION THRU

DETAIL A



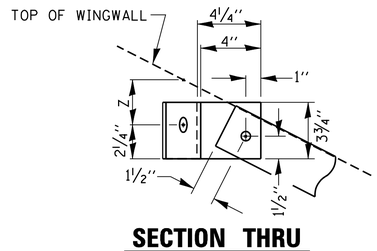
SECTION THRU

DETAIL B



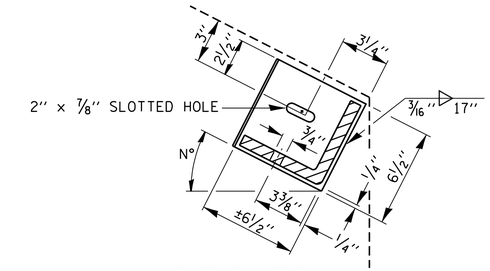
SECTION THRU

DETAIL C



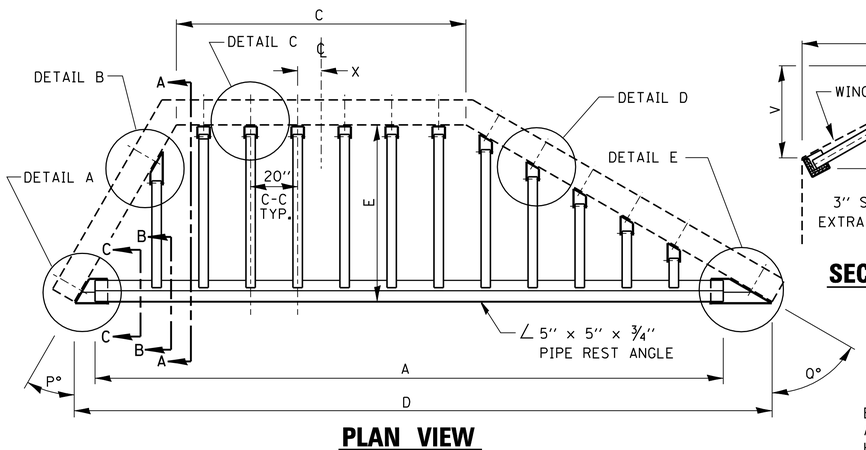
SECTION THRU

DETAIL D

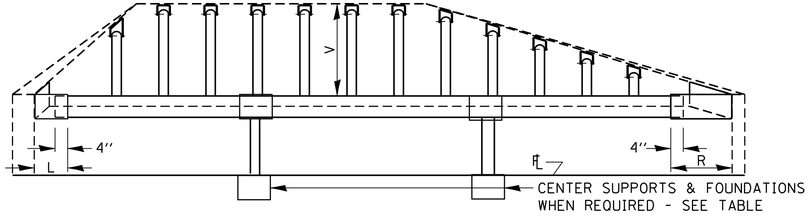


SECTION THRU

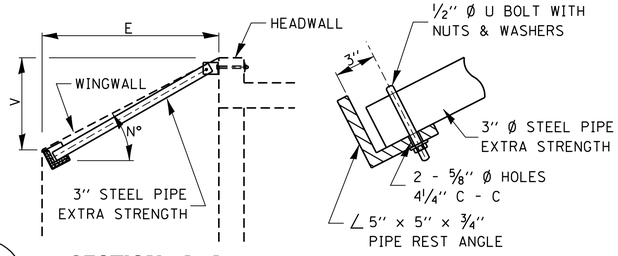
DETAIL E



PLAN VIEW

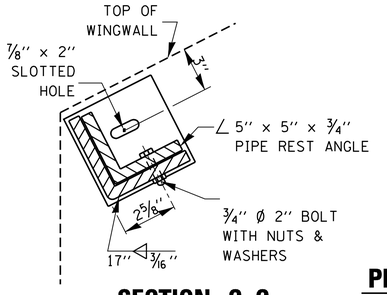


ELEVATION VIEW

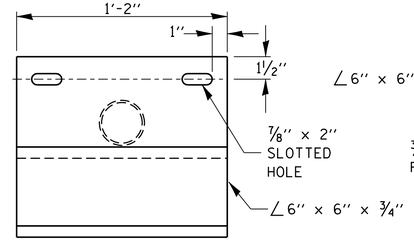


SECTION A–A

SECTION B–B

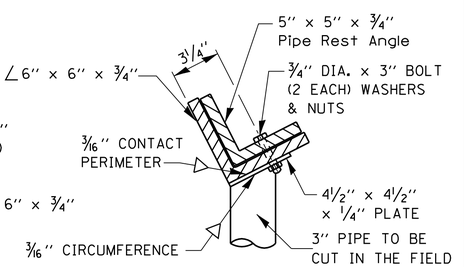


SECTION C–C

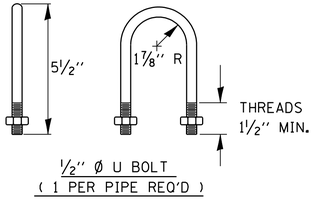


PLAN VIEW OF SUPPORT

3" STEEL PIPE, EXTRA STRENGTH
x 2' LONG TO BE
CUT TO FIT IN THE FIELD



END VIEW OF SUPPORT

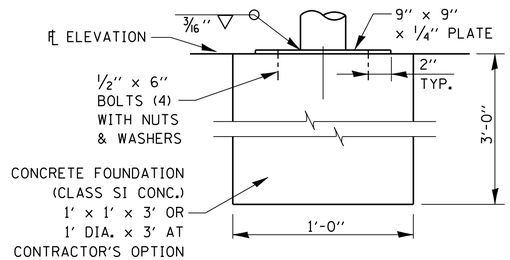


GENERAL NOTES

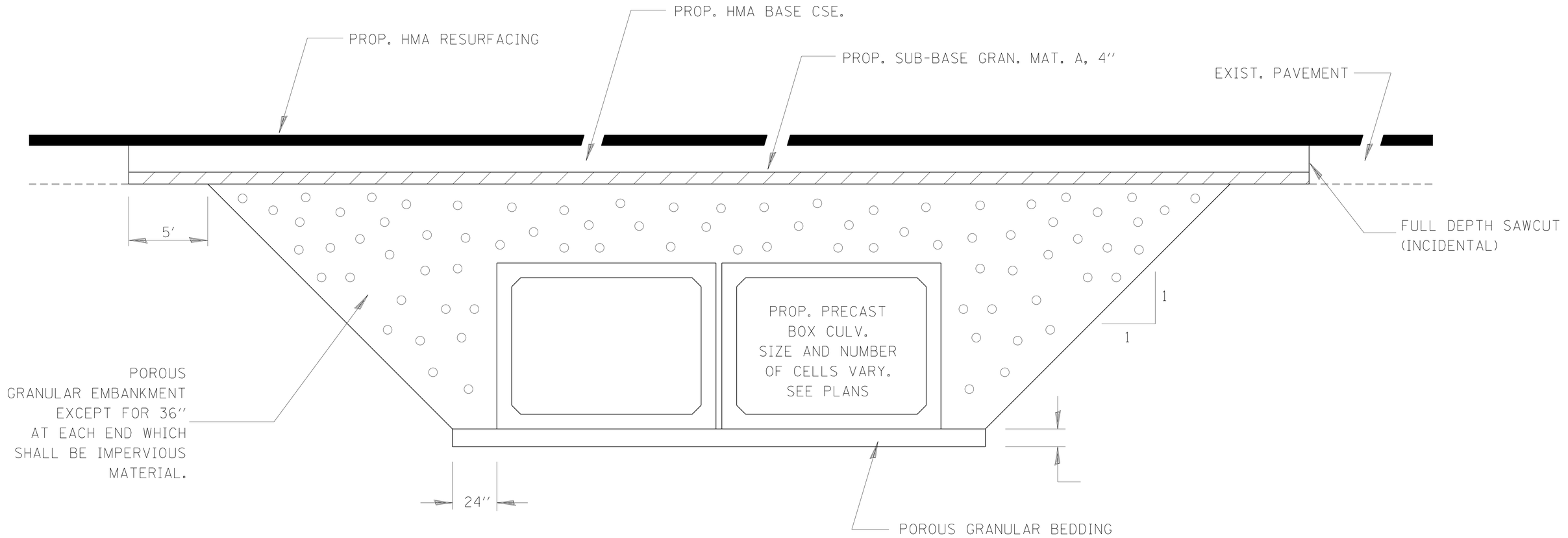
BOLTS AND NUTS SHALL CONFORM TO ASTM A 307.
ALL BOLTS SHALL HAVE WASHERS AT EACH END.
HOLES SHALL BE 1/16" OVERSIZE UNLESS OTHERWISE NOTED EXCEPT IN CONCRETE WHICH SHALL BE 1/8" OVERSIZE.
ANGLES AND STEEL PLATES SHALL CONFORM TO AASHTO M183.
STEEL PIPES SHALL CONFORM TO ASTM A53 GRADE B OR ASTM A 501.
STEEL PIPES, ANGLES AND PLATES SHALL BE HOT DIPPED GALVANIZED CONFORMING TO THE REQUIREMENTS OF AASHTO M111.
BOLTS, NUTS AND WASHERS SHALL BE HOT DIPPED GALVANIZED CONFORMING TO THE REQUIREMENTS OF AASHTO M232.
THE APPROXIMATE WEIGHT OF STEEL GIVEN IN TABLES INCLUDES PLATES ANGLES, AND PIPES. BOLTS, NUTS AND WASHERS ARE NOT INCLUDED.
ALL DIMENSIONS ARE TO BE VERIFIED IN THE FIELD.
CUTTING OF THE EXTRA STRENGTH PIPE AND ANGLES TO THE EXACT LENGTHS AND DRILLING HOLES IS TO BE DONE IN THE FIELD.
THIS WORK SHALL BE PAID FOR AT THE CONTRACT UNIT PRICE "EACH" FOR GRATING FOR CONCRETE HEADWALLS IN PLACE, AND SHALL INCLUDE FABRICATION PAINTING, CENTER SUPPORTS WHEN REQUIRED, AND INSTALLATION OF THE GRATING AS DETAILED.

DETERMINING NEED OF CENTER SUPPORTS

TIP TO TIP OF WINGWALLS (DIMENSION "D")	NUMBER OF SUPPORTS REQUIRED	LOCATION
0'-0" TO 12'-6"	0	--
12'-6" TO 18'-0"	1	CENTER OF SPAN
18'-0" TO 24'-0"	2	1/3 OF SPAN
24'-0" TO 30'-0"	3	1/4 OF SPAN

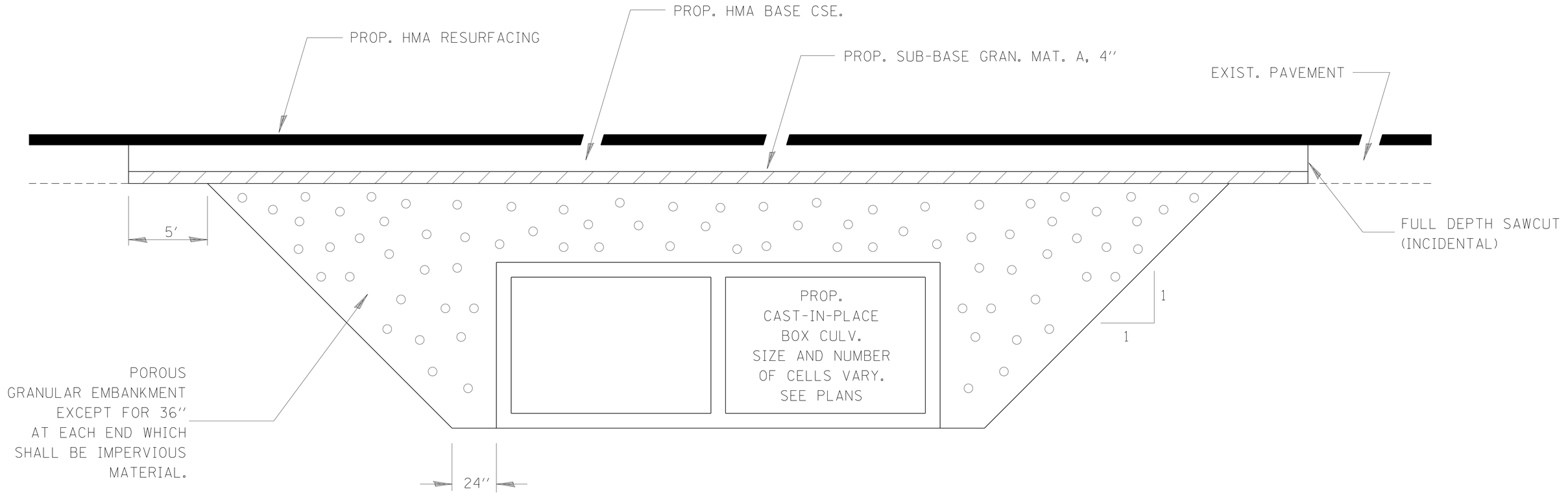


CENTER SUPPORT FOUNDATION



DESIGNER NOTE: SHOW EXISTING STRUCTURE TO BE REMOVED.

SECTION THROUGH PRECAST BOX CULVERT

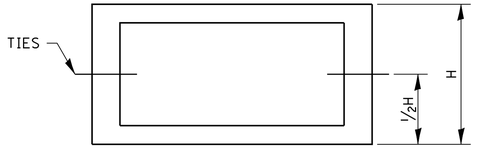


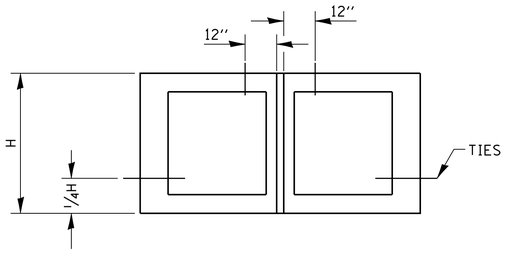
DESIGNER NOTE: SHOW EXISTING STRUCTURE TO BE REMOVED.

SECTION THROUGH CAST–IN–PLACE BOX CULVERT

540–21

THE CULVERT TIES SHALL BE INCLUDED IN THE COST OF THE CONCRETE PIPE CULVERTS OR THE PRECAST CONCRETE BOX CULVERT. THE MECHANICAL TIES SHALL BE ON THE OUTSIDE OF THE CULVERT. THE NUTS AND WASHERS SHALL BE PLACED ON THE INSIDE OF THE CULVERT AND COVERED WITH MASTIC JOINT SEALER CONFORMING TO ARTICLES 1055 OR 1056 IN THE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.

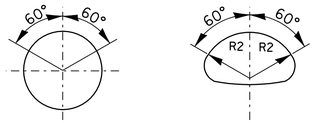


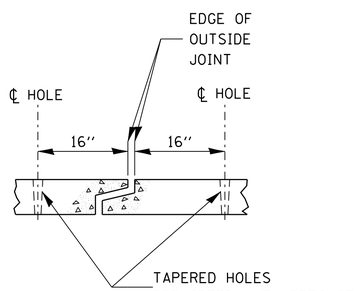


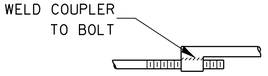
PLACEMENT OF HOLES		
BOX CULVERT FEET	PIPE SIZE INCHES	THREAD DIAMETER INCHES
	12	5/8 ROLLED THREADS (SEE NOTE 4)
	15	
	18	
	21	
	24	
	27	
	30	3/4 CUT OR ROLLED
3 x 2	33	
3 x 3	36	
4 x 2	42	
4 x 3	48	
4 x 4	54	
5 x 3	60	
5 x 4	66	
5 x 5	72	1 CUT OR ROLLED
6 x •	78	
7 x •	84	
8 x •	90	
9 x •	96	
10 x •	102	
	108	
	120	
	132	
11 x • AND GREATER	138 AND GREATER	1 1/4

NOTES:

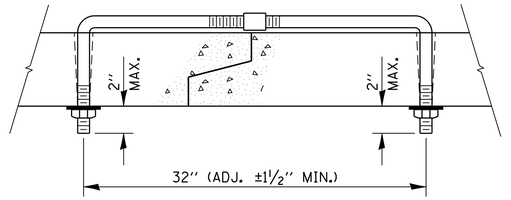
1. HOLES SHALL BE CAST-IN OR DRILLED 16" FROM OUTSIDE EDGE OF JOINT.
2. NUTS AND WASHERS ARE NOT REQUIRED ON INSIDE OF 27" DIAMETER PIPE OR LESS.
3. TIES ARE NOT REQUIRED FOR BELL PIPE 24" AND SMALLER. ON OTHER SIZES TIE MAY BE INSERTED FROM INSIDE.
4. CUT THREADS MAY BE USED IF WASHER AND NUT ARE USED.
5. PIPE SIZE LISTED IS INSIDE DIAMETER OF ROUND PIPE OR EQUIVALENT DIAMETER OF PIPE ARCH OR ELLIPTICAL.
6. GALVANIZING OF TIES IS REQUIRED.



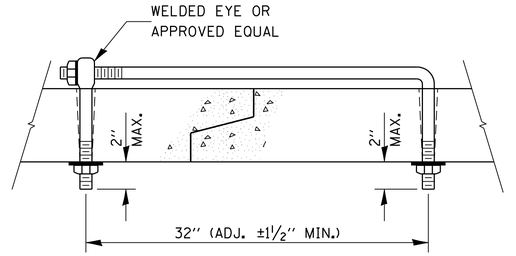




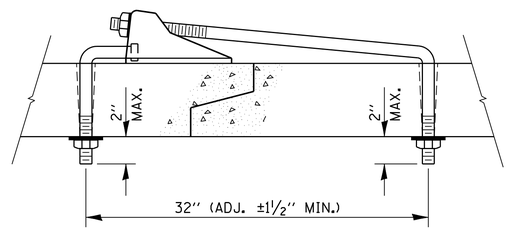
TOP VIEW



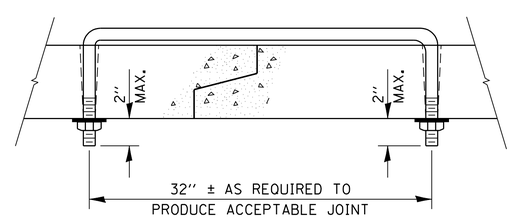
ADJUSTABLE TIE



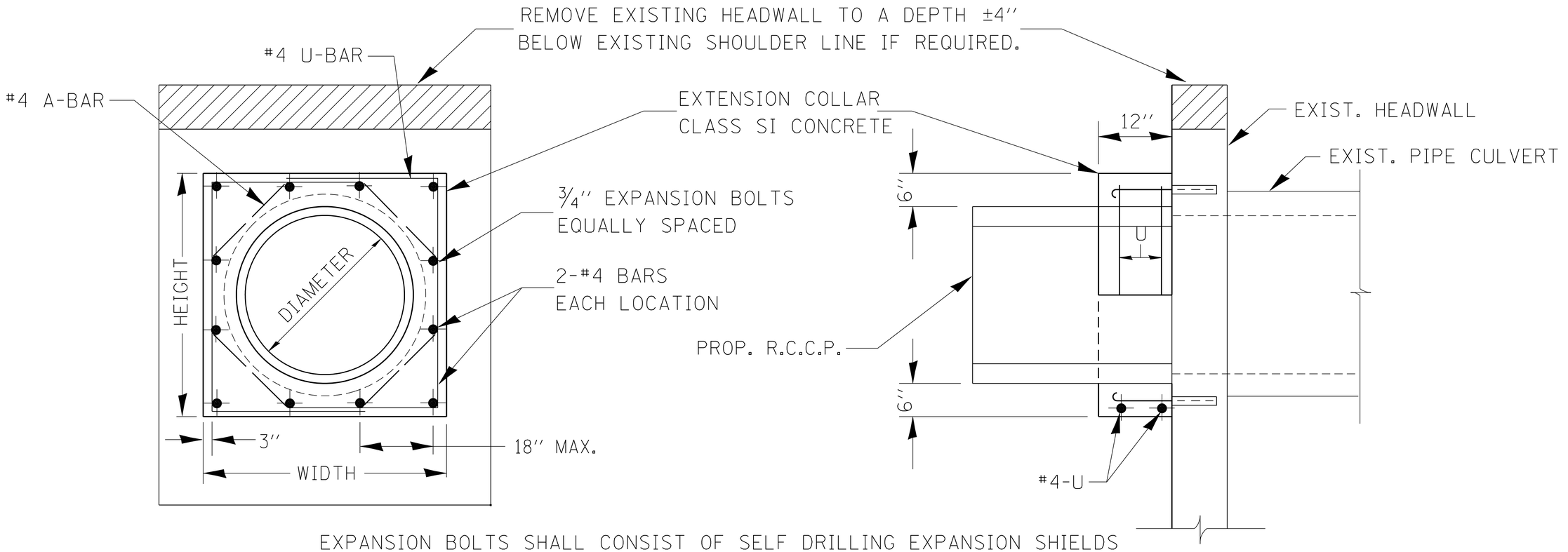
EYE BOLT TIE



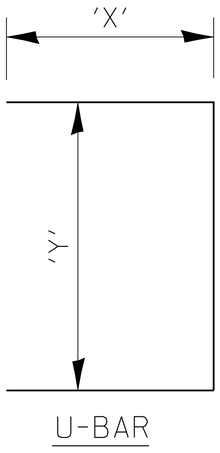
CANOPY TIE



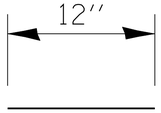
U BOLT TIE



EXPANSION BOLTS SHALL CONSIST OF SELF DRILLING EXPANSION SHIELDS AND ¾'' DIA. HOOKED BOLTS. HOOKED BOLTS SHALL EXTEND A MINIMUM OF 9'' INTO NEW CONCRETE.
MINIMUM CERTIFIED PROOF LOAD = 4,080 LBS



U-BAR

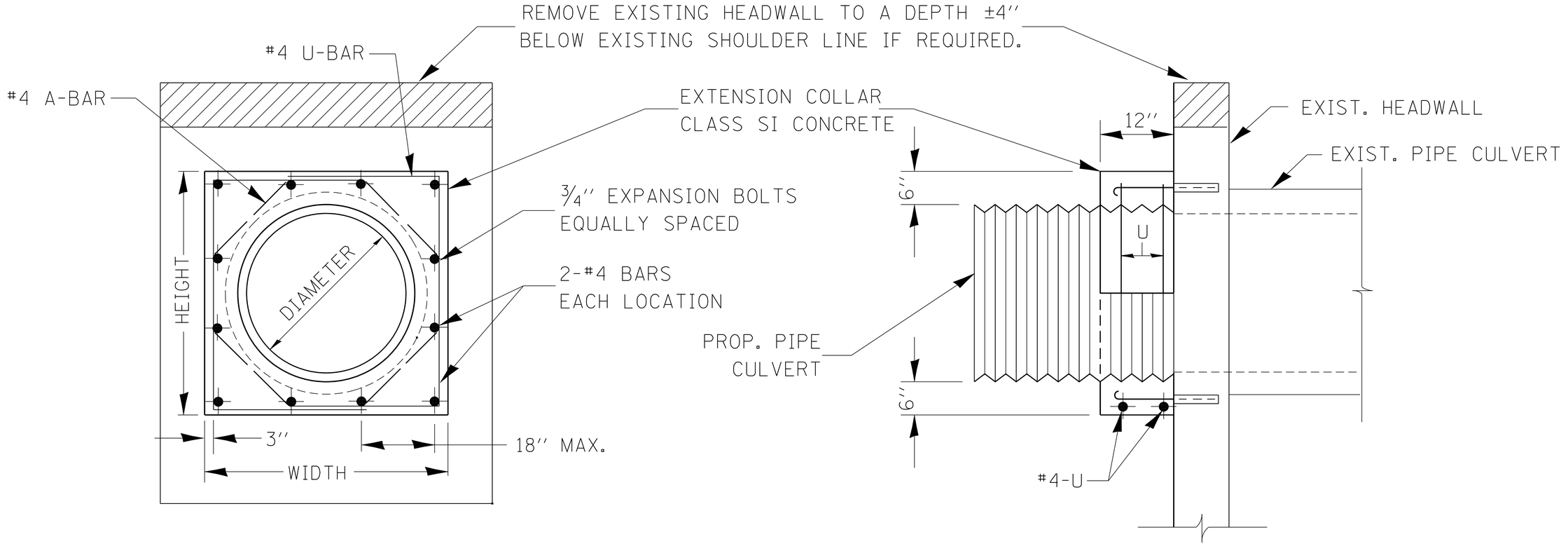


A-BAR

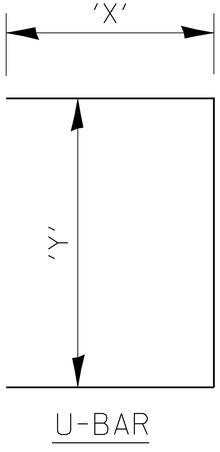
LOCATION	EXISTING CULVERT SIZE	PIPE DIMENSION	PIPE AREA	EXTENSION COLLAR		A-BAR	U-BAR		QUANTITIES ARE FOR ONE SIDE ONLY		
				WIDTH	HEIGHT	12	'X'	'Y'	CLASS SI CONC. COLLAR	REINFORCEMENT BARS	3/4'' DIA. EXPANSION BOLTS
	DIA. IN.	DIA. IN.	SQ. FT.	IN.	IN.	IN.	IN.	IN.	CU. YD.	POUND	EACH

COLLAR DETAIL (R.C.C.P. EXTENSION OF PIPE CULVERT)

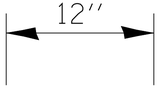
542–1



EXPANSION BOLTS SHALL CONSIST OF SELF DRILLING EXPANSION SHIELDS AND ¾'' DIA. HOOKED BOLTS. HOOKED BOLTS SHALL EXTEND A MINIMUM OF 9'' INTO NEW CONCRETE.
MINIMUM CERTIFIED PROOF LOAD = 4,080 LBS



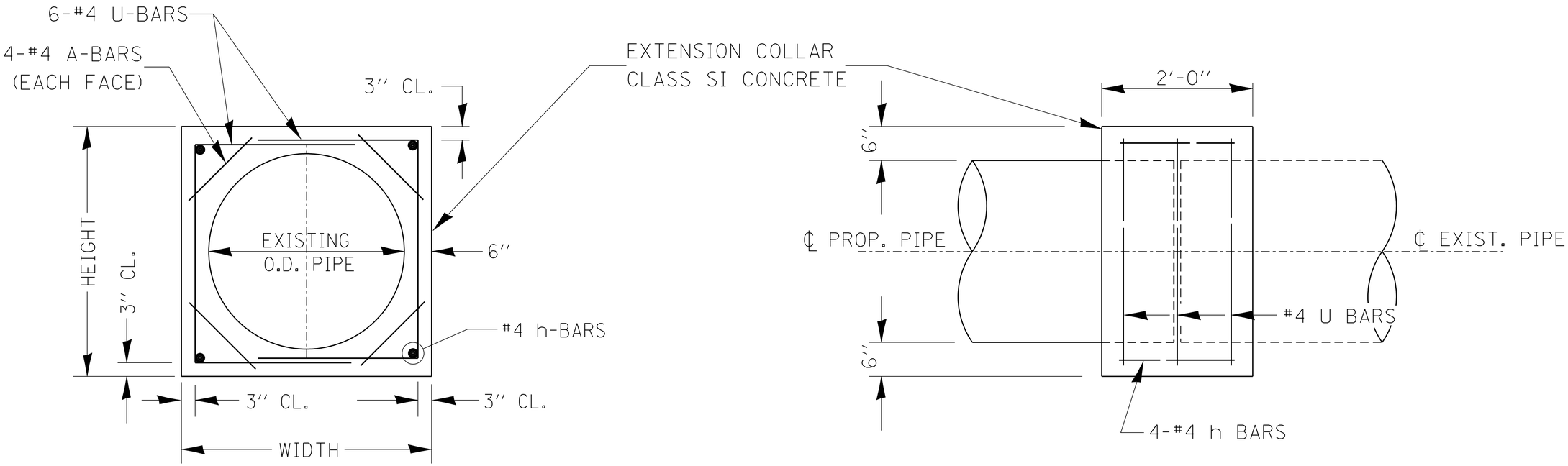
U-BAR

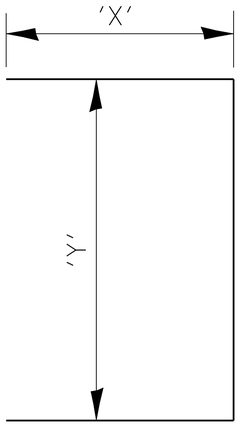


A-BAR

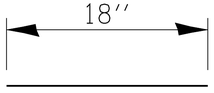
LOCATION	EXISTING CULVERT SIZE	PIPE DIMENSION	PIPE AREA	EXTENSION COLLAR		A-BAR	U-BAR		QUANTITIES ARE FOR ONE SIDE ONLY: CLASS SI CONC. COLLAR	REINFORCEMENT BARS	3/4'' DIA. EXPANSION BOLTS
				WIDTH	HEIGHT	12	'X'	'Y'			
	DIA. IN.	DIA. IN.	SQ. FT.	IN.	IN.	IN.	IN.	IN.	CU. YD.	POUND	EACH

COLLAR DETAILS (CMP EXTENSION OF PIPE CULVERT)

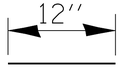




U-BAR



h-BAR

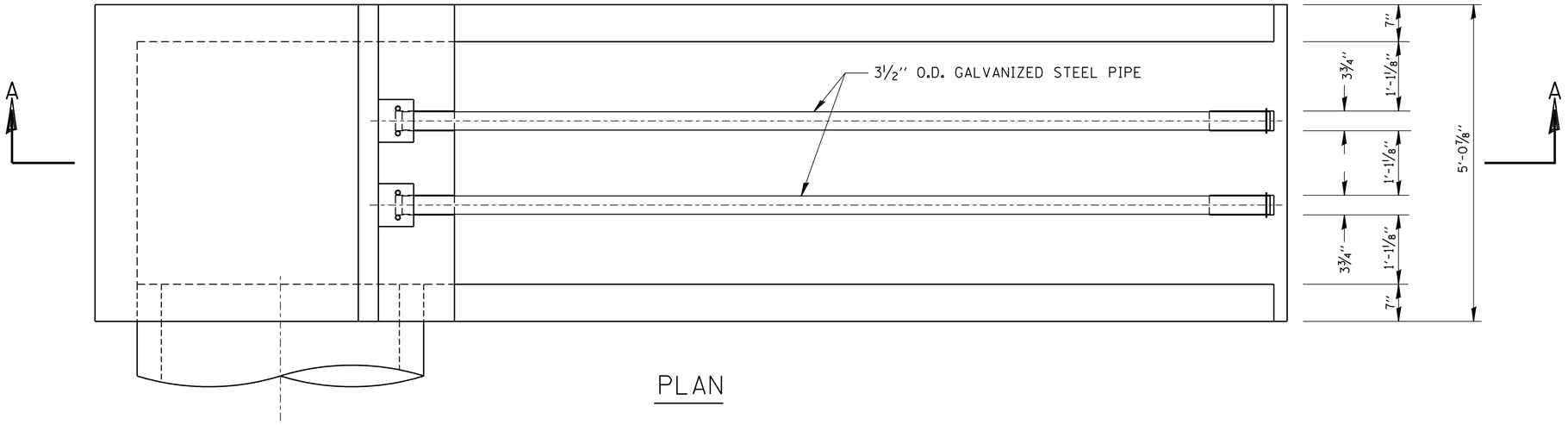


A-BAR

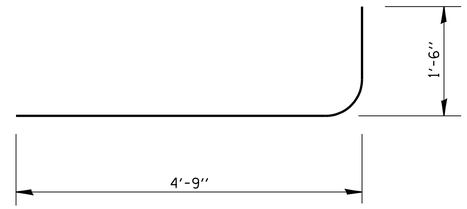
LOCATION	EXISTING CULVERT SIZE	EXTENSION COLLAR		A-BAR	U-BAR		h-BAR	CONC. COLLAR	REINFORCEMENT BARS
		WIDTH	HEIGHT	12	'X'	'Y'	18		
	FT. x FT.	IN.	IN.	IN.	IN.	IN.	IN.	CU. YD.	POUND

COLLAR DETAIL (DIRECT PIPE CULVERT EXTENSION)

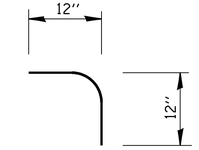
542–3



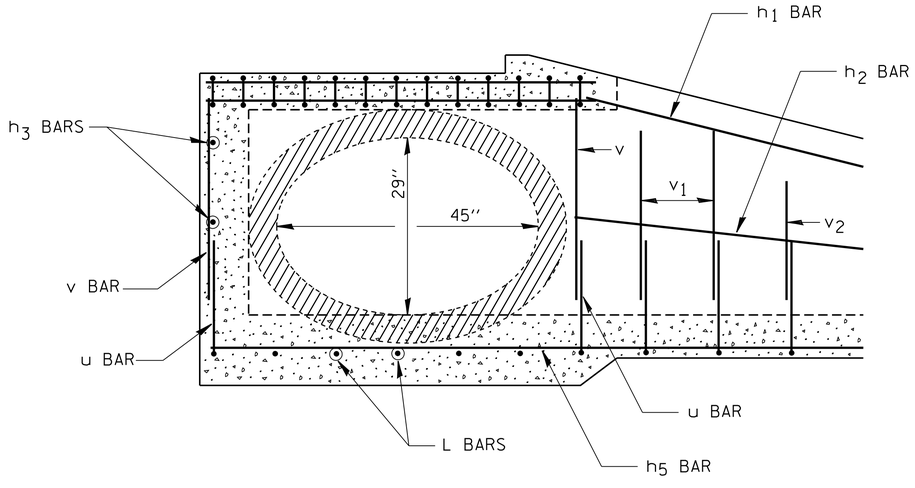
PLAN



#15 L bars



#15 L1 bars



SECTION B-B

CLASS SI CONCRETE OR PRECAST CONCRETE SHALL BE USED THROUGHOUT.

PRECAST CONCRETE SHALL BE IN ACCORDANCE WITH SECTION 504 OF THE STANDARD SPECIFICATIONS.

A 3'' DEEP SAND BEDDING CONFORMING TO ARTICLE 1003.01 (FA-1 OR FA-2) SHALL BE PROVIDED UNDER FULL LENGTH AND WIDTH OF PRECAST UNIT. ALL VOIDS AROUND PIPE ENTRANCE, BOTH INSIDE AND OUTSIDE, SHALL BE SEALED WITH MORTAR.

FOR BACKFILLING AND EMBANKMENT, SEE STANDARD SPECIFICATIONS.

GALVANIZED STEEL PIPE SHALL MEET THE REQUIREMENTS OF ASTM A-53, GRADE B, SCHEDULE 40 OR APPROVED EQUAL.

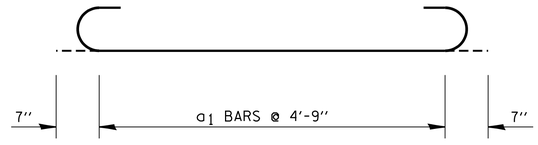
GALVANIZED U-BOLTS, NUTS AND WASHERS SHALL MEET THE REQUIREMENTS OF ARTICLE 706.27 (f) OF THE STANDARD SPECIFICATIONS.

STEEL PLATE SHALL MEET THE REQUIREMENTS OF ARTICLE 1006.04 OF THE STANDARD SPECIFICATIONS AND BE GALVANIZED IN ACCORDANCE WITH AASHTO M111 AFTER FABRICATION.

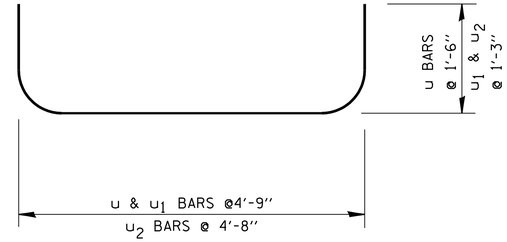
EXPOSED EDGES SHALL BE BEVELED ¾''.

MINIMUM BAR LAPS SHALL BE 1'-1'' UNLESS OTHERWISE SPECIFIED.

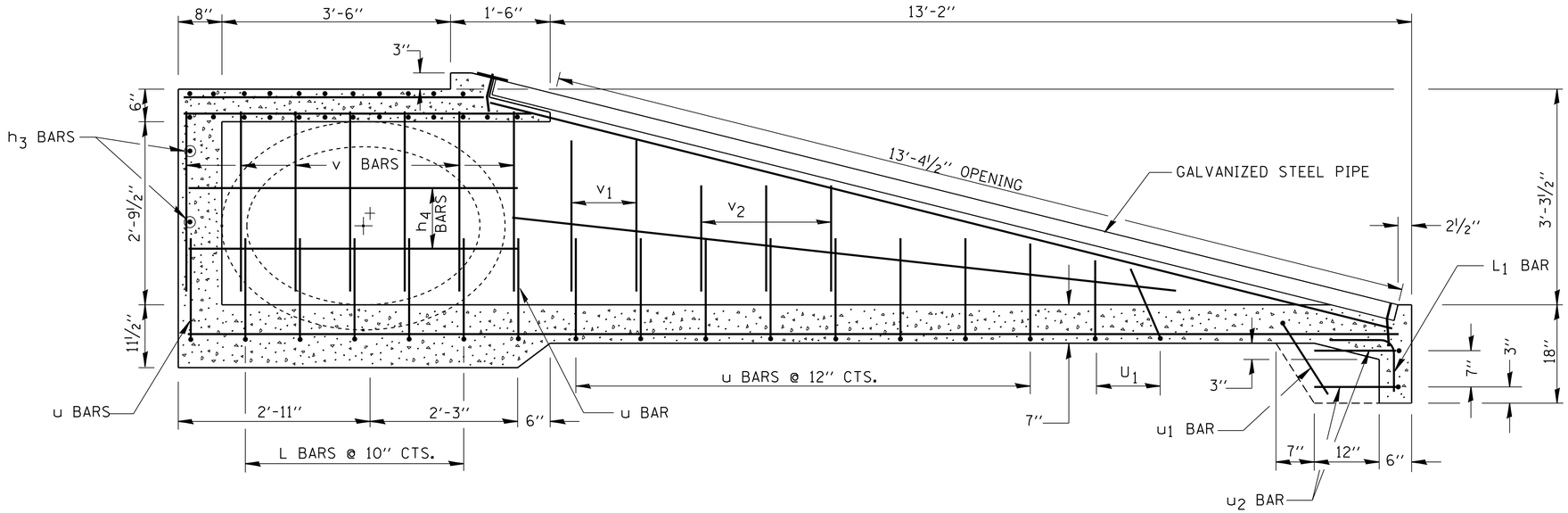
THE CONTRACT UNIT PRICE "EACH" FOR INLET BOX, SPECIAL, IN PLACE SHALL INCLUDE CLASS SI OR PRECAST CONCRETE, REINFORCEMENT BARS, BEDDING WHEN REQUIRED, GALVANIZED PIPE AND GALVANIZED HARDWARE.



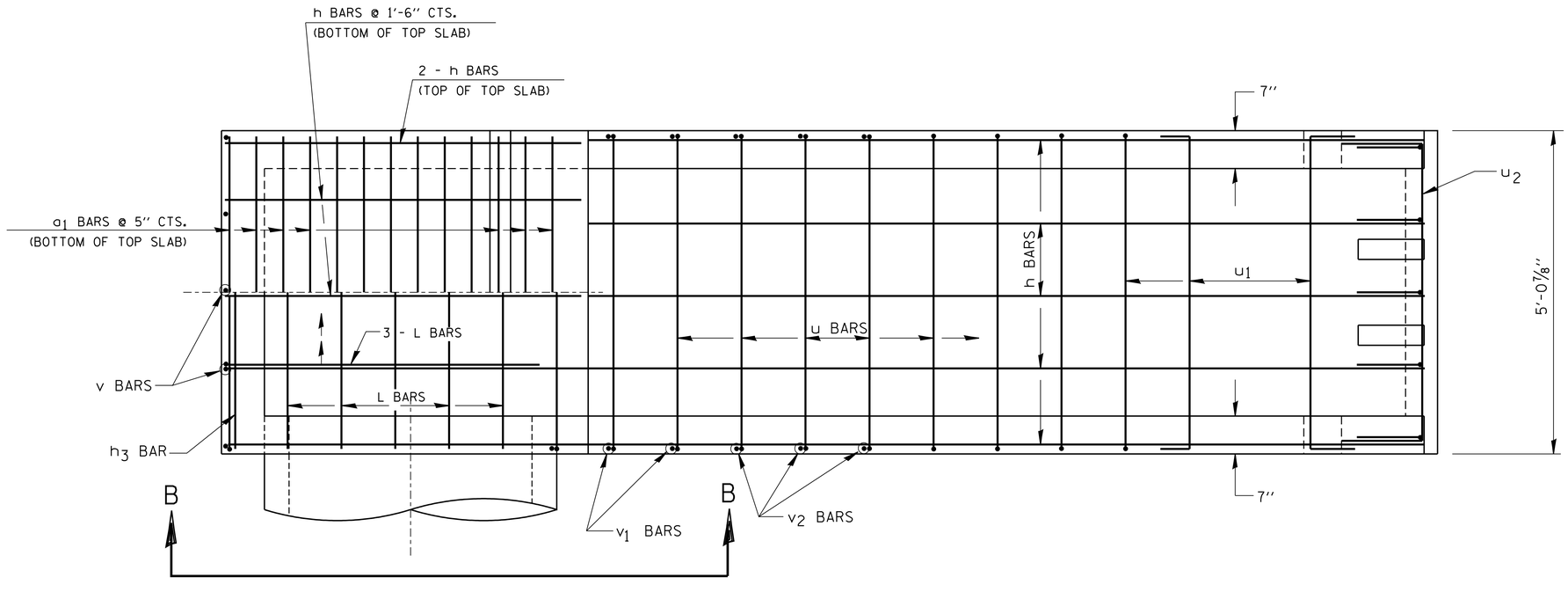
#15 a1 bars



#15 U, U1 & U2



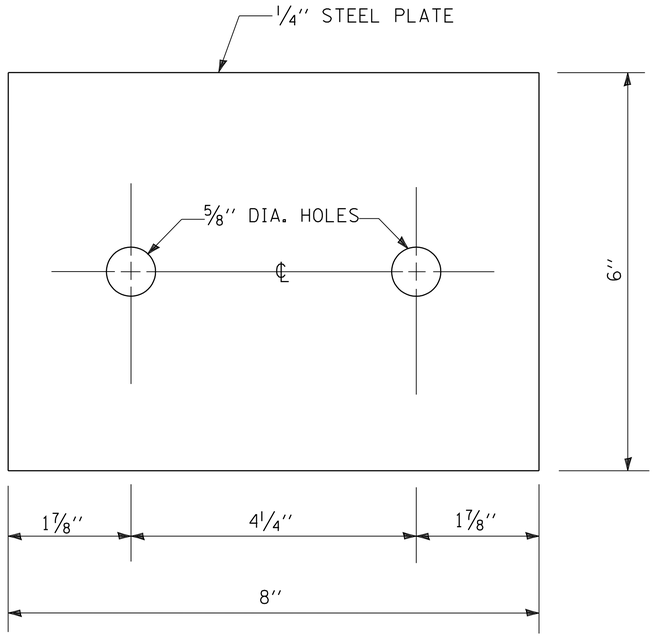
SECTION A-A



PLAN OF REINFORCEMENT

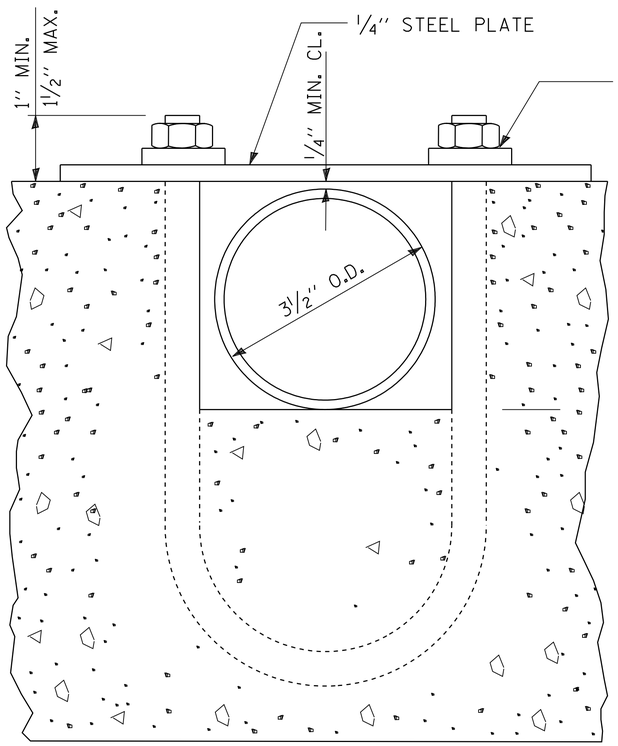
FOR INFORMATION ONLY

BAR	NO.	SIZE	LENGTH
a_1	13	#4	5'-11''
h	5	#4	5'-5''
h_1	2	#4	13'-6''
h_2	2	#4	10'-3''
h_3	2	#4	4'-9''
h_4	2	#4	5'-4''
h_5	5	#4	18'-6''
L	8	#4	6'-3''
L_1	5	#4	2'-0''
U	10	#4	7'-9''
U_1	3	#4	6'-0''
U_2	2	#4	5'-11''
V	12	#4	2'-9''
V_1	4	#4	2'-3''
V_2	6	#4	1'-6''
GALV. STEEL PIPE 3½'' O.D.	2	LENGTH	14'-3''
REINFORCEMENT BARS		LBS.	323
CLASS SI CONCRETE		CU. YD.	4.9

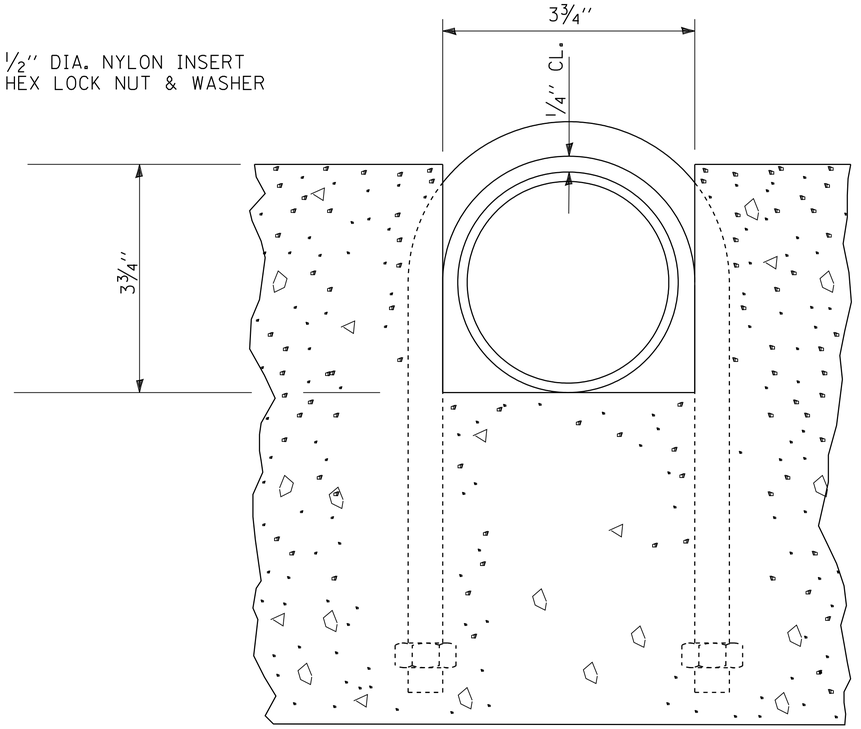


TOP ANCHOR PLATE

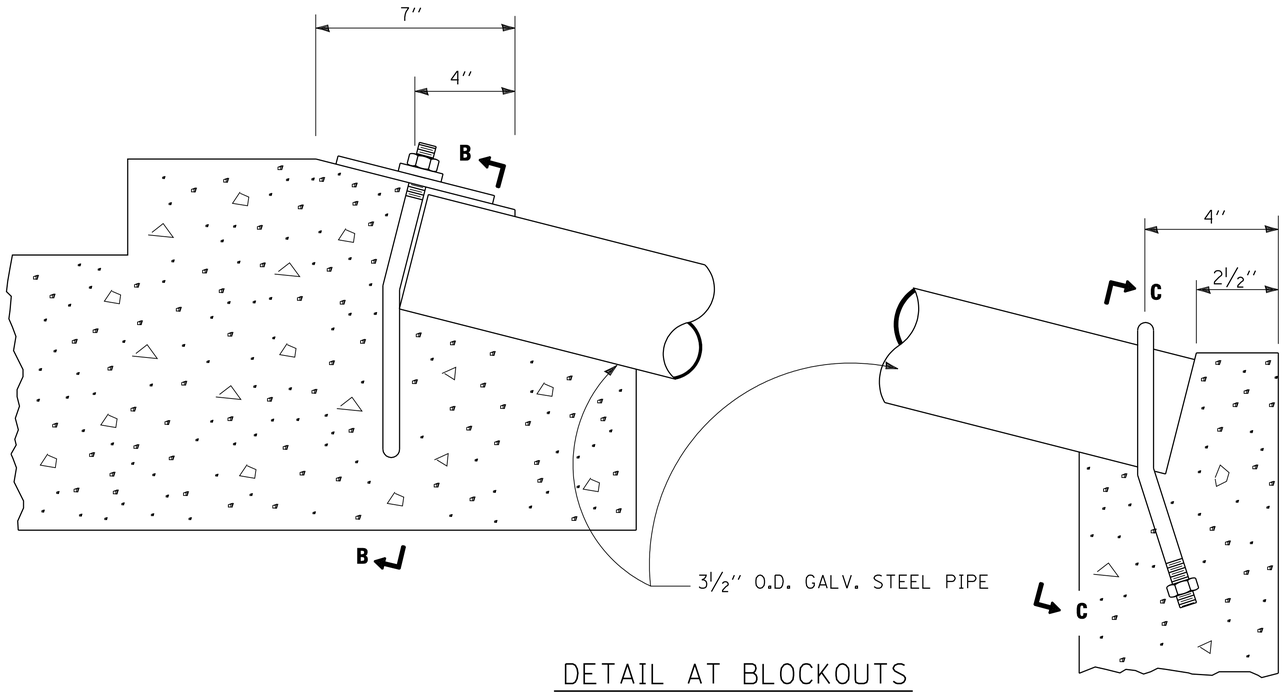
(1 - required)



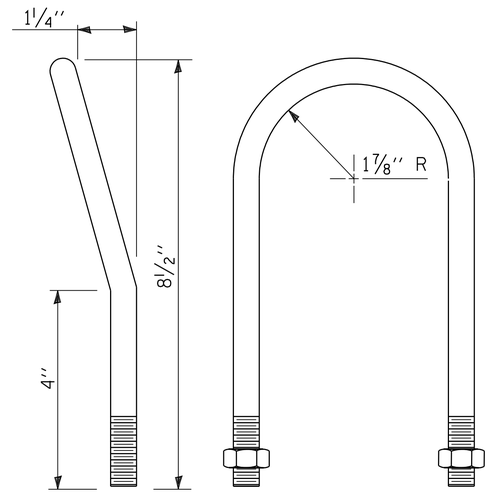
SECTION B-B



SECTION C-C

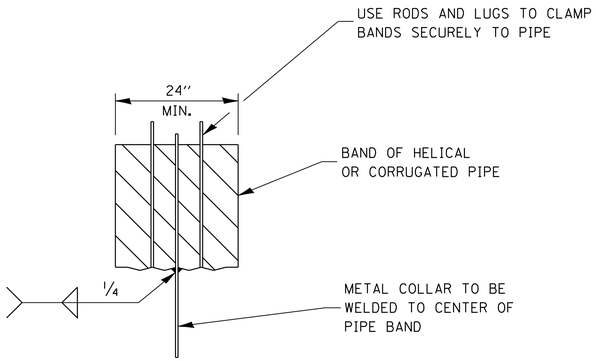


DETAIL AT BLOCKOUTS

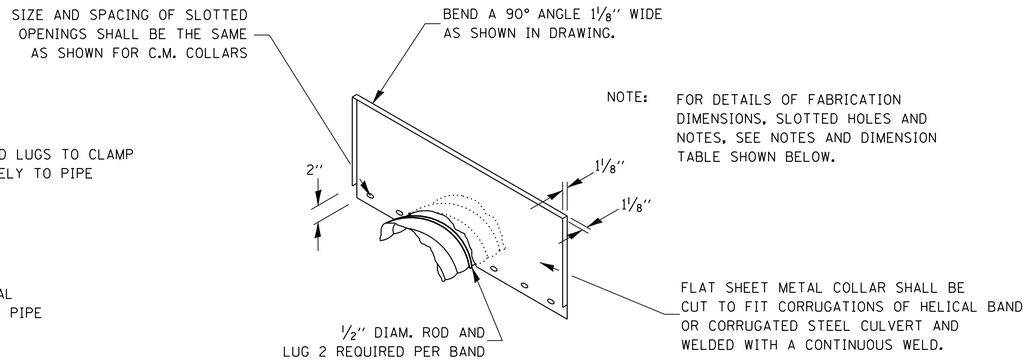


1/2'' DIA. U BOLT

(2- required)



PARTIAL ELEVATION



NOTE: FOR DETAILS OF FABRICATION DIMENSIONS, SLOTTED HOLES AND NOTES, SEE NOTES AND DIMENSION TABLE SHOWN BELOW.

ISOMETRIC VIEW

NOTES FOR COLLARS:

1. MATERIALS AND COATING FOR ALL COLLARS SHALL BE THE SAME AS THAT SPECIFIED FOR THE PIPE.

2. COLLARS SHALL BE SHOP FABRICATED, ASSEMBLED AND MARKED BY PAINTING TO IDENTIFY MATCHING HALF SECTIONS OF EACH COLLAR.

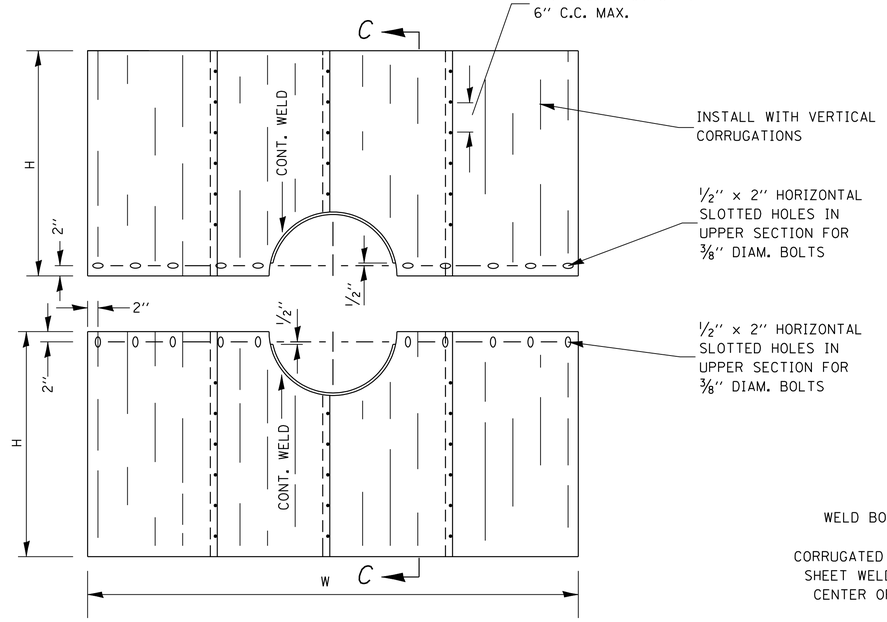
3. THE LAPS BETWEEN THE HALF SECTIONS AND BETWEEN THE PIPE AND CONNECTING BANDS SHALL BE CAULKED WITH FIBERIZED ASPHALT MASTIC AT THE TIME OF INSTALLATION.

4. ALL TANK LUGS, RODS, AND NUTS SHALL BE GALVANIZED STEEL. WHERE ALUMINUM COLLARS ARE USED, THE RODS AND LUGS SHALL BE SEPARATED FROM THE ALUMINUM BANDS BY AT LEAST TWO (2) LAYERS OF 2'' WIDE PLASTIC TAPE WITH A TOTAL THICKNESS OF 2 1/4 MILS OR MORE.

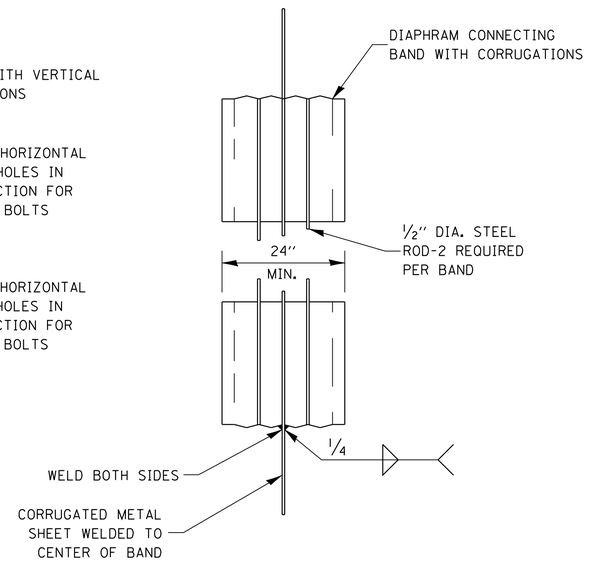
5. THE COLLARS SHALL BE WELDED TO THE CONNECTING BANDS AS SHOWN ON THE DRAWINGS. ALL WELDS SHALL BE TREATED AS SPECIFIED FOR CLASS I, II, AND III WELDS, MISCELLANEOUS. (REFER TO AWS STANDARD SPECIFICATIONS)

6. BANDS SHALL BE FABRICATED FROM MATERIAL HAVING THE SAME CLASS OF CORRUGATIONS AS THE PIPE TO WHICH IT IS TO BE ATTACHED.

DETAILS OF CORRUGATED PIPE COLLAR



ELEVATION



SECTION C–C

SEEPAGE COLLAR DIMENSION TABLE

PIPE DIAMETER	NOMINAL COLLAR SIZE	FABRICATIONS DIMENSIONS	
		W(WIDTH)	H(HEIGHT)
15'', 18'' 21'', 24''	8' X 6'	8' - 0''	3' - 2''
27'', 30''	8' X 7'	8' - 0''	3' - 8''
36'', 42'' 48''	10' X 7'	10' - 0''	3' - 8''

COLLAR DIMENSIONS SHOWN MAY BE INCREASED TO ALLOW FABRICATION FROM STANDARD SIZE SHEETS.

DETAILS OF SEEPAGE COLLAR

542–5

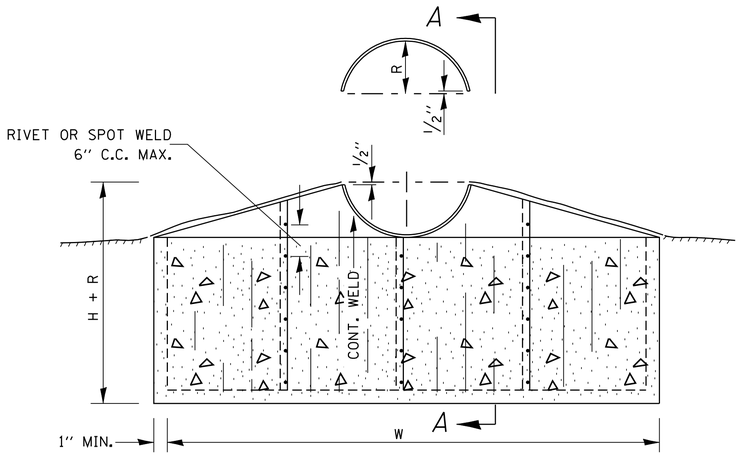
FILE NAME = c:\pw_work\PWIDOT\CORCORANLM\dms41560\5000599.dgn	USER NAME = corcoranlm	DESIGNED -	REVISED -
		DRAWN -	REVISED -
	PLOT SCALE = 47.727 '/ IN.	CHECKED -	REVISED -
	PLOT DATE = Jul 24, 2009 - 08:34:01 AM	DATE -	REVISED -

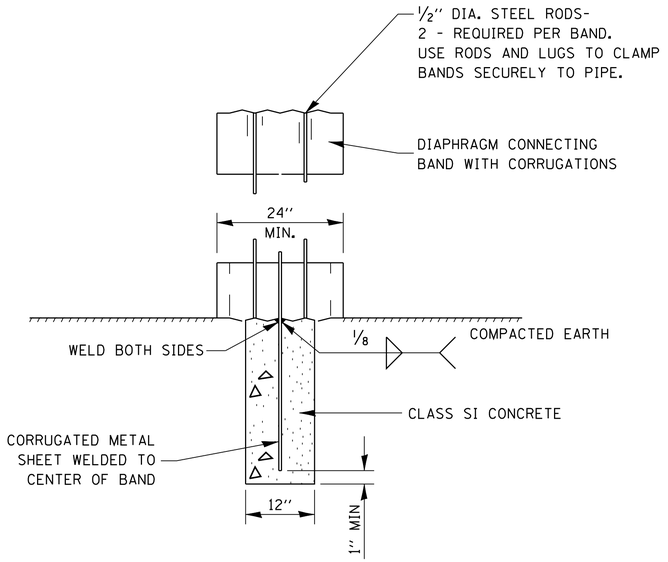
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

DETAIL OF SEEPAGE COLLAR FOR BURIED PIPES

SCALE: | SHEET NO. OF SHEETS | STA. | TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
		CONTRACT NO.		
FED. ROAD DIST. NO.	ILLINOIS	FED. AID PROJECT		





SECTION A–A

NOTES FOR COLLARS:

1. MATERIALS AND COATING FOR ALL COLLARS SHALL BE THE SAME AS THAT SPECIFIED FOR THE PIPE.

2. COLLARS SHALL BE SHOP FABRICATED, ASSEMBLED AND MARKED BY PAINTING TO IDENTIFY MATCHING HALF SECTIONS OF EACH COLLAR.

3. THE LAPS BETWEEN THE HALF SECTIONS AND BETWEEN THE PIPE AND CONNECTING BANDS SHALL BE CAULKED WITH FIBERIZED ASPHALT MASTIC AT THE TIME OF INSTALLATION.

4. ALL TANK LUGS, RODS, AND NUTS SHALL BE GALVANIZED STEEL. WHERE ALUMINUM COLLARS ARE USED, THE RODS AND LUGS SHALL BE SEPARATED FROM THE ALUMINUM BANDS BY AT LEAST TWO (2) LAYERS OF 2" WIDE PLASTIC TAPE WITH A TOTAL THICKNESS OF 2¼ MILS OR MORE.

5. THE COLLARS SHALL BE WELDED TO THE CONNECTING BANDS AS SHOWN ON THE DRAWINGS. ALL WELDS SHALL BE TREATED AS SPECIFIED FOR CLASS I, II, AND III WELDS, MISCELLANEOUS. (REFER TO AWS STANDARD SPECIFICATIONS)

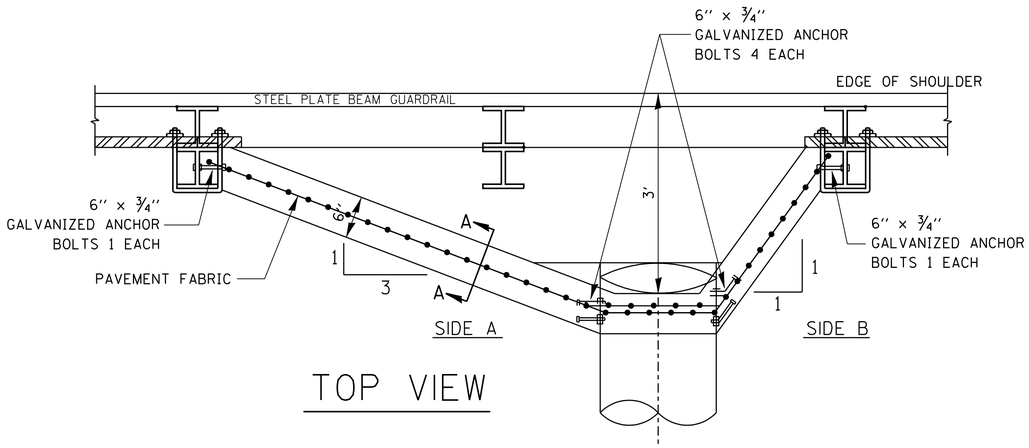
6. BANDS SHALL BE FABRICATED FROM MATERIAL HAVING THE SAME CLASS OF CORRUGATIONS AS THE PIPE TO WHICH IT IS TO BE ATTACHED.

7. TRENCH FOR CLASS SI CONCRETE TO BE EXCAVATED AFTER THE BASE OF PIPE HAS BEEN COMPACTED.

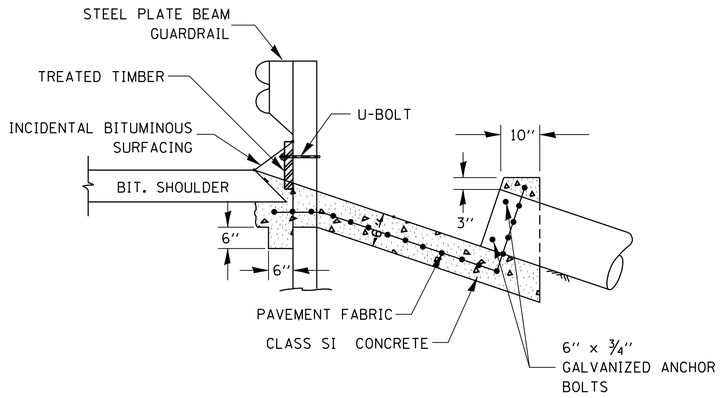
SEEPAGE COLLAR DIMENSION TABLE

PIPE DIAMETER		FABRICATIONS DIMENSIONS	
		W(WIDTH)	H(HEIGHT)
15", 18" 21", 24"		8' - 0"	3' - 0"
27", 30"		8' - 0"	3' - 6"
36", 42" 48"		10' - 0"	3' - 6"

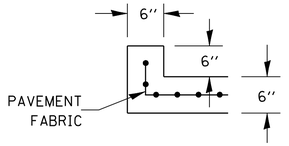
COLLAR DIMENSIONS SHOWN MAY BE INCREASED TO ALLOW FABRICATION FROM STANDARD SIZE SHEETS.



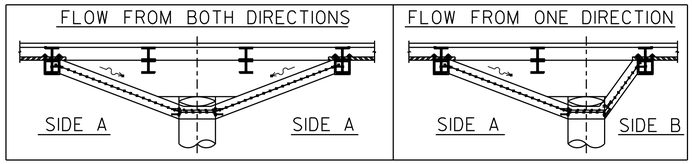
TOP VIEW

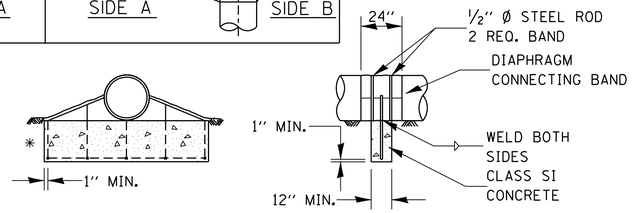


SIDE VIEW



A-A





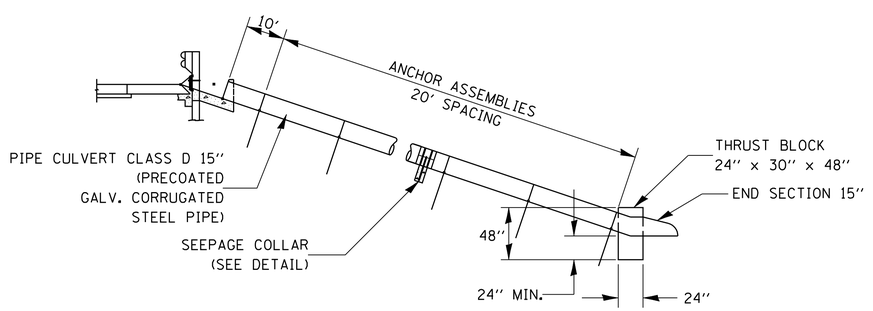
SEEPAGE COLLAR
FOR EXPOSED PIPE

NOTE:
SEEPAGE COLLAR FOR BURIED PIPE AND/OR SEEPAGE COLLAR FOR EXPOSED PIPE SHALL BE PAID FOR AT CONTRACT UNIT PRICE PER EACH AND SHALL INCLUDE ALL EXCAVATION, CLASS SI CONCRETE, ANCHORS, CONNECTING BANDS, AND COMPACTED BACKFILLING NECESSARY FOR COMPLETE INSTALLATION.

CLASS SI CONCRETE SHALL BE USED FOR THE CONCRETE OUTLET.

PAVEMENT FABRIC SHALL CONFORM TO ARTICLE 1006.10.

CONCRETE OUTLET SHALL BE INSTALLED AND PAID FOR PER EACH FOR CONCRETE OUTLET WHICH PRICE SHALL ALSO INCLUDE GALVANIZED ANCHOR BOLTS, PAVEMENT FABRIC AND ANY OTHER MATERIALS NECESSARY TO COMPLETE THIS WORK.

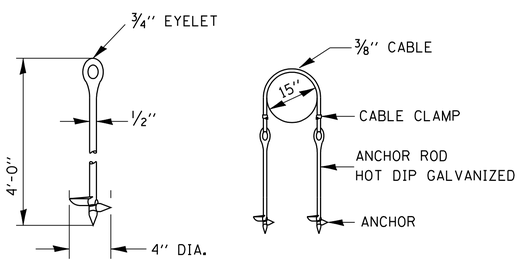


SEEPAGE COLLAR SPACING
< 24'' Ø PIPE = 100' SPACING OR MIDPOINT
≥ 24'' Ø PIPE = 80' SPACING OR MIDPOINT

NOTE:
PIPE CULVERT SHALL BE INSTALLED, MEASURED, AND PAID FOR IN ACCORDANCE WITH SECTION 542 OF THE STANDARD SPECIFICATIONS. ALL CONNECTING BANDS SHALL HAVE A MINIMUM WIDTH OF 24'' AND IT SHALL BE PRECOATED. THE UNIT PRICE SHALL ALSO INCLUDE ANCHOR ASSEMBLIES.

THE MATERIAL FOR PIPE CULVERT CLASS D 15'' SHALL BE PRECOATED GALVANIZED CORRUGATED STEEL PIPE. AN APPROVED MASTIC JOINT SEALER SHALL BE APPLIED TO THE INSIDE OF THE CONNECTING BAND.

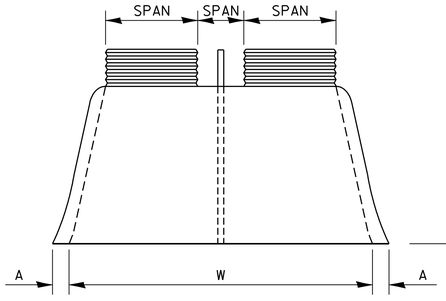
THE CONCRETE THRUST BLOCK IS TO BE PAID FOR AT THE CONTRACT UNIT PRICE EACH FOR CONCRETE THRUST BLOCK.



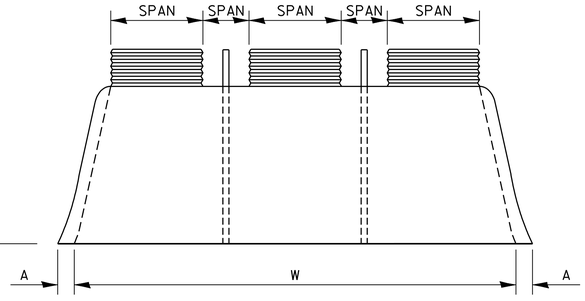
END VIEW

ANCHOR DETAIL

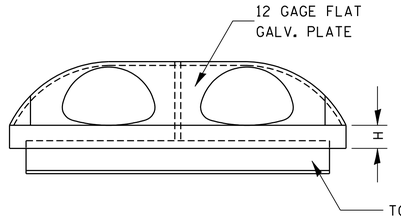
ANCHOR ASSEMBLIES DETAIL



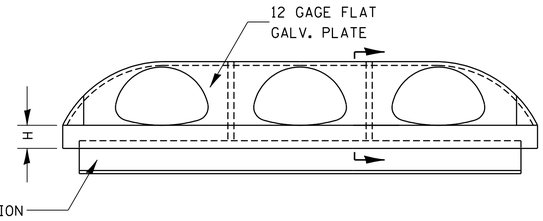
PLAN



PLAN



ELEVATION



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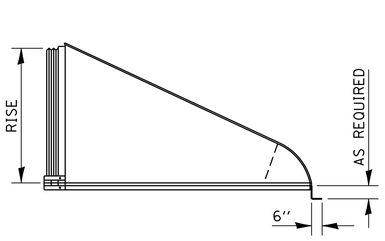
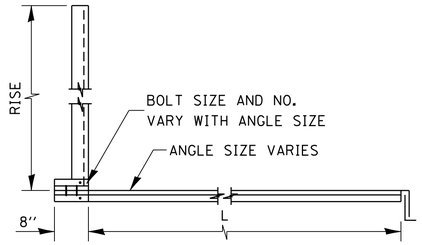
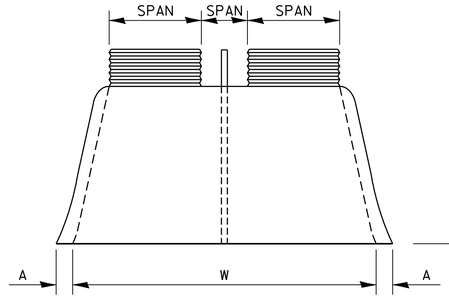


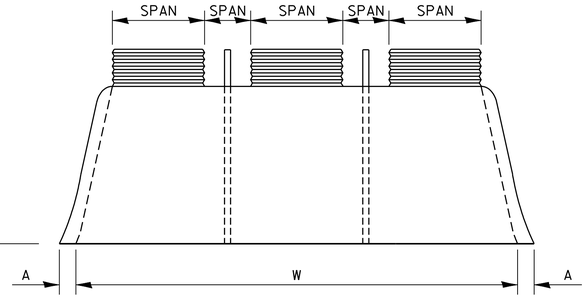
SIDE VIEW



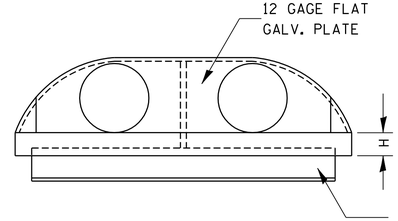
SECTION VIEW



PLAN



PLAN



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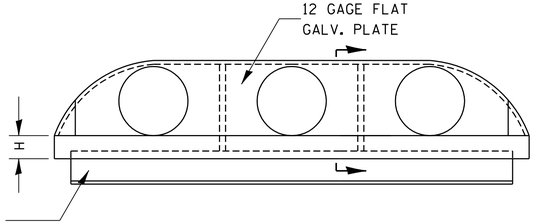
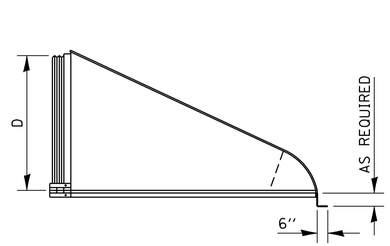
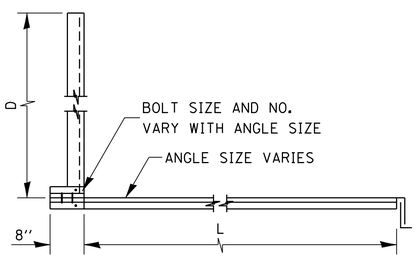


ELEVATION



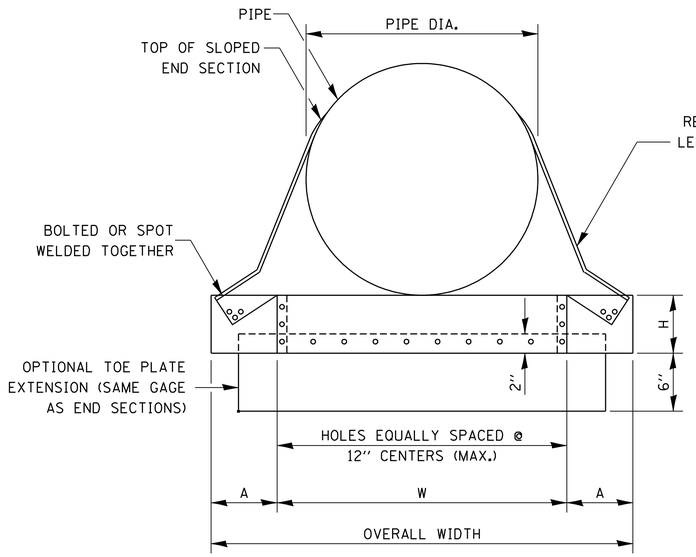
SIDE VIEW

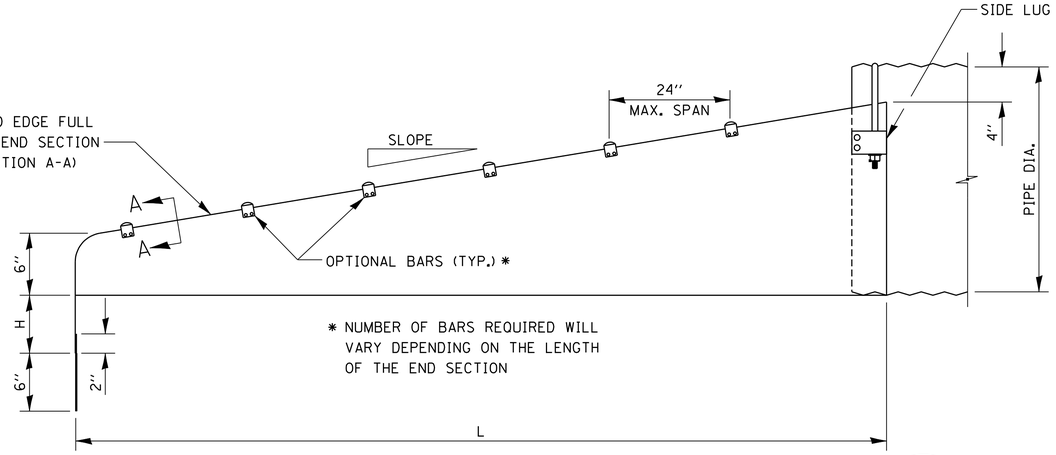


ANGLE SECTION VIEW

PIPE-ARCH MULTIPLE INLET END SECTIONS									
SPAN x RISE 2-2/3'' x 1/2''	EQUIV. ROUND	GAGE	SPA. (in)	A (in)	H (in)	L (in)	DOUBLE W	TRIPLE W	REINFORCING ANGLE
17 x 13	15	16	12	6 1/2	6	20	59	88	2 x 2 x 1/4
21 x 15	18	16	12	7 1/2	6	24	69	102	2 x 2 x 1/4
24 x 18	21	16	12	8	6	28	78	114	2 x 2 x 1/4
28 x 20	24	16	12	8	6	32	88	128	5 x 3 x 1/4
35 x 24	30	14	12	10	6	39	107	154	5 x 3 x 1/4
42 x 29	36	14	14	12	7 1/2	46	131	187	5 x 3 x 1/4
49 x 33	42	12	17	13 1/2	9	53	150	216	5 x 3 x 1/4
57 x 38	48	12	19	18 1/2	12	62	166	242	6 x 4 x 3/8
64 x 43	54	12	22	18	12	69	188	274	6 x 4 x 3/8
71 x 47	60	12/10	24	18 1/2	12	77	209	304	6 x 4 x 3/8
77 x 62	66	12/10	26	18	12	77	229	332	6 x 4 x 3/8
83 x 67	72	12/10	28	18	12	77	243	354	6 x 4 x 3/8
SPAN x RISE 3''x1'' & 5''x1''	EQUIV. ROUND	GAGE	SPA. (in)	A (in)	H (in)	L (in)	DOUBLE W	TRIPLE W	REINFORCING ANGLE
60 x 46	54	12	20	18	12	70	182	262	6 x 4 x 3/8
66 x 51	60	12/10	22	18	12	77	202	290	6 x 4 x 3/8
73 x 55	66	12/10	25	18	12	77	224	322	6 x 4 x 3/8
81 x 69	72	12/10	27	18	12	77	246	354	6 x 4 x 3/8

ROUND PIPE MULTIPLE INLET END SECTIONS								
PIPE DIA. (D) (in)	GAGE	SPA. (in)	A (in)	H (in)	L (in)	DOUBLE W	TRIPLE W	REINFORCING ANGLE
12	16	12	6 1/2	6	21	48	72	2 x 2 x 1/4
15	16	12	7 1/2	6	26	57	84	2 x 2 x 1/4
18	16	12	8	6	31	66	96	2 x 2 x 1/4
21	16	12	10	6	36	75	108	2 x 2 x 1/4
24	16	12	10	6	41	84	120	5 x 3 x 1/4
30	14	15	12 1/4	8	51	102	147	5 x 3 x 1/4
36	14	18	14 1/2	9	60	126	180	5 x 3 x 1/4
42	12	21	17	10 1/2	69	147	210	5 x 3 x 1/4
48	12	24	18 1/2	12	79	162	234	6 x 4 x 7/16
54	12	27	18 1/2	12	84	183	264	6 x 4 x 7/16
60	12/10	30	18	12	88	204	294	6 x 4 x 7/16
66	12/10	33	18	12	87	219	318	6 x 4 x 7/16
72	12/10	36	18	12	88 1/2	228	336	6 x 4 x 7/16
78	12/10	36	18	12	87 1/2	252	366	6 x 4 x 7/16
84	12/10	36	18	12	87 1/2	254	384	6 x 4 x 7/16

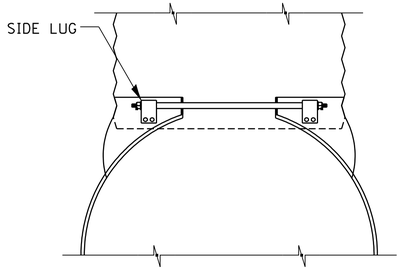




SIDE ELEVATION

GENERAL NOTES

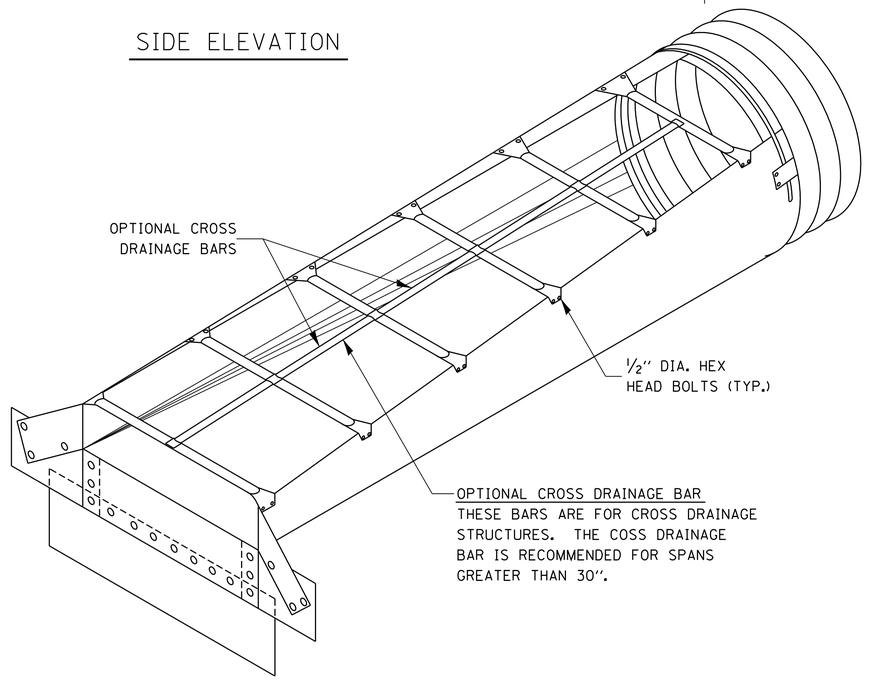
1. CONNECTORS - ROUND SIZES THRU 24" ATTACH TO PIPE WITH TYPE #1 STRAPS, ALL OTHER SIZES ATTACH WITH TYPE #2 RODS AND LUGS.
2. TOE PLATE EXTENSIONS - WHEN REQUIRED, TOE PLATE EXTENSIONS ARE TO BE THE SAME GAGE AS END SECTIONS. DIMENSIONS SHALL BE OVERALL WIDTH LESS 6 INCHES BY 8 INCHES HIGH.
3. OPTIONAL BARS - BARS WHEN SPECIFIED, SHALL BE SCHEDULE 40 GALVANIZED STEEL PIPE.
4. TYPICALLY PARALLEL BARS ARE PLACED ON 24" CENTERS.
5. TYPICALLY THE CROSS BARS ARE USED ON CROSS DRAIN APPLICATIONS.
6. HOLES FOR BAR ATTACHMENTS SHALL BE PROVIDED ON ALL END SECTIONS.
7. DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
8. THESE END SECTIONS WILL BE PAID FOR AT THE CONTRACT UNIT PRICE PER EACH FOR SLOPED METAL END SECTIONS WITH GRATE OF THE DIAMETER SPECIFIED, WHICH SHALL INCLUDE FURNISHING AND INSTALLING THE END SECTION COMPLETE IN PLACE, INCLUDING THE TOE PLATE, EXCAVATING, BACKFILLING, CONNECTING TO THE PIPE, AND CROSS DRAINAGE BARS.



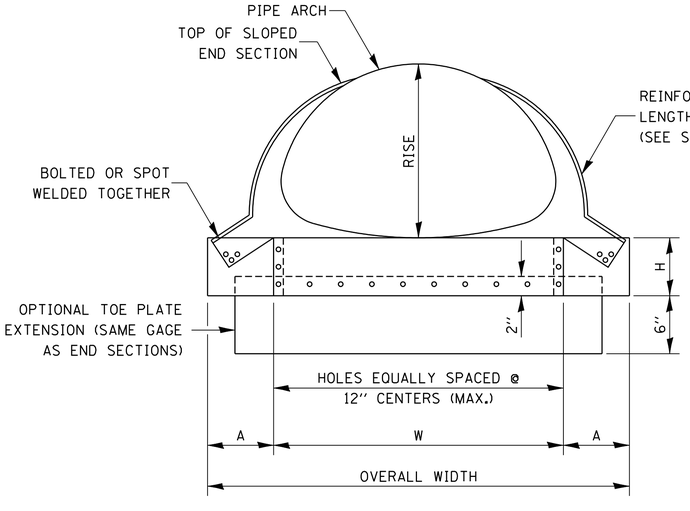
TYPE #2 CONNECTOR DETAIL

TYPE #1 CONNECTOR DETAILS
THRU 24"
GALVANIZED STRAP

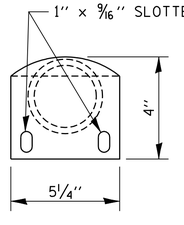
TYPE #2 CONNECTOR DETAILS (SHOWN)
FOR 30" AND LARGER
21" x 15" AND LARGER
1/2" THREADED ROD W/FLANGED
NUT AND SIDE LUG

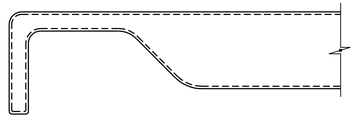


CIRCULAR PIPE ISOMETRIC VIEW



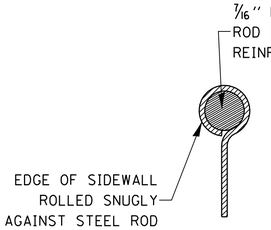
FRONT VIEW PIPE ARCH





3" GALVANIZED PIPE FLATTEN END, THEN BEND OUTSIDE 4" TO MATCH END SECTION SIDES.

DETAIL OF OPTIONAL BARS



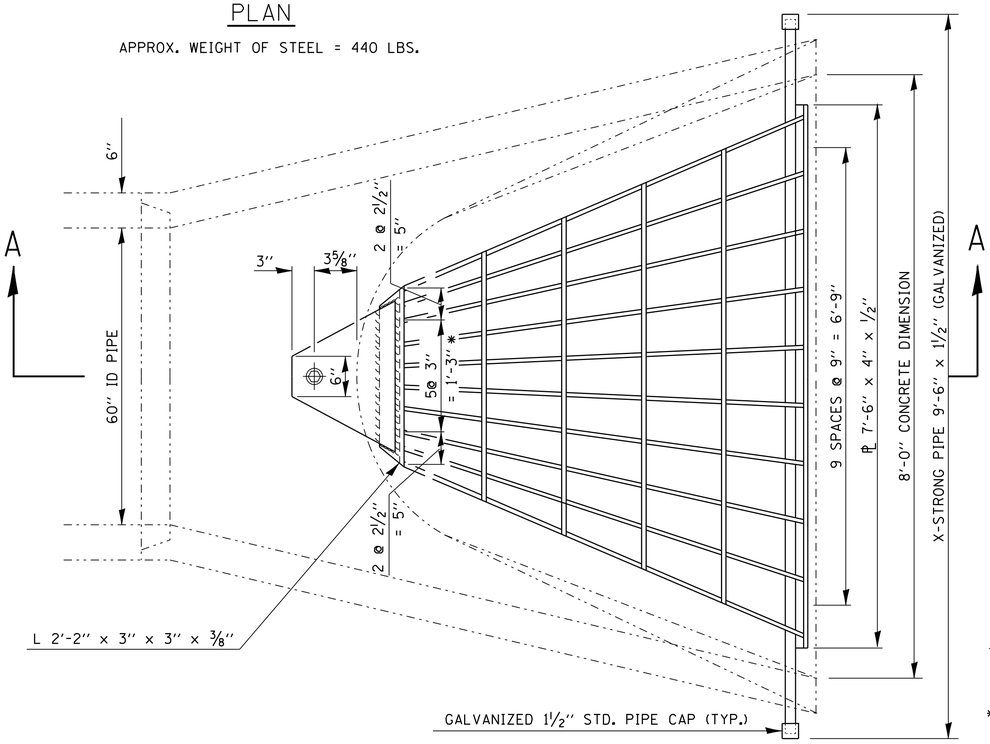
SECTION A-A

METAL END SECTIONS FOR ROUND PIPE										
PIPE DIA. (IN)	MIN. THICK		DIMENSIONS (INCHES)				L DIMENSIONS			
	IN.	GAGE	A	H	W	OVERALL WIDTH	SLOPE	LENGTH (IN.)	SLOPE	LENGTH (IN.)
15	.064	16	8	6	21	37	6:1	30	4:1	20
18	.064	16	8	6	24	40	6:1	48	4:1	32
21	.064	16	8	6	27	43	6:1	66	4:1	44
24	.064	16	8	6	30	46	6:1	84	4:1	56
30	.109	12	12	9	36	60	6:1	120	4:1	80
36	.109	12	12	9	42	66	4:1	104	6:1	156
42	.109	12	16	12	48	80	4:1	128	6:1	192
48	.109	12	16	12	54	86	4:1	152	6:1	228
54	.109	12	16	12	60	92	4:1	176	6:1	264
60	.109	12	16	12	66	98	4:1	200	6:1	300

METAL END SECTIONS FOR PIPE ARCH											
EQUIV. DIA. (IN)	(INCHES)		MIN. THICK		DIMENSIONS (INCHES)				L DIMENSIONS		
	SPAN	RISE	IN.	GAGE	A	H	W	OVERALL WIDTH	SLOPE	LENGTH (IN.)	SLOPE	LENGTH (IN.)
18	21	15	.064	16	8	6	27	43	6:1	30	4:1	20
21	24	18	.064	16	8	6	30	46	6:1	48	4:1	32
24	28	20	.064	16	8	6	34	50	6:1	60	4:1	40
30	36	24	.079	14	12	9	41	65	6:1	84	4:1	56
36	42	29	.109	12	12	9	48	72	6:1	114	4:1	76
42	49	33	.109	12	16	12	55	87	4:1	92	6:1	138
48	57	38	.109	12	16	12	63	95	4:1	112	6:1	168
54	64	43	.109	12	16	12	70	102	4:1	132	6:1	198
60	71	47	.109	12	16	12	77	109	4:1	148	6:1	222
72	83	57	.109	12	16	12	89	121	4:1	188	6:1	282

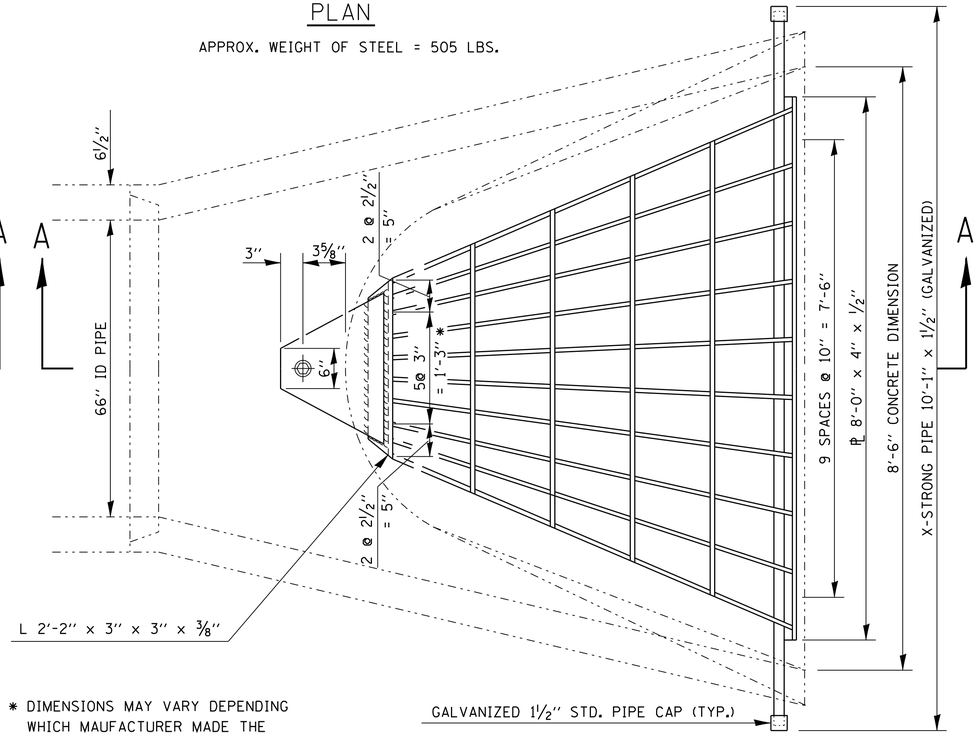
PLAN

APPROX. WEIGHT OF STEEL = 440 LBS.



PLAN

APPROX. WEIGHT OF STEEL = 505 LBS.



* DIMENSIONS MAY VARY DEPENDING WHICH MAUFACTURER MADE THE END SECTION

GENERAL NOTES

GRATING DETAILS SHOWN ARE INTENDED FOR USE WITH PARTICULAR SIZES OF PRECAST REINFORCED CONCRETE FLARED END SECTIONS AS SHOWN ON STANDARD 542106 & 542111.

STRUCTURAL STEEL SHAPES AND PLATES SHALL BE IN ACCORDANCE WITH ARTICLE 1006.04 OF THE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.

GALVANIZED STEEL PIPE SHALL BE IN ACCORDANCE WITH ARTICLE 542.07 (d) OF THE STANDARD SPECIFICATIONS. STEEL PIPE SHALL CONFORM TO ASTM A-53 (TYPE E OR S) GRADE B SCHEDULE 40.

BOLTS, NUTS AND WASHERS SHALL BE IN ACCORDANCE WITH ARTICLE 1006.08 OF THE STANDARD SPECIFICATIONS.

ALL FABRICATION SHALL BE COMPLETED AND READY FOR ASSEMBLY BEFORE GALVANIZING.

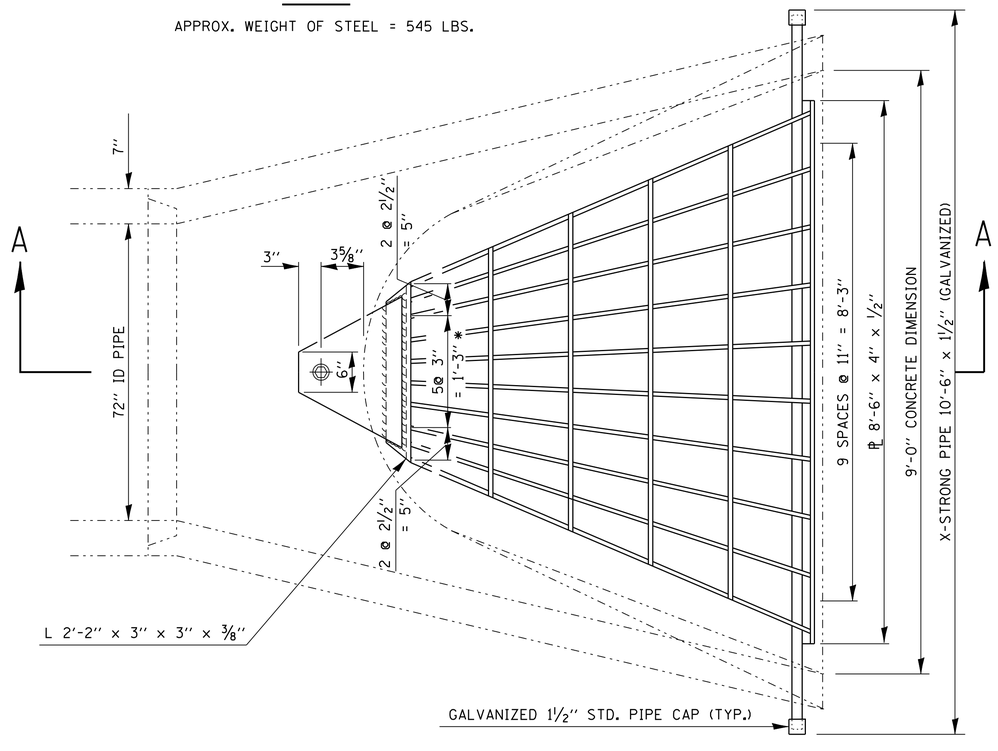
THE CORED HOLES IN THE PRECAST CONCRETE FLARED END SECTIONS SHALL BE TO THE DIAMETERS NOTED. IF CONE-OUT ON THE OTHER END OF THE HOLE OCCURS, THE HOLE SHALL BE FILLED WITH GROUT TO CORRECT DIAMETER OF THE HOLE.

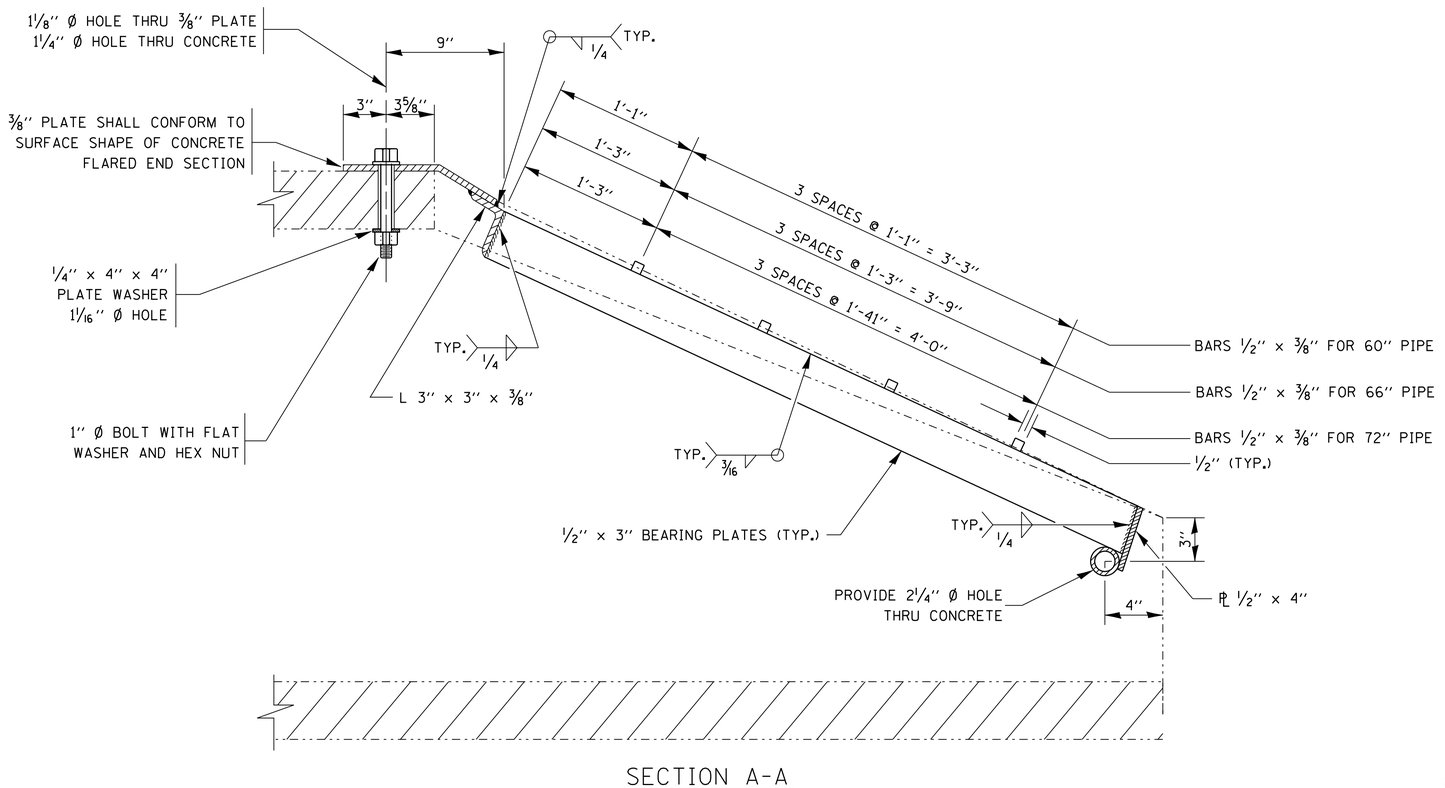
APPROXIMATE WEIGHT OF STEEL SHOWN INCLUDES TOTAL WEIGHT OF GRATING, BOLTS, WASHERS, NUTS AND STEEL PIPE.

THE CONTRACT UNIT PRICE "EACH" FOR GRATING FOR CONCRETE FLARED END SECTION EQUIVALENT ROUND-SIZE OF THE SIZE INDICATED SHALL INCLUDE FABRICATION AND INSTALLATION OF THE GRATING AS DETAILED HEREIN, INCLUDING FABRICATION OF THE NECESSARY MOUNTING HOLES IN THE FLARED END SECTION, THIS PRICE DOES NOT INCLUDE THE COST OF THE PRECAST CONCRETE FLARED END SECTIONS.

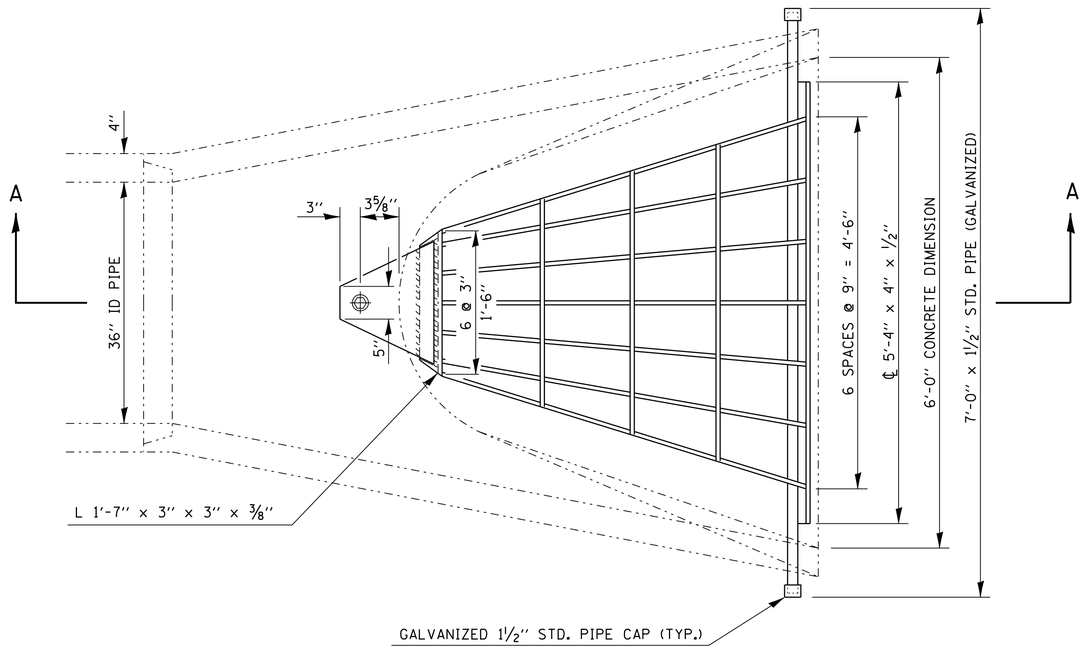
PLAN

APPROX. WEIGHT OF STEEL = 545 LBS.





SECTION A-A



PLAN

APPROX. WEIGHT OF STEEL = 270 LBS.

GENERAL NOTES

GRATING DETAILS SHOWN ARE INTENDED FOR USE WITH PARTICULAR SIZES OF PRECAST REINFORCED CONCRETE FLARED END SECTIONS AS SHOWN ON STANDARD 542306.

STRUCTURAL STEEL SHAPES AND PLATES SHALL BE IN ACCORDANCE WITH ARTICLE 1006.04 OF THE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.

GALVANIZED STEEL PIPE SHALL BE IN ACCORDANCE WITH ARTICLE 542.07 (d) OF THE STANDARD SPECIFICATIONS. STEEL PIPE SHALL CONFORM TO ASTM A-53 (TYPE E OR S) GRADE B SCHEDULE 40.

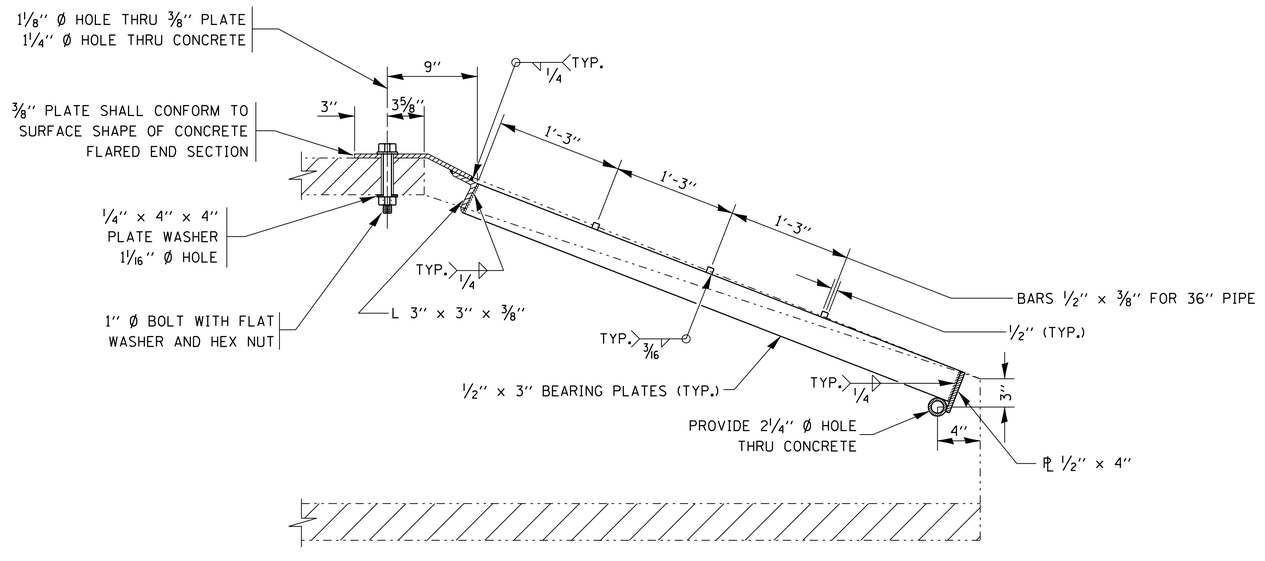
BOLTS, NUTS AND WASHERS SHALL BE IN ACCORDANCE WITH ARTICLE 1006.08 OF THE STANDARD SPECIFICATIONS.

ALL FABRICATION SHALL BE COMPLETED AND READY FOR ASSEMBLY BEFORE GALVANIZING.

THE CORED HOLES IN THE PRECAST CONCRETE FLARED END SECTIONS SHALL BE TO THE DIAMETERS NOTED. IF CONE-OUT ON THE OTHER END OF THE HOLE OCCURS, THE HOLE SHALL BE FILLED WITH GROUT TO CORRECT DIAMETER OF THE HOLE.

APPROXIMATE WEIGHT OF STEEL SHOWN INCLUDES TOTAL WEIGHT OF GRATING, BOLTS, WASHERS, NUTS AND STEEL PIPE.

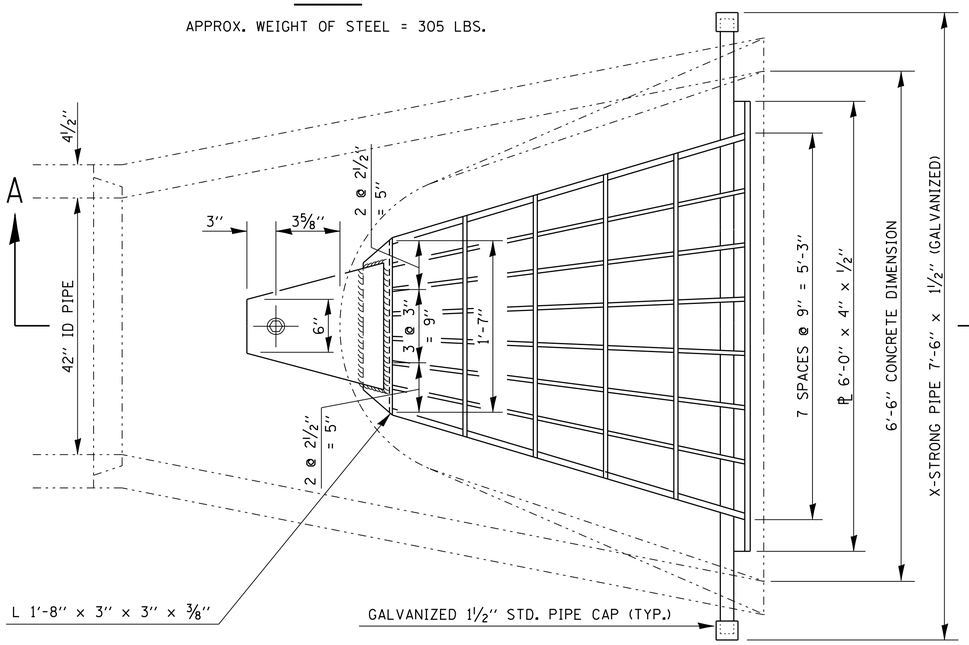
THE CONTRACT UNIT PRICE "EACH" FOR GRATING FOR CONCRETE FLARED END SECTION EQUIVALENT ROUND-SIZE OF THE SIZE INDICATED SHALL INCLUDE FABRICATION AND INSTALLATION OF THE GRATING AS DETAILED HEREIN, INCLUDING FABRICATION OF THE NECESSARY MOUNTING HOLES IN THE FLARED END SECTION. THIS PRICE DOES NOT INCLUDE THE COST OF THE PRECAST CONCRETE FLARED END SECTIONS.



SECTION A-A

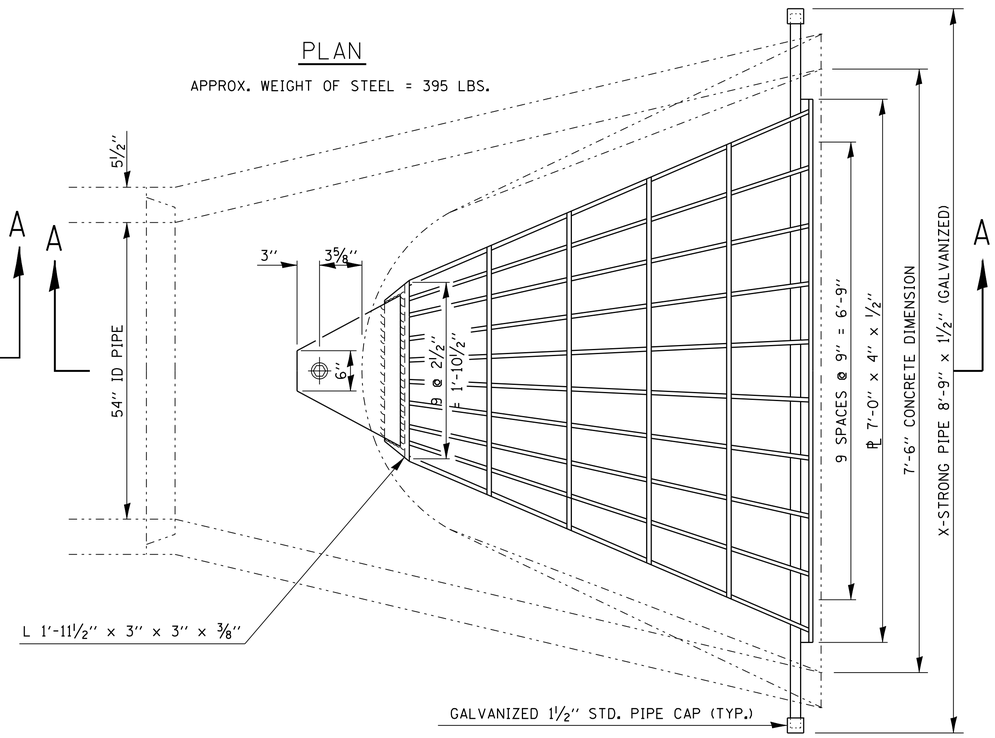
PLAN

APPROX. WEIGHT OF STEEL = 305 LBS.



PLAN

APPROX. WEIGHT OF STEEL = 395 LBS.



GENERAL NOTES

GRATING DETAILS SHOWN ARE INTENDED FOR USE WITH PARTICULAR SIZES OF PRECAST REINFORCED CONCRETE FLARED END SECTIONS AS SHOWN ON STANDARD 542306.

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GALVANIZED STEEL PIPE SHALL BE IN ACCORDANCE WITH ARTICLE 542.07 (d) OF THE STANDARD SPECIFICATIONS. STEEL PIPE SHALL CONFORM TO ASTM A-53 (TYPE E OR S) GRADE B SCHEDULE 40.

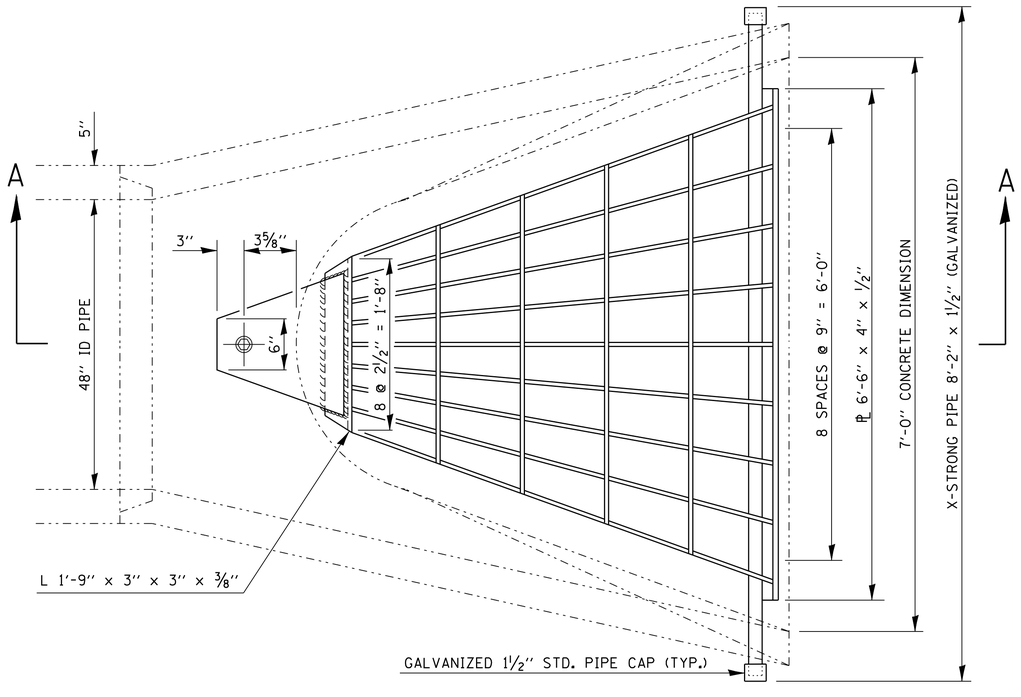
BOLTS, NUTS AND WASHERS SHALL BE IN ACCORDANCE WITH ARTICLE 1006.08 OF THE STANDARD SPECIFICATIONS.

ALL FABRICATION SHALL BE COMPLETED AND READY FOR ASSEMBLY BEFORE GALVANIZING.

THE CORED HOLES IN THE PRECAST CONCRETE FLARED END SECTIONS SHALL BE TO THE DIAMETERS NOTED. IF CONE-OUT ON THE OTHER END OF THE HOLE OCCURS, THE HOLE SHALL BE FILLED WITH GROUT TO CORRECT DIAMETER OF THE HOLE.

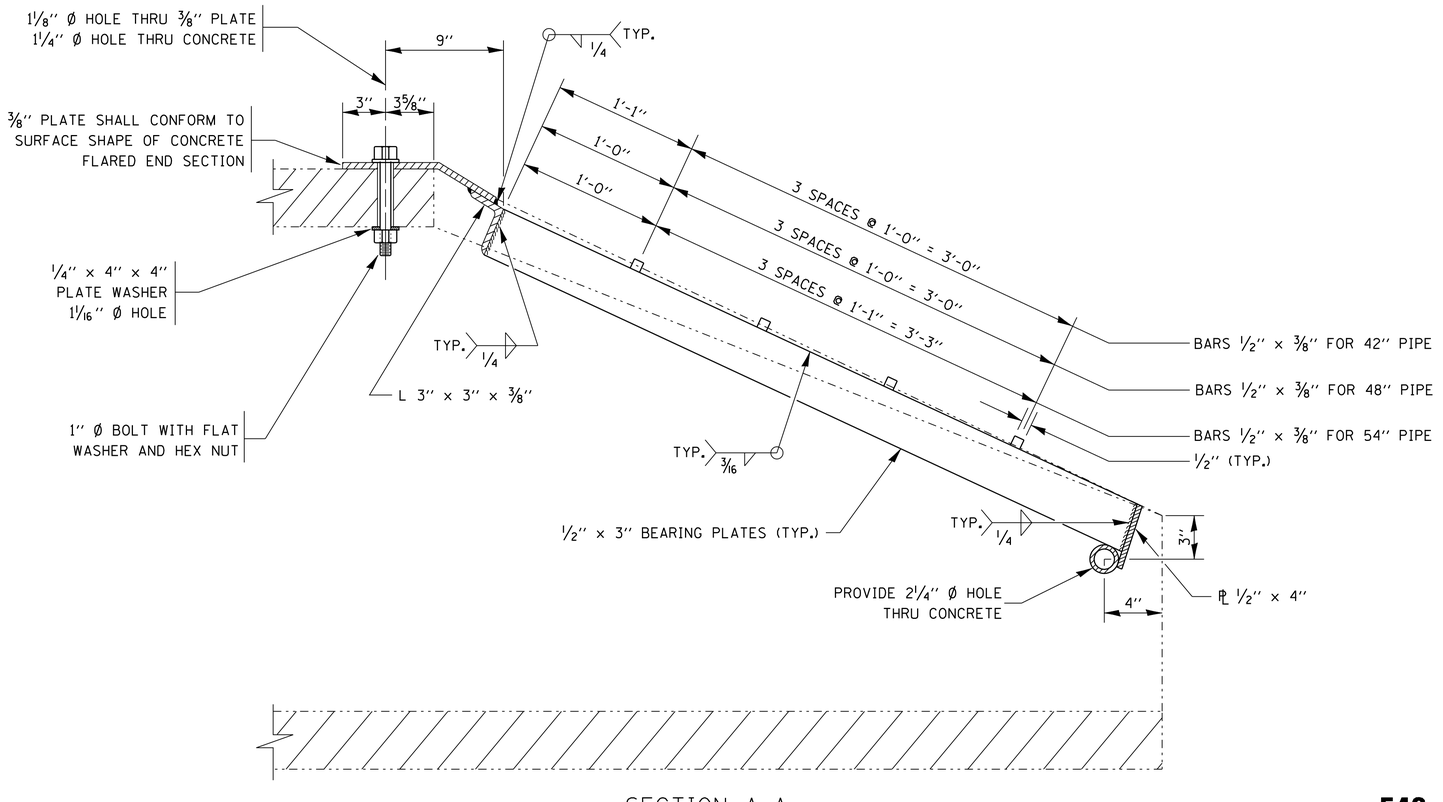
APPROXIMATE WEIGHT OF STEEL SHOWN INCLUDES TOTAL WEIGHT OF GRATING, BOLTS, WASHERS, NUTS AND STEEL PIPE.

THE CONTRACT UNIT PRICE "EACH" FOR GRATING FOR CONCRETE FLARED END SECTION EQUIVALENT ROUND-SIZE OF THE SIZE INDICATED SHALL INCLUDE FABRICATION AND INSTALLATION OF THE GRATING AS DETAILED HEREIN, INCLUDING FABRICATION OF THE NECESSARY MOUNTING HOLES IN THE FLARED END SECTION, THIS PRICE DOES NOT INCLUDE THE COST OF THE PRECAST CONCRETE FLARED END SECTIONS.



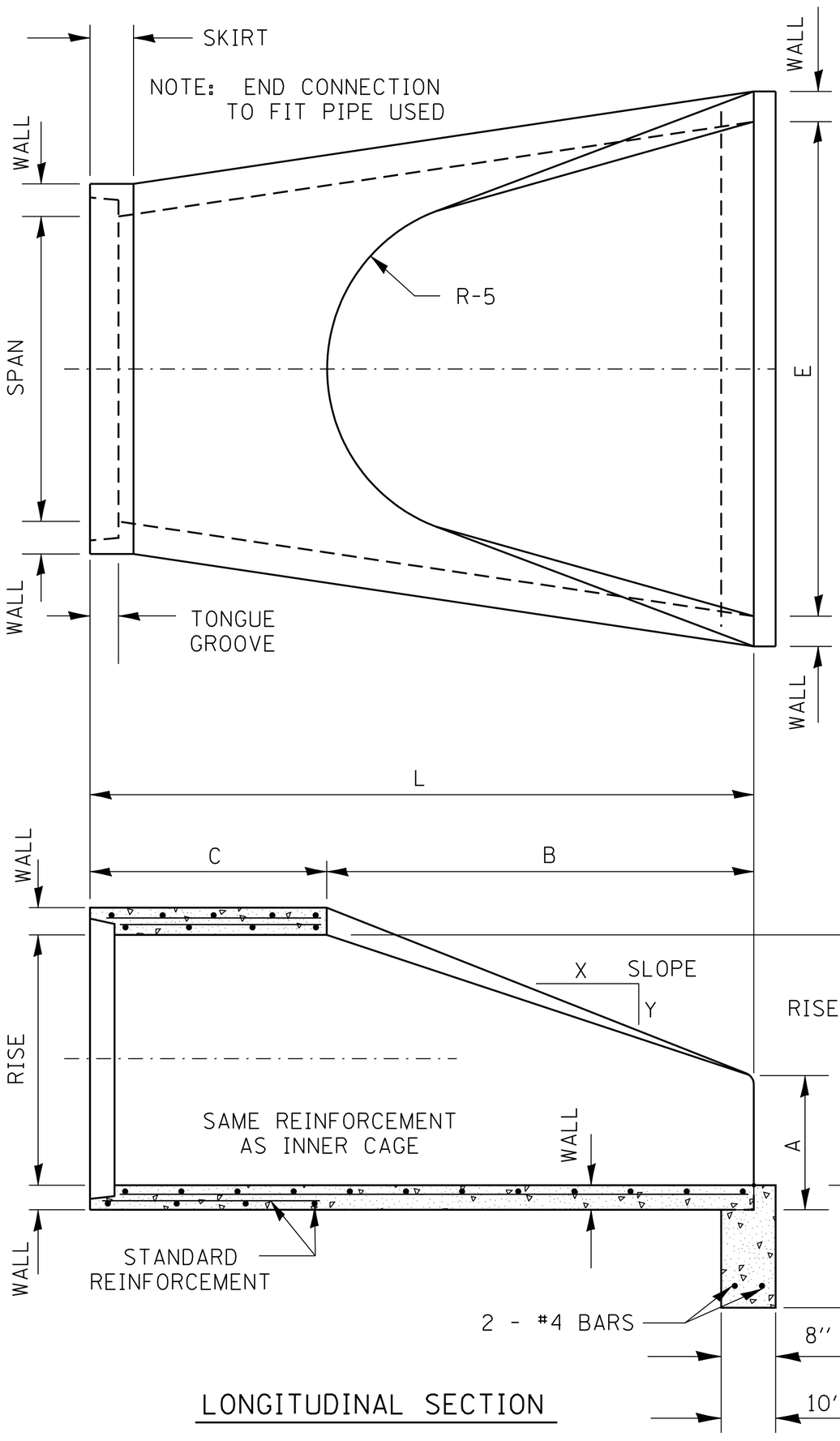
PLAN

APPROX. WEIGHT OF STEEL = 335 LBS.

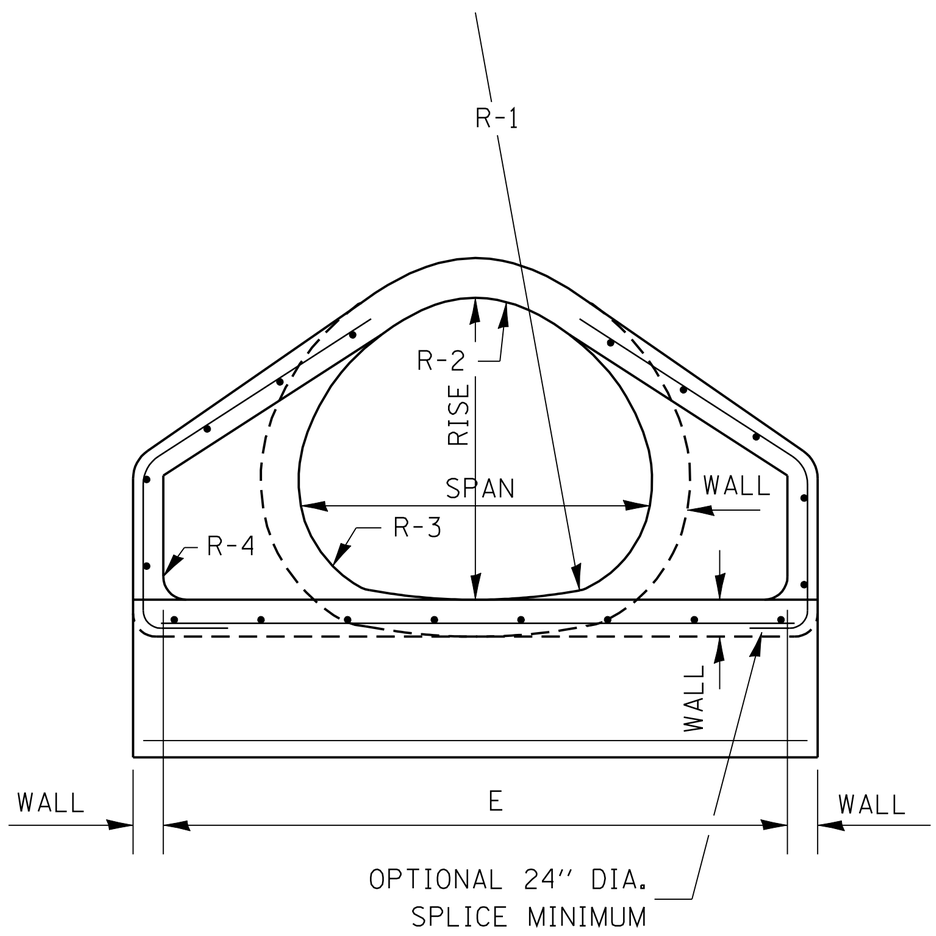


SECTION A-A

SIZE	WALL	SPAN	RISE	L	B	C	E	A	SLOPE	R-1	R-2	R-3	R-4	R-5
18''	2 1/2''	22''	13 1/2''	72''	27''	45''	36''	7''	2.16:1	27 1/2''	13 3/4''	5 1/4''	2''	12''
24''	3''	28 1/2''	18''	72''	39''	33''	48''	8''	2.29:1	40 11/16''	14 9/16''	4 19/32''	3''	14''
30''	3 1/2''	36 1/4''	22 1/2''	72''	48''	24''	60''	10''	2.34:1	51''	18 3/4''	6 1/8''	3''	15''
36''	4''	43 3/4''	26 5/8''	96''	60''	36''	72''	10 5/8''	2.4:1	62''	22 1/2''	6 1/2''	6''	20''
42''	4 1/2''	51 1/8''	31 5/16''	96''	60''	36''	78''	15 13/16''	2.35:1	73''	26 1/4''	7 3/4''	6''	22''
48''	5''	58 1/2''	36''	96''	60''	36''	84''	21''	2.31:1	84''	30''	8 7/8''	6''	22''
54''	5 1/2''	65''	40''	96''	60''	36''	90''	25 1/2''	2.26:1	92 1/2''	33 3/8''	10''	6''	24''
60''	6''	73''	45''	96''	75''	21''	96''	26''	2.34:1	105''	37 1/2''	11 1/16''	6''	21''
72''	7''	88''	54''	100''	78''	22''	120''	35''	2.29:1	126''	45''	13 5/16''	6''	24''



LONGITUDINAL SECTION



END VIEW

NOTES:

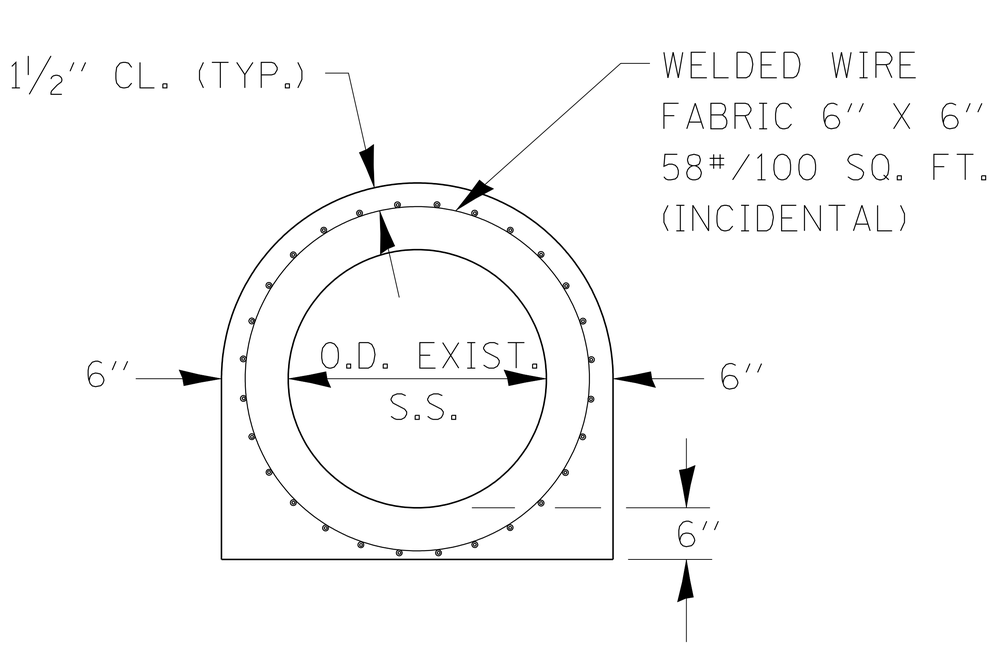
PRECAST CONCRETE FLARED END SECTIONS SHALL CONFORM TO THE APPLICABLE REQUIREMENT OF AASHTO M-206.

PRECAST CONCRETE FLARED END SECTION FOR PIPE ARCH DIAMETER REQUIRED SHALL BE AS INDICATED ON DETAIL PLAN FOR EACH INDIVIDUAL INSTALLATION.

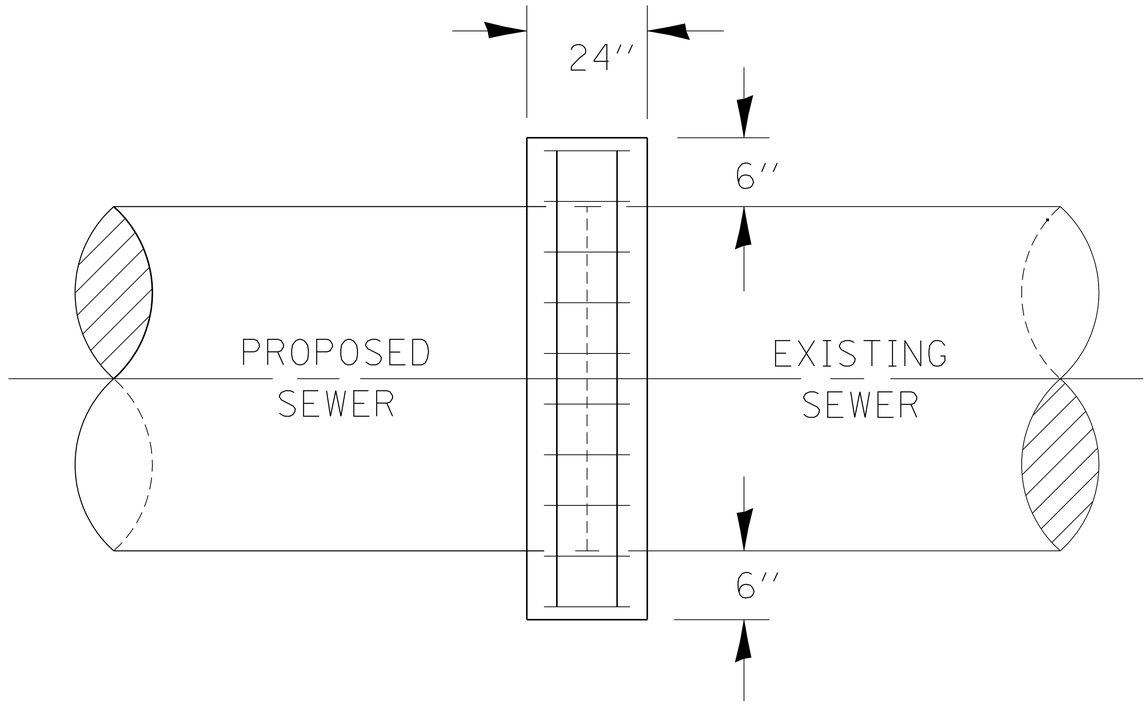
THE END BLOCK SHALL BE PLACED PRIOR TO THE INSTALLATION OF THE FLARED END SECTION. THE END BLOCK SHALL BE BACKFILLED IN ACCORDANCE WITH ARTICLE 502.10 OF THE STANDARD SPECIFICATIONS, COST INCLUDED IN THE END SECTION.

PRECAST REINFORCED CONCRETE ARCH DIAMETER FLARED END SECTION

542–13



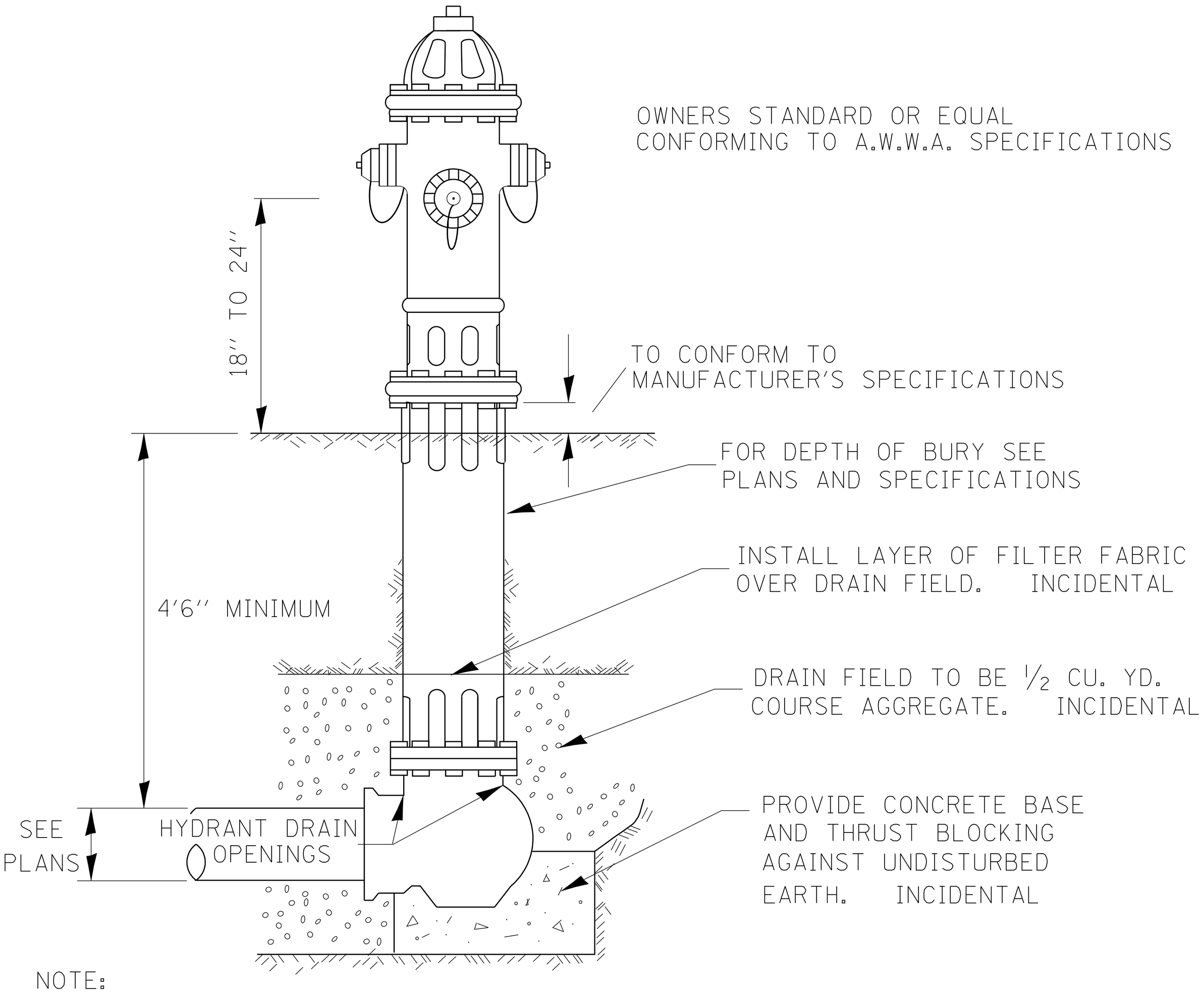
FRONT VIEW



SIDE VIEW

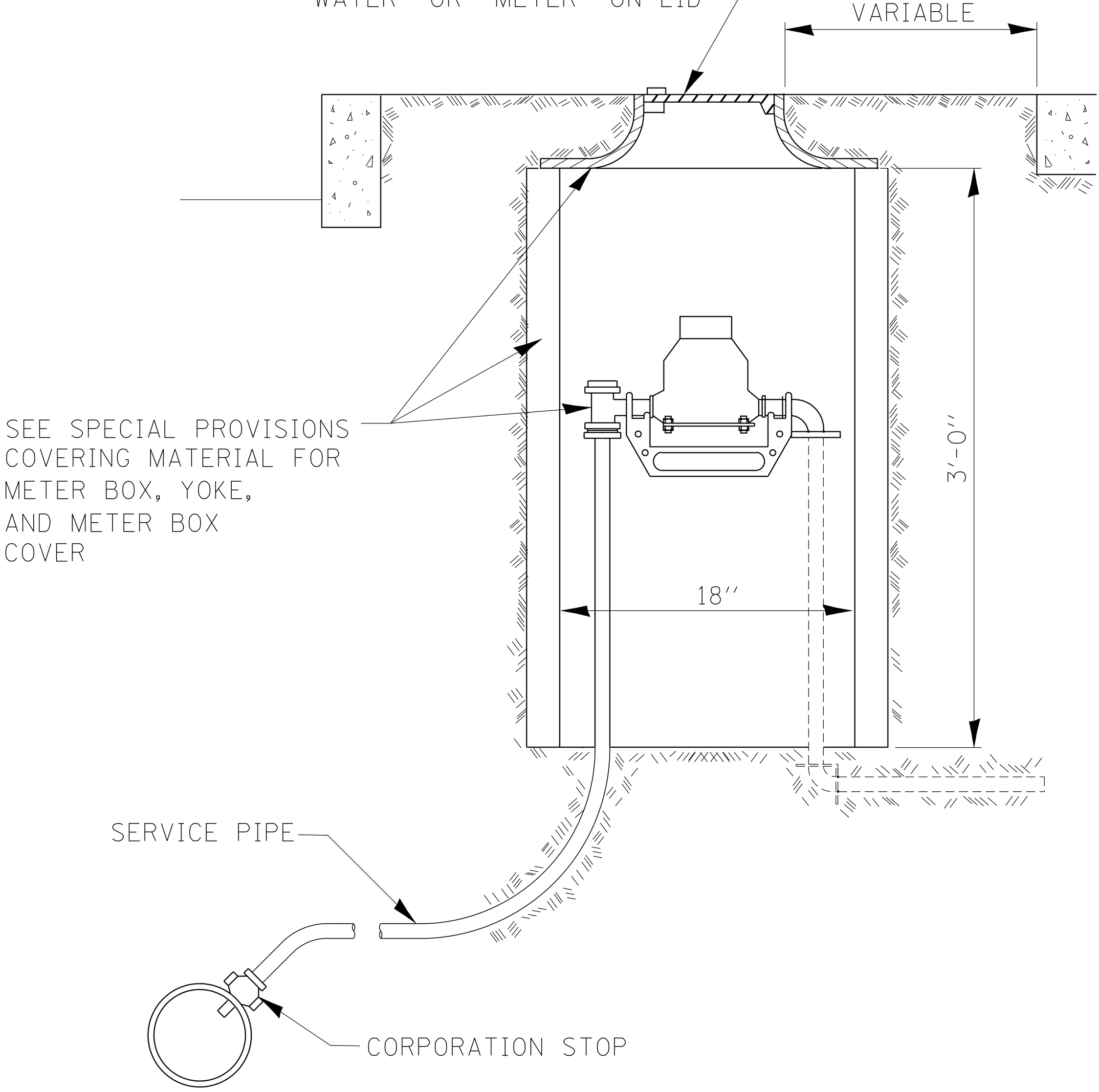
CONCRETE COLLAR FOR SEWER CONNECTION

550–1



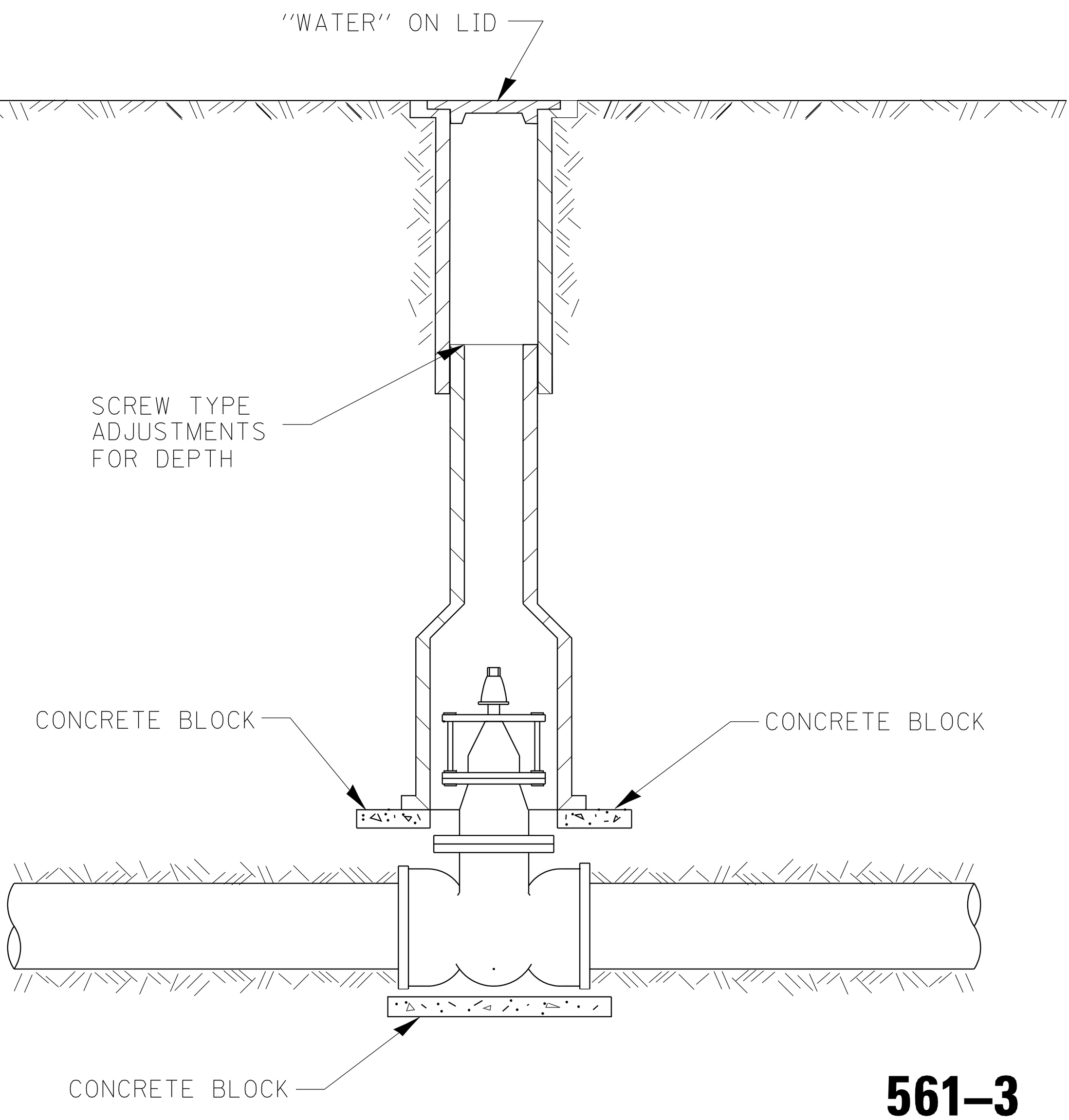
NOTE:
CONCRETE BASE AND BLOCKING MATERIAL SHALL
NOT BLOCK NOR OBSTRUCT HYDRANT DRAIN.

TYPICAL HYDRANT INSTALLATION 561–1



TYPICAL SINGLE METER BOX INSTALLATION

561–2

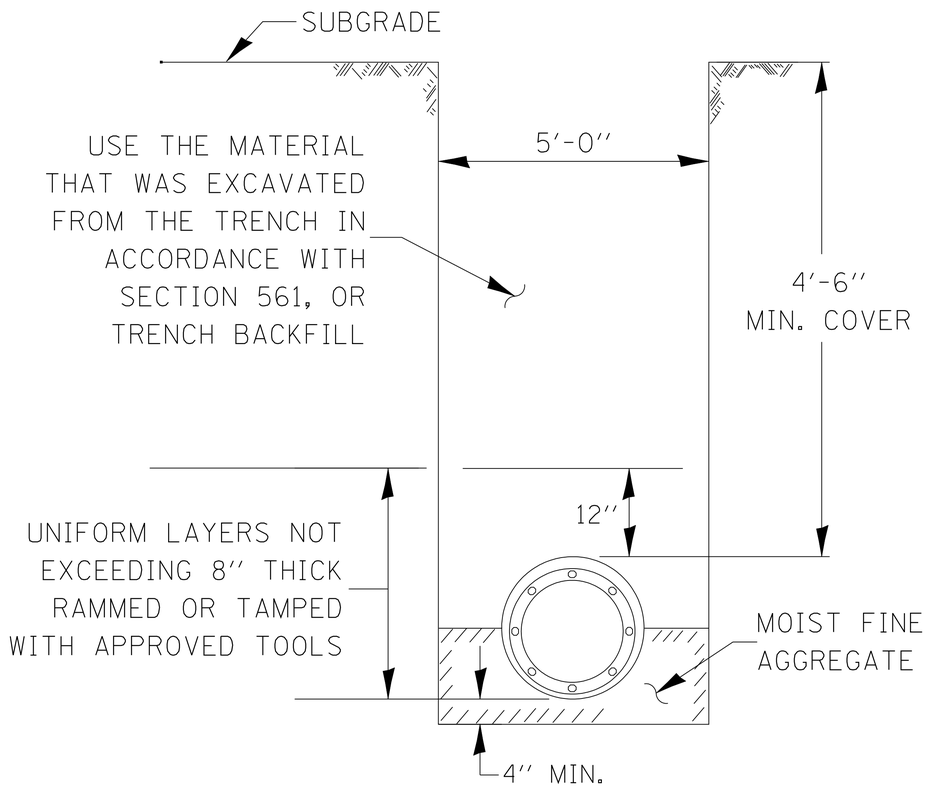


561–3

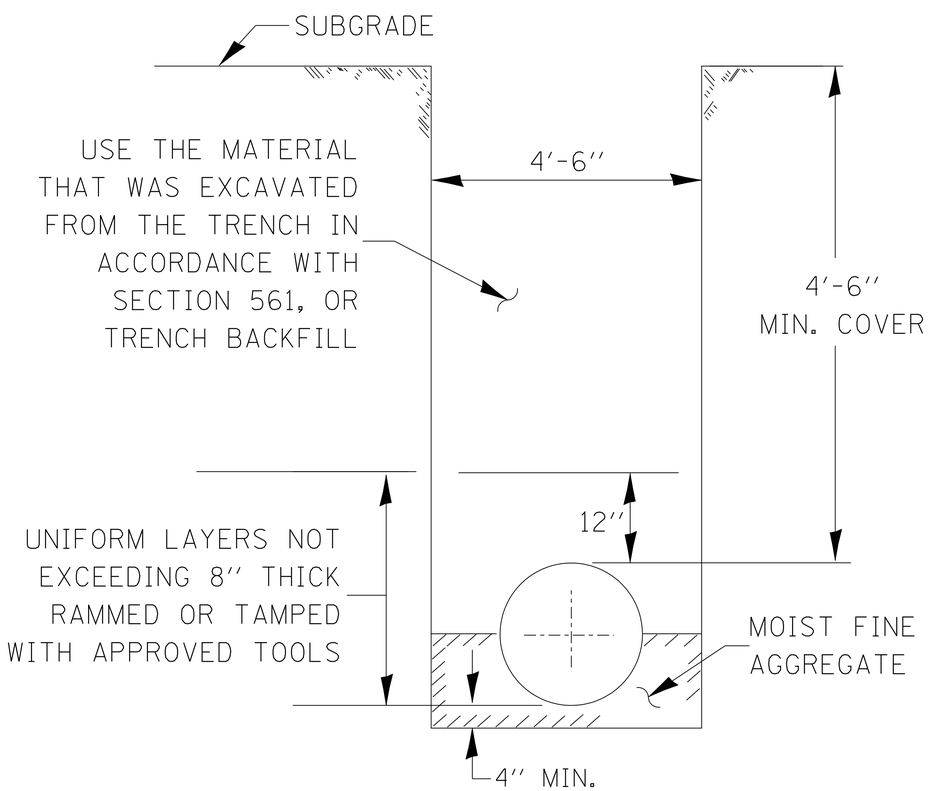
TYPICAL VALVE BOX INSTALLATION

WATERMAIN INSTALLATION REQUIREMENTS

WATERMAIN IN STEEL CASING



WATERMAIN TRENCHES EXCAVATED



GENERAL NOTES:

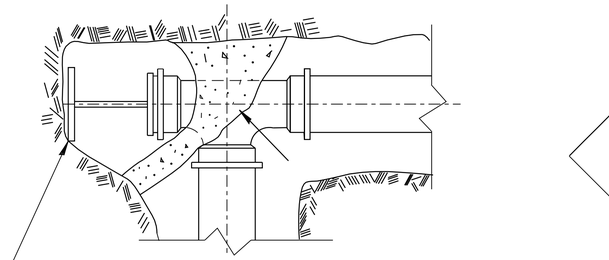
1. ANY SOFT OR SPONGY MATERIAL ENCOUNTERED BELOW THE ELEVATION OF THE PIPE SHALL BE REMOVED AND REPLACED WITH WELL COMPACTED MOIST FINE AGGREGATE.

2. ANY ROCK ENCOUNTERED IN THE TRENCH SHALL BE REMOVED TO A DEPTH OF AT LEAST 8 INCHES BELOW THE PIPE GRADE AND REPLACED WITH WELL COMPACTED MOIST FINE AGGREGATE.

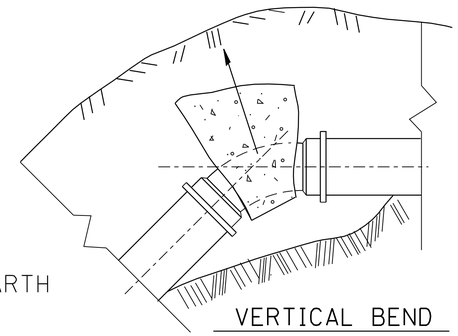
3. THE SIDES OF THE TRENCH MAY BE SLOPED OR BENCHED ABOVE A 5 FT. TRENCH DEPTH OR ABOVE THE ELEVATION OR THE TOP OF PIPE, WHICHEVER IS GREATER, IN LIEU OF CONPLETE SHORING OR SHEETING OF THE FULL TRENCH DEPTH.

BACKFILL OPTIONS:

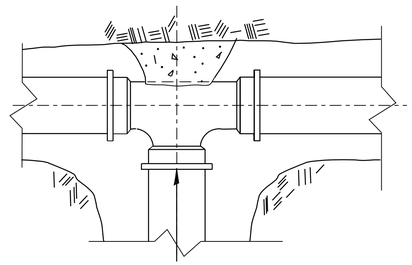
METHOD 1: UNIFORM LAYERS NOT EXCEEDING 12'' THICK RAMMED OR TAMPED WITH APPROVED TOOLS
METHOD 2: UNIFORM LAYERS NOT EXCEEDING 12'' THICK INUNDATED OR DEPOSITED IN WATER
METHOD 3: FILL TRENCH WITH LOOSE MATERIAL THEN JET WITH WATER, 6 FT MANIMUM SPACING OF HOLES



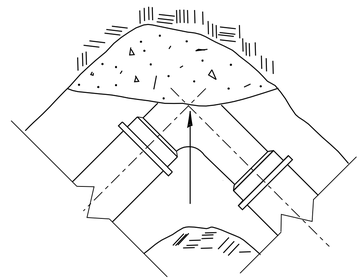
PLUGGED TEE



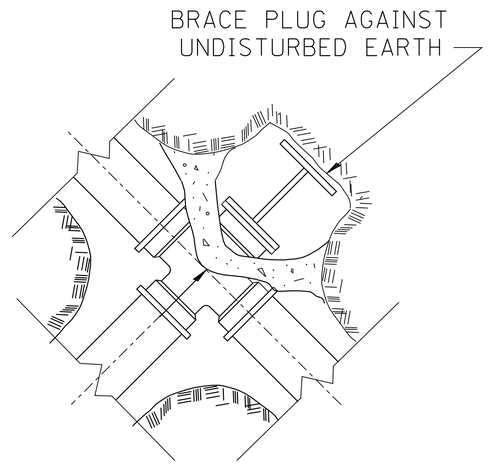
VERTICAL BEND



TEE



90° ELBOW



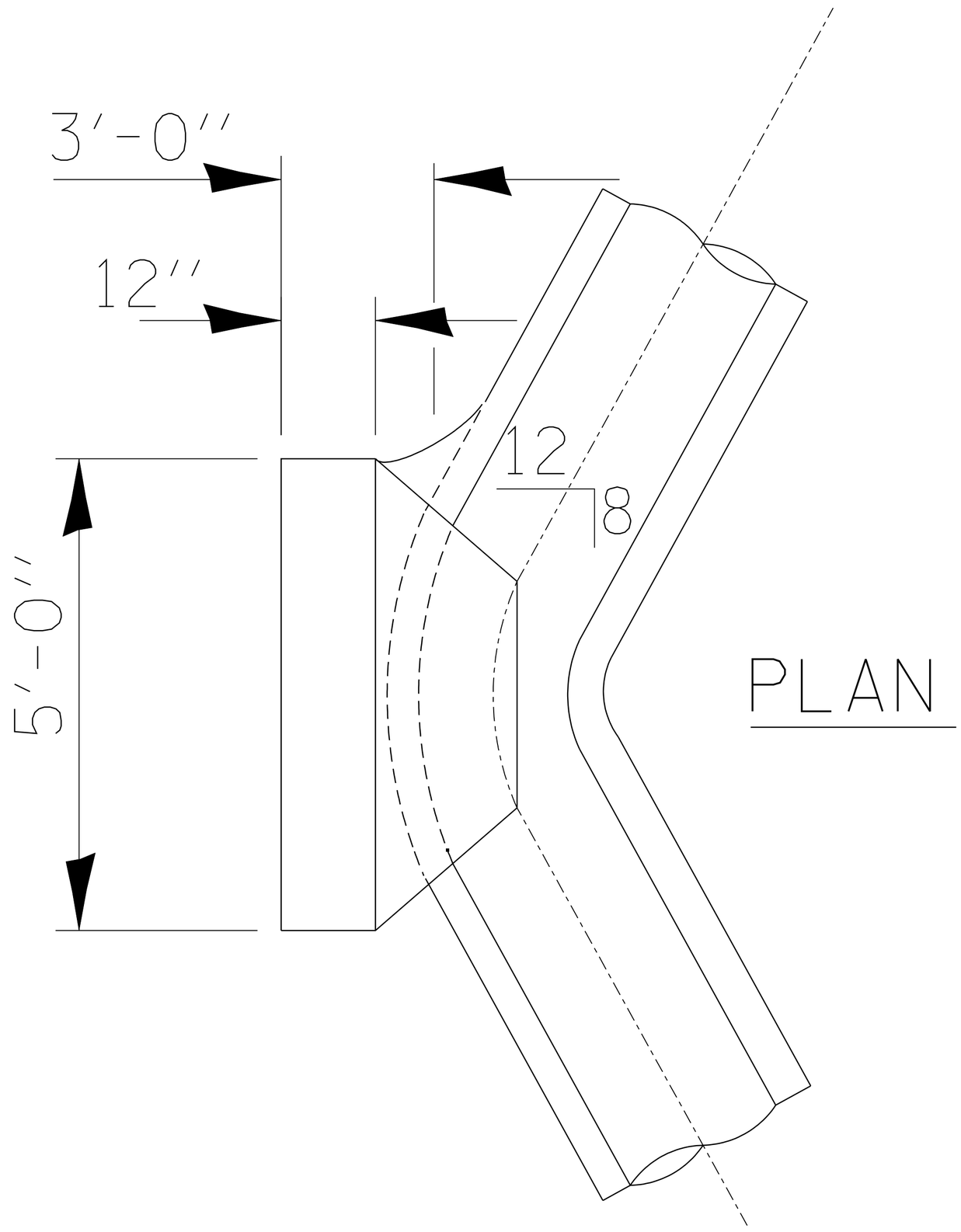
PLUGGED CROSS

NOTES:

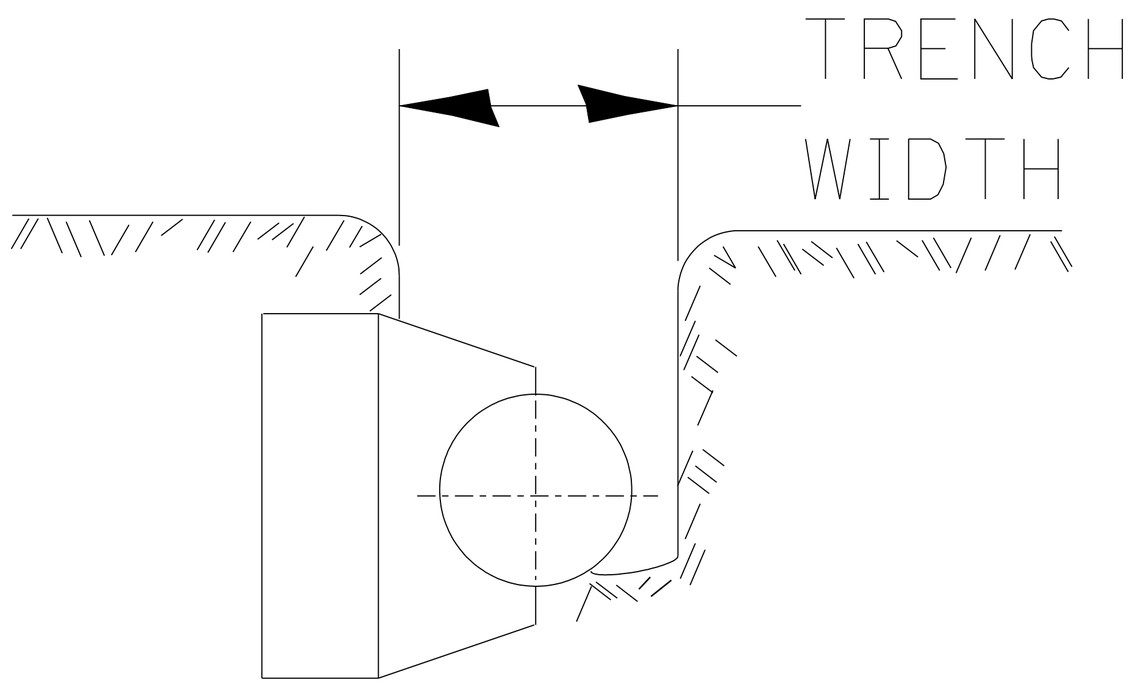
ALL BLOCKS BEAR AGAINST UNDISTRUBED EARTH.
ALL BLOCKING SHALL BE 3,000 P.S.I. POURED CONCRETE.
ARROWS INDICATE DIRECTION OF THRUST.
ALL FITTINGS SHOWN IN PLAN EXCEPT VERTICLE BEND.

TYPICAL THRUST BLOCK INSTALLATIONS

561–5



PLAN

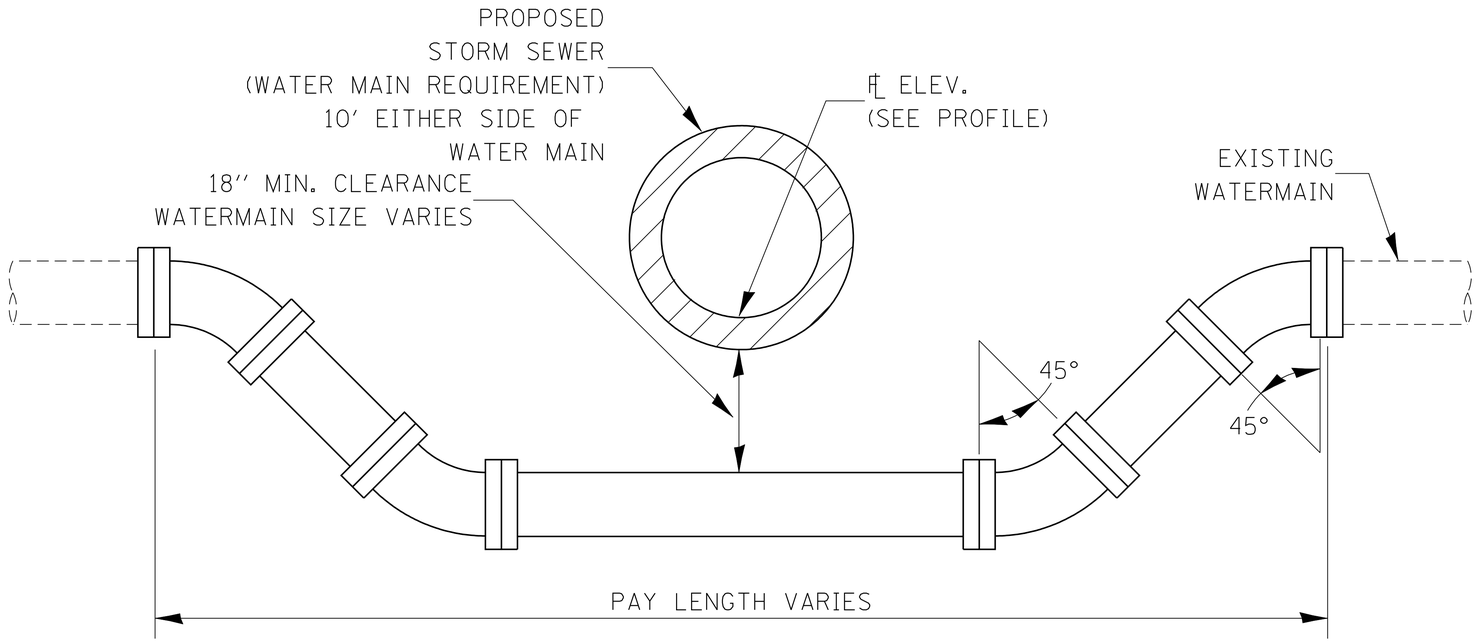


ELEVATION

BEND BLOCKING

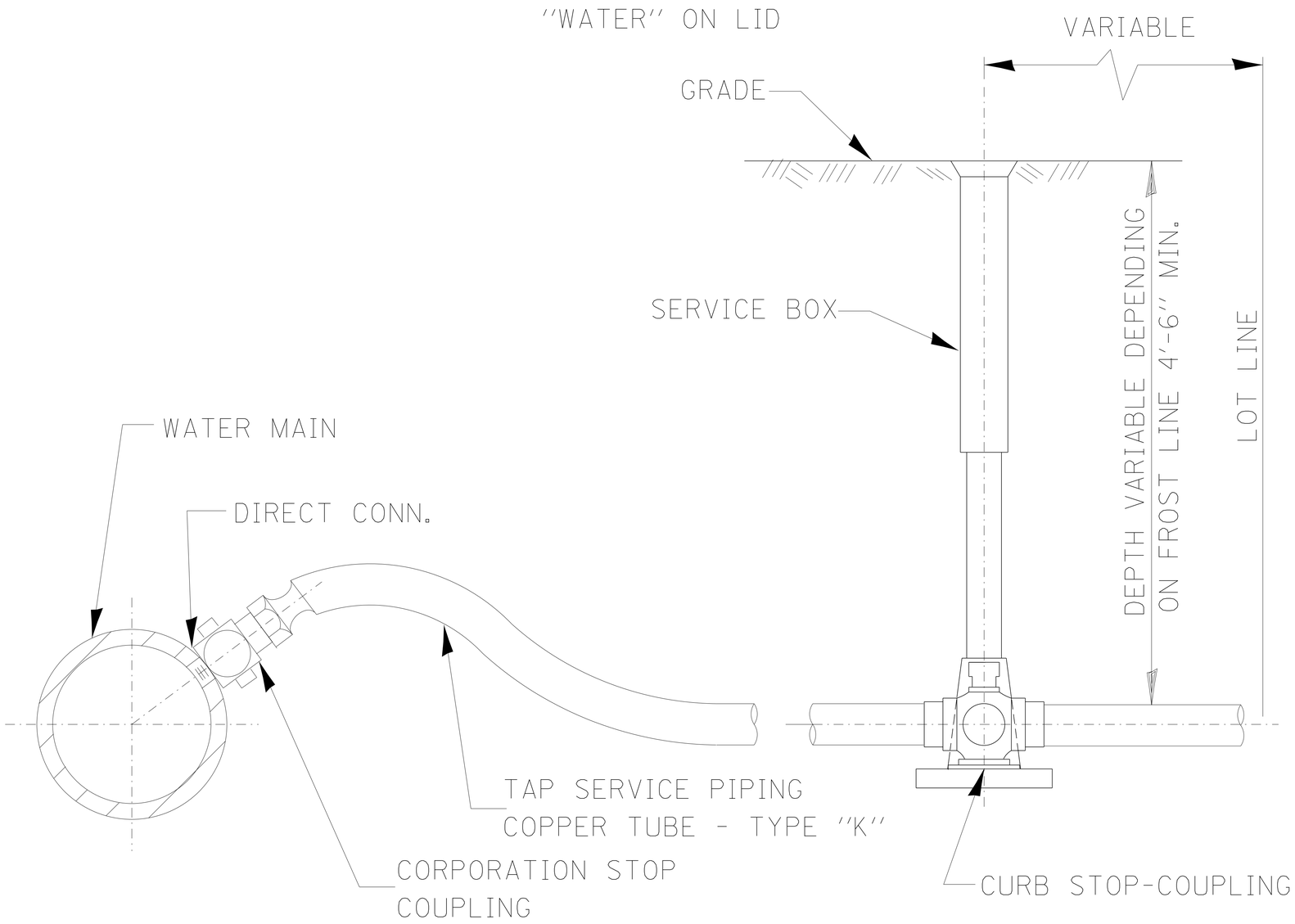
11°4'

561–6



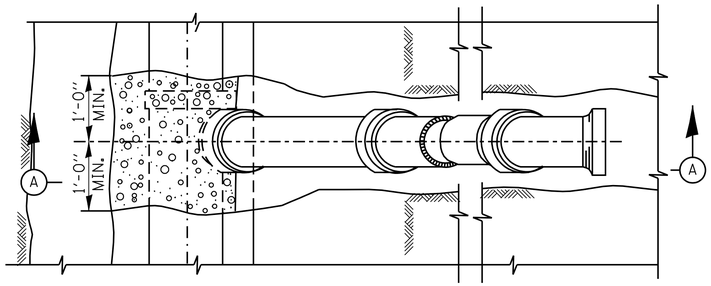
ADJUSTING WATERMAIN DETAIL

561–7



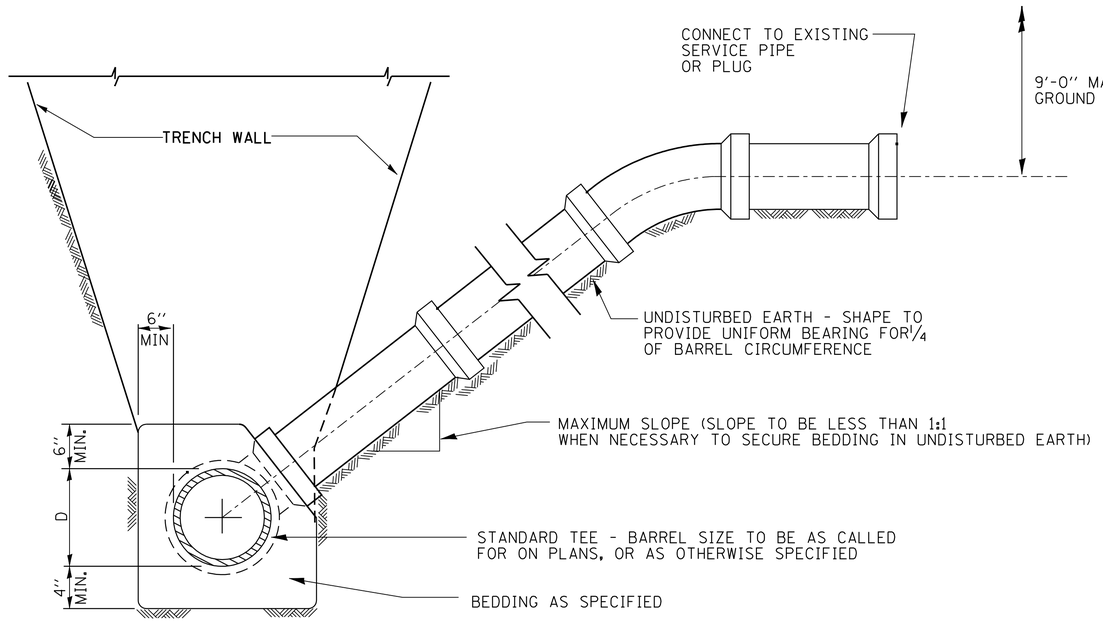
TYPICAL TAP SERVICE PIPING (COPPER)

562–1



PLAN

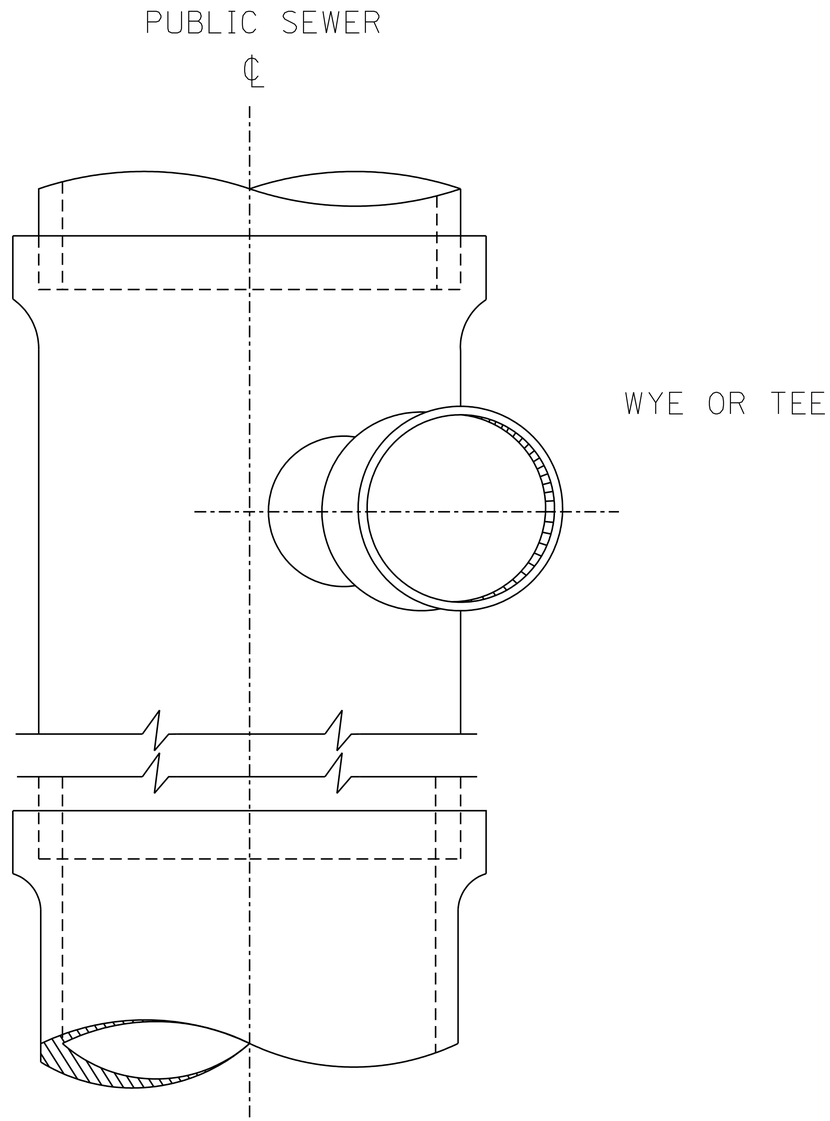
NOTE: RISERS TO BE CONSTRUCTED IN LIEW OF WYES WHERE SEWER DEPTH EXCEEDS 12'-0". FOR PIPE MATERIAL AND CONCRETE SEE SPECIFICATIONS



SECTION A–A

563–1

TYPICAL RISER FOR SERVICE LATERAL



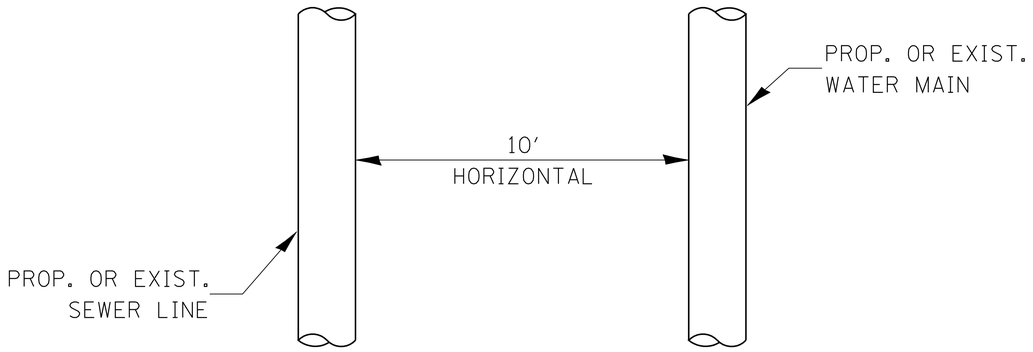
PLAN OF SEWER
AT HOUSE INLET

WHERE TEES AND WYES ARE NOT PROVIDED. TAPPING SADDLES WILL BE REQUIRED. AXIS OF OUTLET PLACED AT 45° SLOPE WITH HORIZONTAL. OUTLET TO BE PROVIDED WITH STOPPER.

TYPICAL HOUSE INLET

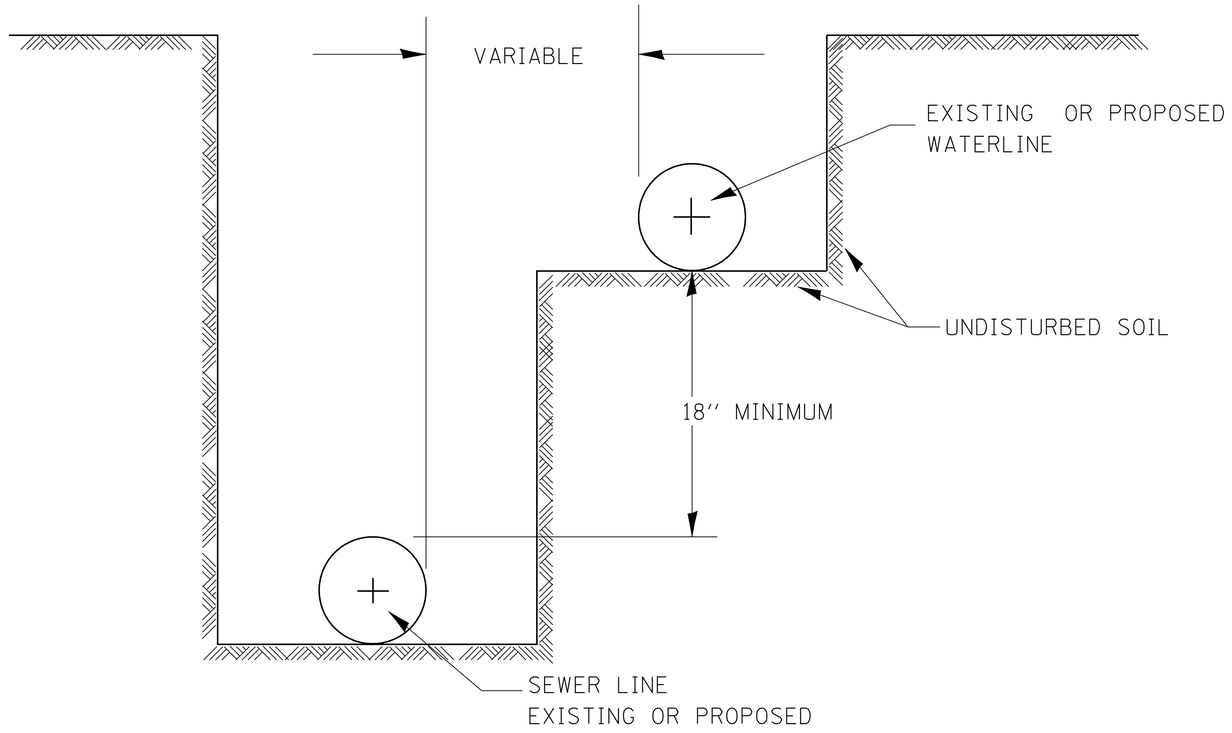
563–2

PROPOSED SEWER (OR WATER) IS LOCATED 10 FEET OR MORE FROM EXISTING WATER (OR SEWER).

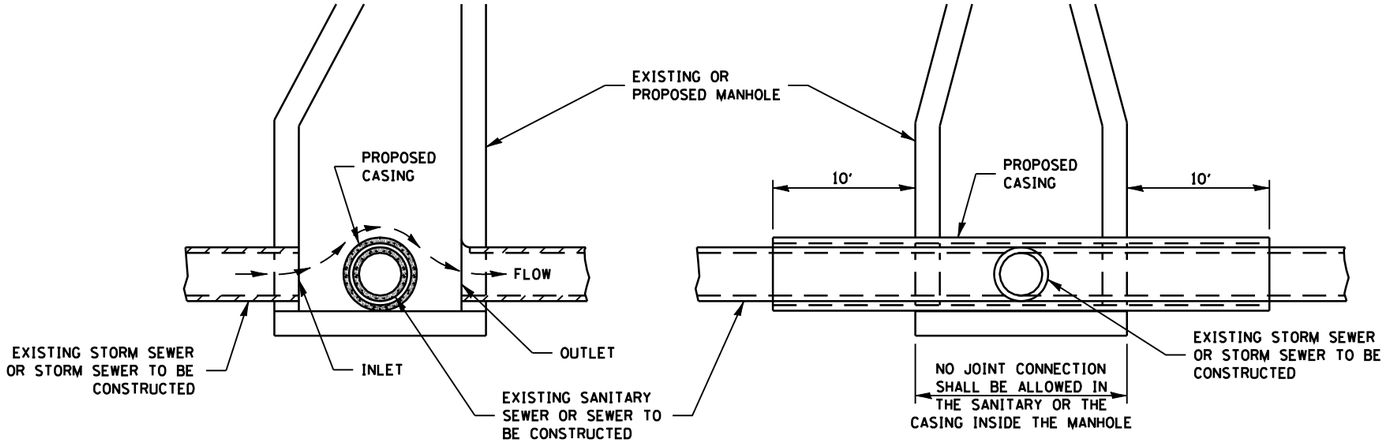


PLAN VIEW

PROPOSED SEWER (OR WATER) IS LOCATED LESS THAN 10 FEET FROM EXISTING WATER (OR SEWER).



WATER AND SEWER SEPARATION REQUIREMENTS – HORIZONTAL SEPARATION



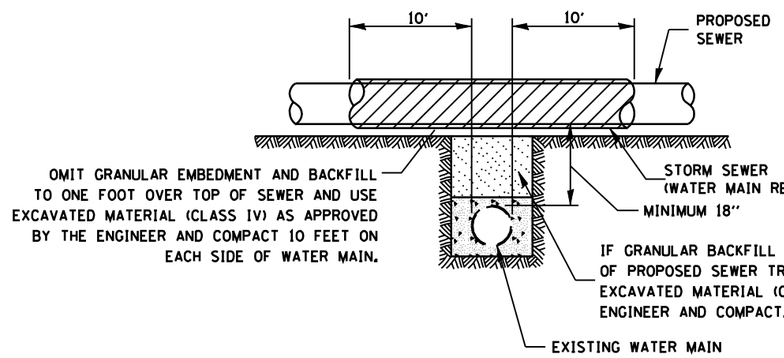
ELEVATION - ECCENTRIC

ELEVATION - CONCENTRIC

CASING SHALL BE CAST IRON WITH AN INSIDE DIAMETER 2" LARGER IN DIAMETER THAN ENCASED PIPE OUTSIDE DIAMETER WITH BOTH ENDS OF CASING SEALED

AT GRADE CROSSING OF SANITARY AND STORM SEWER

PROVIDE ADEQUATE SUPPORT FOR SEWER TO
PREVENT SETTLING AND BREAKING THE WATER MAIN.

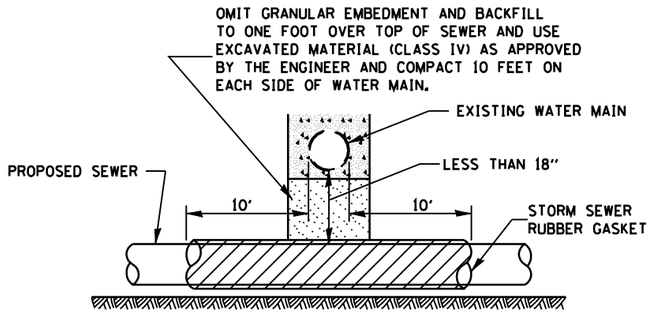


CASING SHALL BE OF WATERMAIN MATERIAL WITH AN INSIDE DIAMETER 2" LARGER IN DIAMETER
THAN ENCASED PIPE OUTSIDE DIAMETER WITH BOTH ENDS OF CASING SEALED

PROPOSED SEWER LINE WITH MINIMUM 18" VERTICAL SEPARATION ABOVE EXISTING WATERMAIN

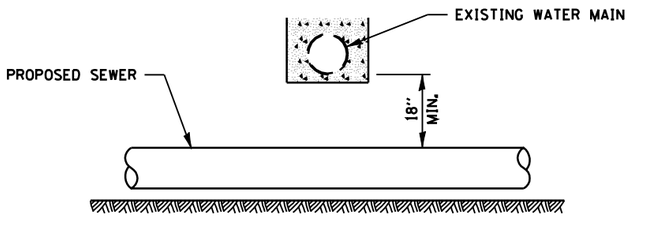
POINT LOADS SHALL NOT BE ALLOWED BETWEEN SEWER OR
SEWER CASING AND WATER MAIN

PROVIDE ADEQUATE SUPPORT FOR EXISTING WATER MAIN
TO PREVENT DAMAGE DUE TO SETTLEMENT OF SEWER TRENCH



PROVIDE ADEQUATE SUPPORT FOR EXISTING WATER MAIN
TO PREVENT DAMAGE DUE TO SETTLEMENT OF SEWER TRENCH

MAINTAIN 18" MINIMUM VERTICAL SEPARATION FOR 10' HORIZONTALLY

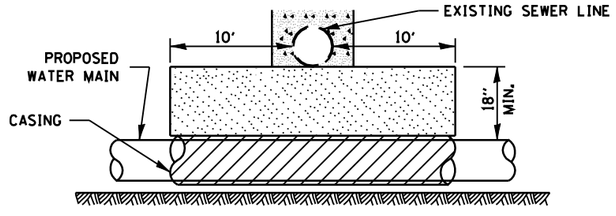


PROPOSED SEWER LINE BELOW EXISTING WATER MAIN

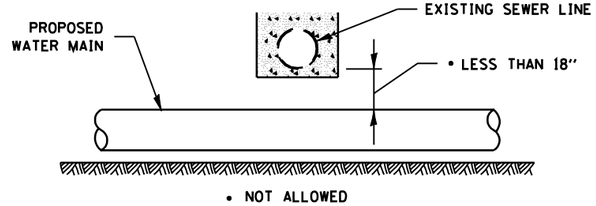
PROVIDE ADEQUATE SUPPORT FOR EXISTING SEWER LINE TO PREVENT
DAMAGE DUE TO SETTLEMENT.

IF GRANULAR BACK FILL EXISTS, REMOVE WITHIN WIDTH OF EXISTING
SEWER TRENCH AND REPLACE WITH EXCAVATED MATERIAL (CLASS IV) AS
APPROVED BY THE ENGINEER AND COMPACT.

OMIT GRANULAR EMBEDMENT AND BACKFILL TO ONE FOOT OVER TOP OF
WATER MAIN AND USE EXCAVATED MATERIAL (CLASS IV) AS APPROVED
BY THE ENGINEER AND COMPACT FOR 10' EITHERSIDE OF SEWER LINE.



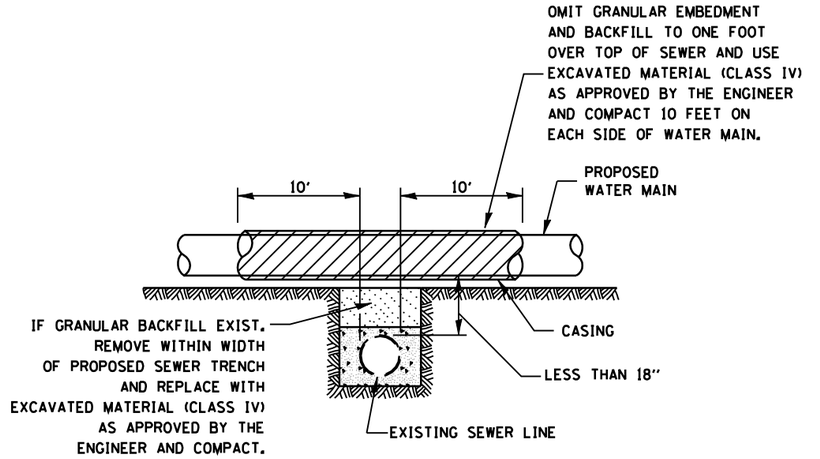
CASING SHALL BE OF WATER MAIN MATERIAL WITH AN INSIDE DIAMETER 2" LARGER IN DIAMETER
THAN ENCASED PIPE OUTSIDE DIAMETER WITH BOTH ENDS OF CASING SEALED



• NOT ALLOWED
MUST MAINTAIN 18" VERTICAL SEPARATION

PROPOSED WATER MAIN BELOW EXISTING SEWER LINE

POINT LOADS SHALL NOT BE ALLOWED BETWEEN WATER MAIN
CASING AND SEWER



CASING SHALL BE OF WATERMAIN MATERIAL WITH AN INSIDE DIAMETER 2" LARGER IN DIAMETER
THAN ENCASED PIPE OUTSIDE DIAMETER WITH BOTH ENDS OF CASING SEALED

PROPOSED WATER MAIN ABOVE EXISTING SEWER LINE