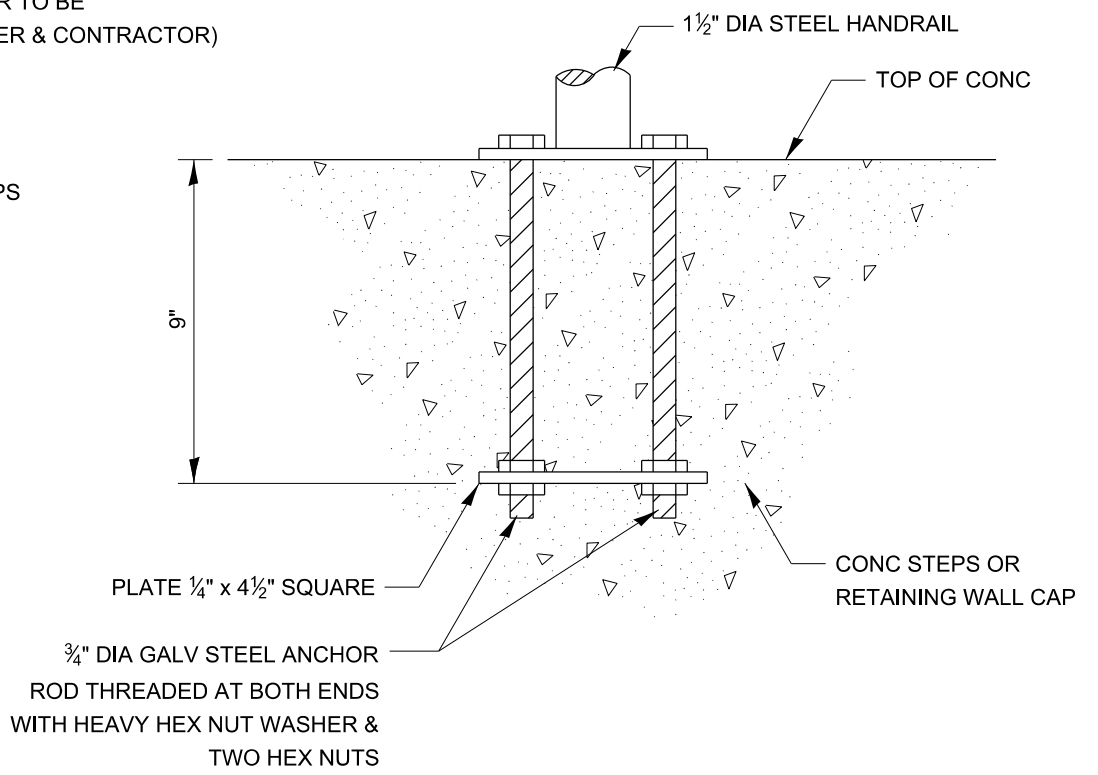
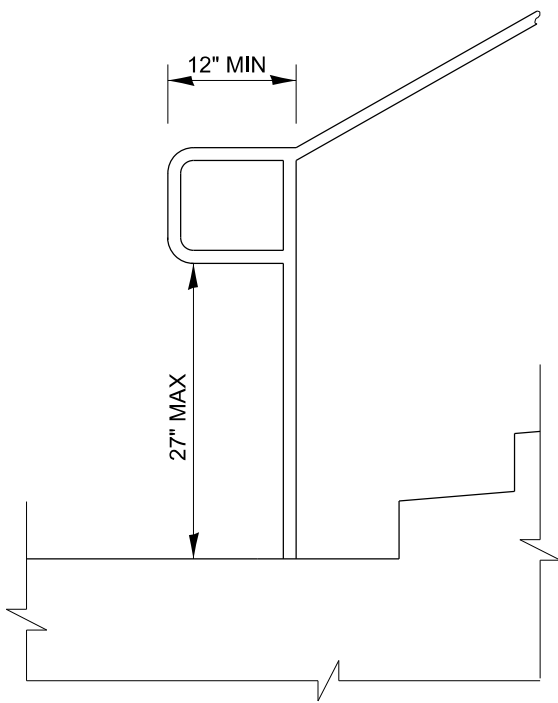


HANDRAIL FOR CONCRETE STEPS

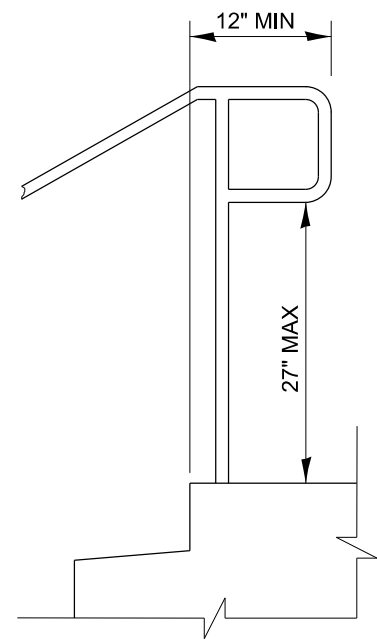


ANCHOR ROD DETAIL

(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 ALWAYS 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.

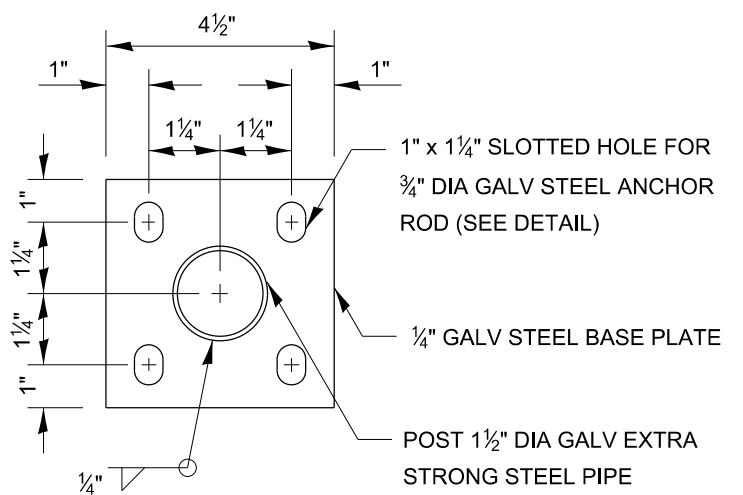
HAND & SAFETY RAILS SHALL NOT ROTATE WITHIN THEIR FITTINGS.

THE CLEAR SPACES BETWEEN HANDRAILS AND ANY WALL SHALL BE 1 1/2".

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 1 1/4" TO 1 1/2".

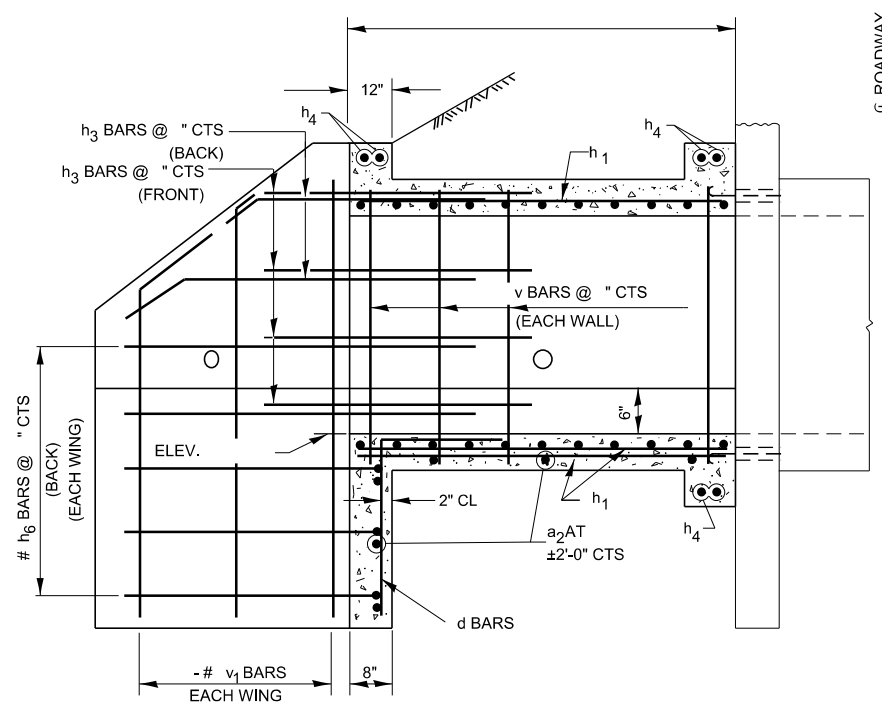
THIS WORK SHALL BE PAID FOR AT THE CONTRACT UNIT PRICE PER FOOT FOR PIPE HANDRAIL.



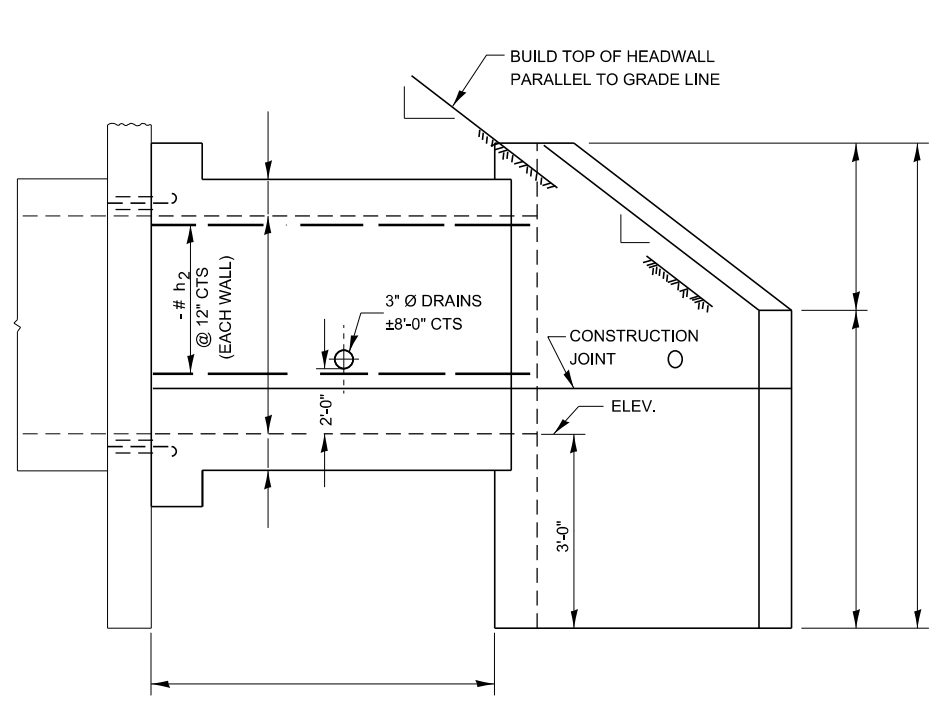
POST CASE PLATE DETAIL

(INCLUDED IN THE COST OF HAND OR SAFETY RAIL)

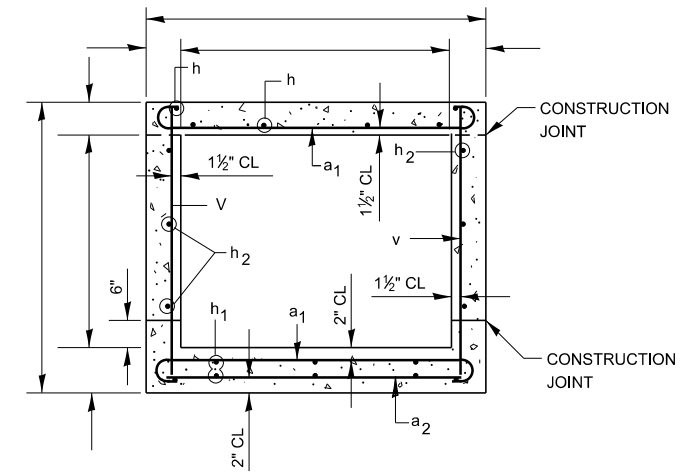
PIPE HANDRAILS FOR STEPS



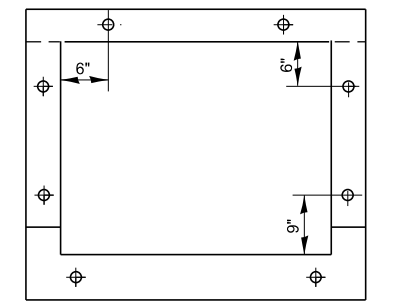
HALF LONG SECTION



HALF ELEVATION



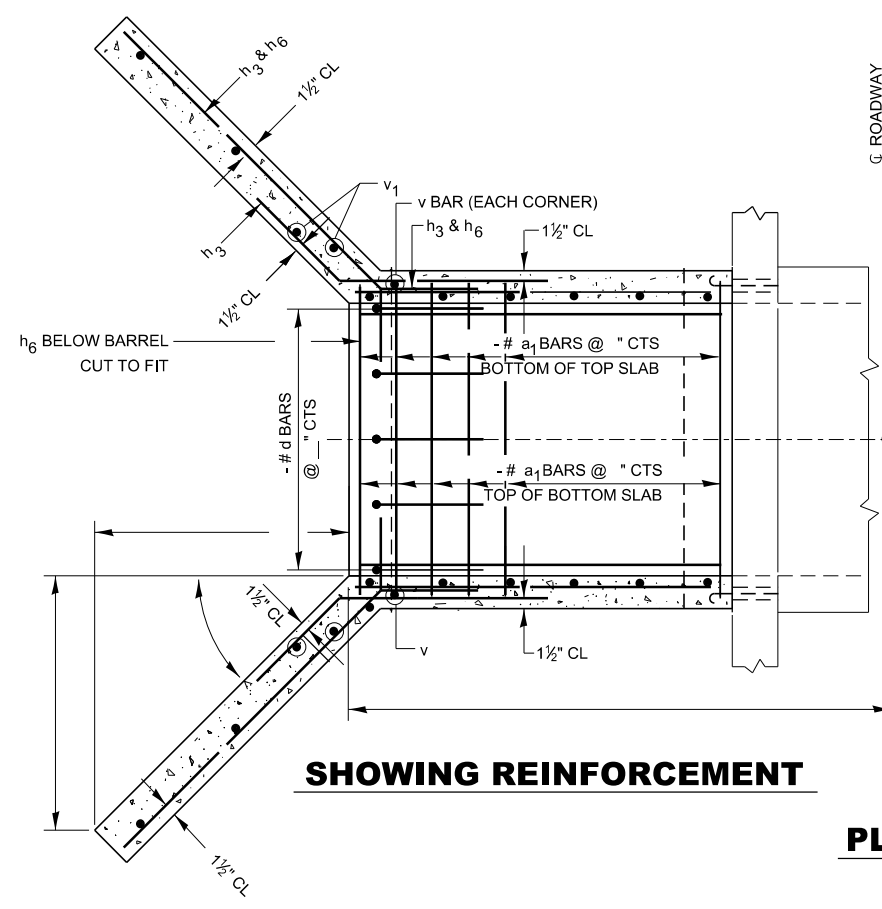
SECTION THRU BARREL



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

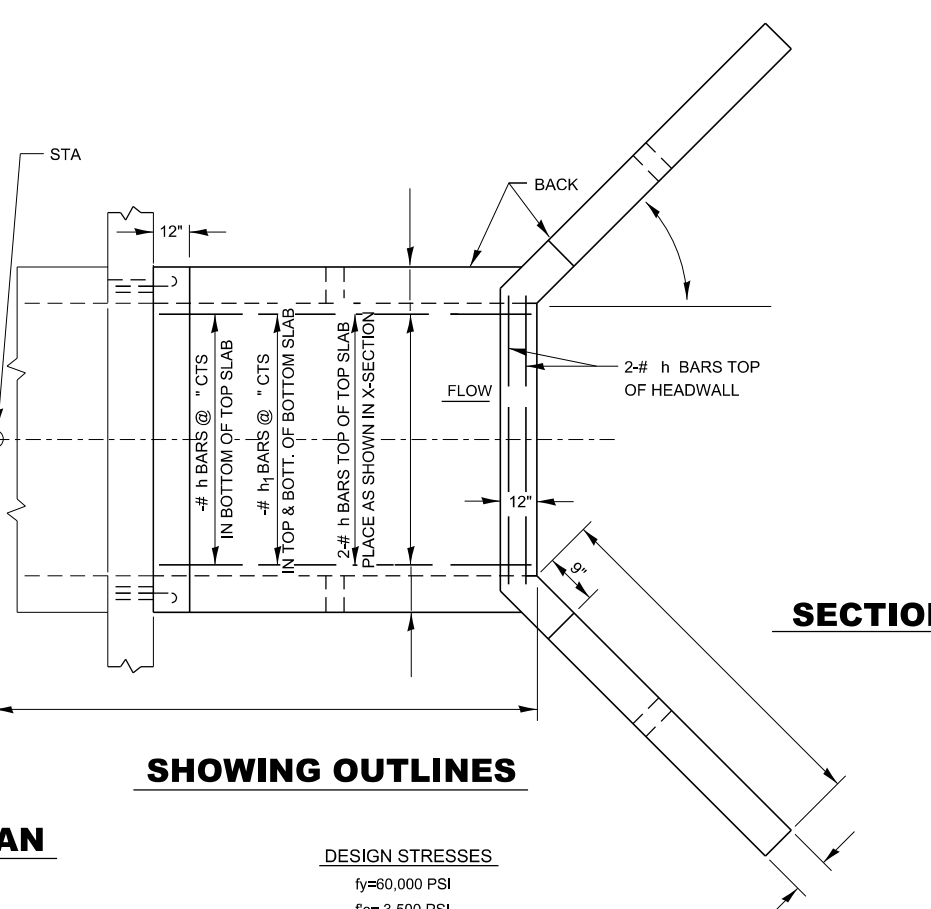
EXPANSION BOLT LOCATION

NOTE: EXPANSION BOLTS SHALL CONSIST OF SELF DRILLING EXPANSION SHIELD AND 3/4" DIAMETER HOOKED BOLTS. HOOKED BOLTS SHALL EXTEND A MINIMUM OF 9" INTO NEW CONCRETE. MINIMUM CERTIFIED PROOF LOAD = 4,080 LBS.



SHOWING REINFORCEMENT

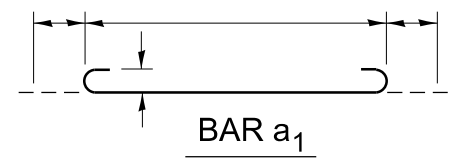
PLAN



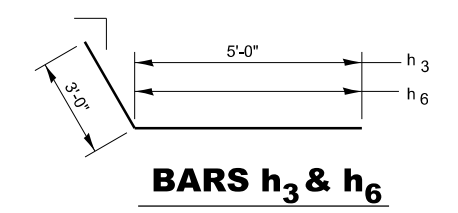
SHOWING OUTLINES

DESIGN STRESSES
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fc= 3,500 PSI

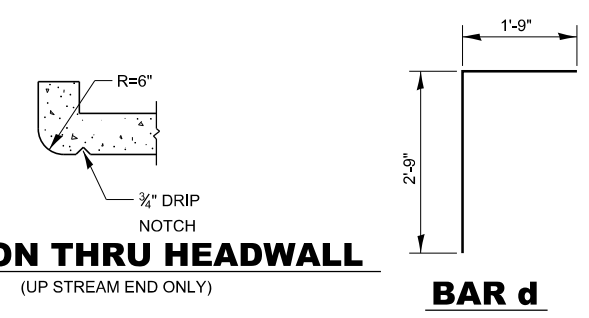
LOADING HS 20-44 & ALT



BAR a₁



BARS h₃ & h₆



BAR d

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			
CONCRETE BOX CULVERTS		CU YDS	
REINFORCEMENT BARS		LBS	
EXPANSION BOLTS		EACH	

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 3/4".
FOR BACKFILLING AND EMBANKMENTS SEE STANDARD SPECIFICATIONS.
TILT HOOK OF a₁ BARS, IF NECESSARY, TO OBTAIN 1 1/2" MINIMUM CLEARANCE AT TOP OF HOOK.
REINFORCEMENT BARS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-31, M-42, ORM-53, GRADE 60.

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PLOT SCALE = 100,000 ' / in.	DRAWN -	REVISED -
PLOT DATE = 3/15/2024	CHECKED -	REVISED -
	DATE -	REVISED -

**STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION**

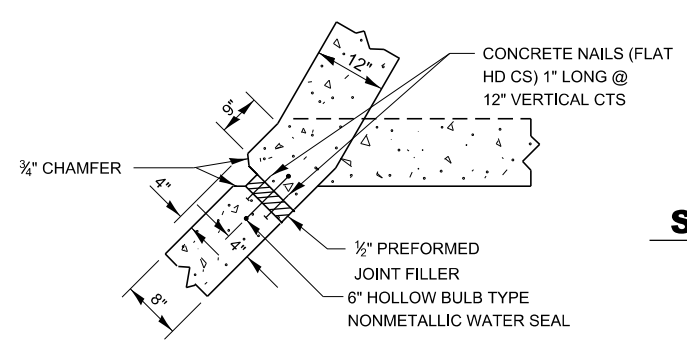
BOX CULVERT EXTENSION STATION

SCALE: SHEET OF SHEETS STA. TO STA.

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

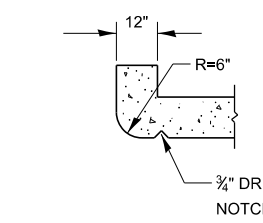
GENERAL NOTES

CLASS SI CONCRETE SHALL BE USED THROUGHOUT.
 EXPOSED EDGES SHALL BE BEVELED 3/4".
 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.

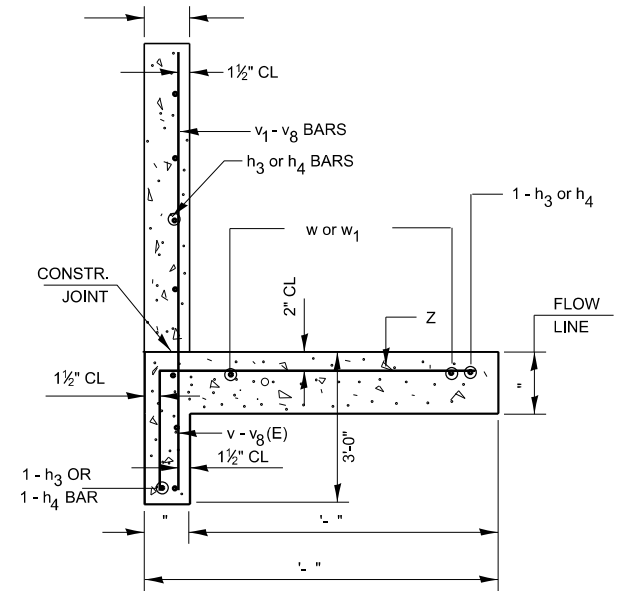


CORNER DETAIL

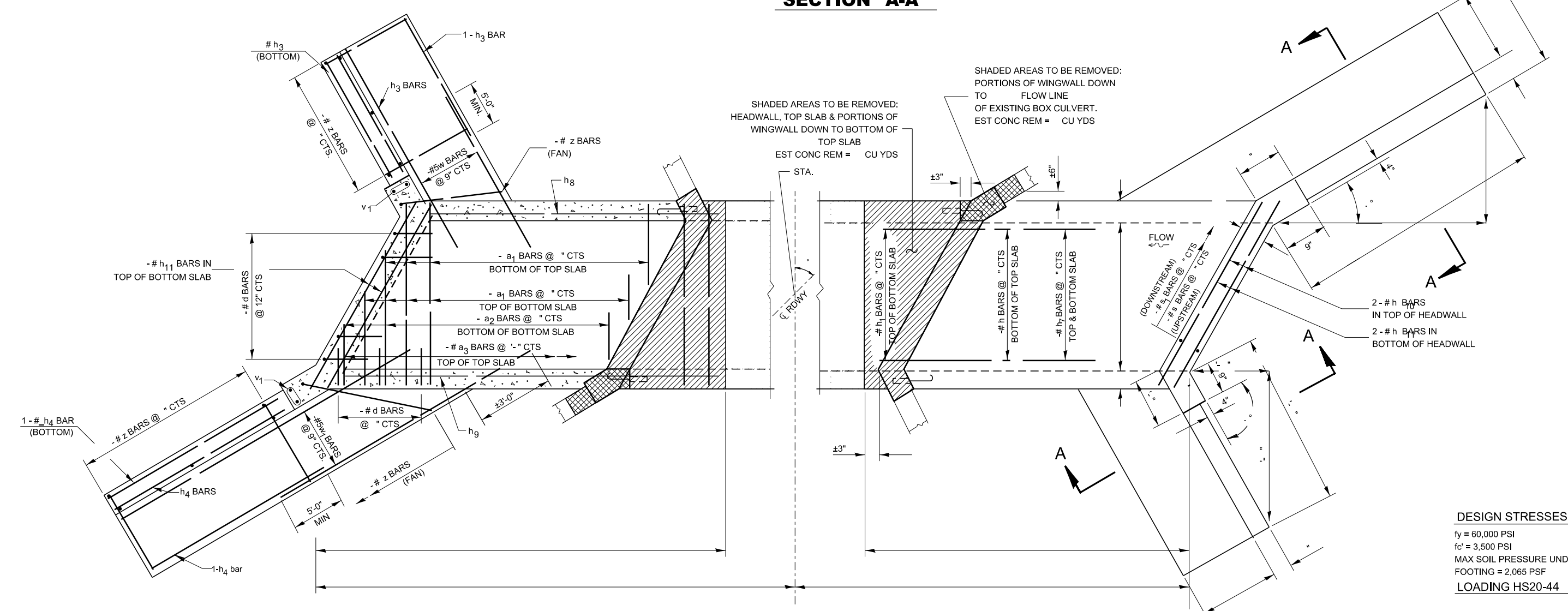
SECTION THRU HEADWALL
(UP STREAM END ONLY)



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.



SECTION "A-A"



SHOWING REINFORCEMENT

SHOWING OUTLINES

PLAN

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

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

2 - # h BARS IN TOP OF HEADWALL
 2 - # h BARS IN BOTTOM OF HEADWALL

DESIGN STRESSES
 fy = 60,000 PSI
 fc' = 3,500 PSI
 MAX SOIL PRESSURE UNDER FOOTING = 2,065 PSF
 LOADING HS20-44

540-2A

MODEL: det 3 details
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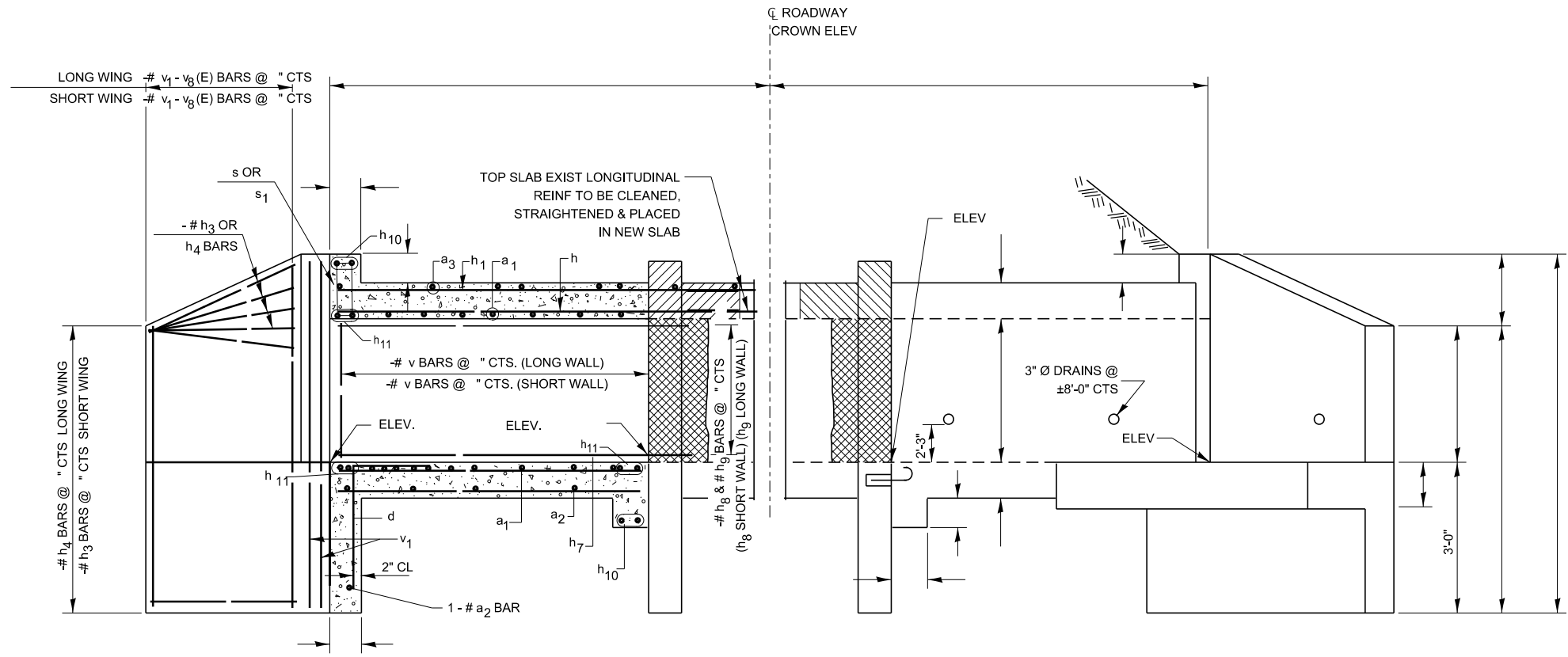
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	DATE -	REVISED -

STATE OF ILLINOIS
 DEPARTMENT OF TRANSPORTATION

BOX CULVERT EXTENSION STATION

SCALE: SHEET OF SHEETS STA. TO STA.

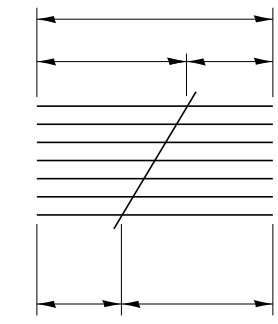
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CONTRACT NO.				
ILLINOIS FED. AID PROJECT				



HALF LONG SECTION

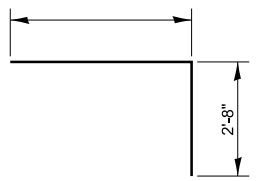
HALF ELEVATION

DIMENSIONS AT RT. ∠'S TO C ROADWAY

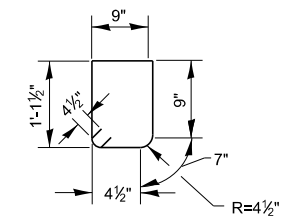


BAR CUTTING DIAGRAM

BARS h & h1

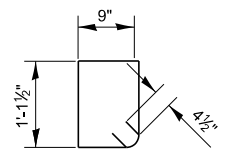


BAR z



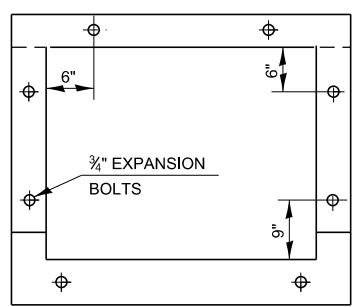
BAR s

(UPSTREAM)



BAR s1

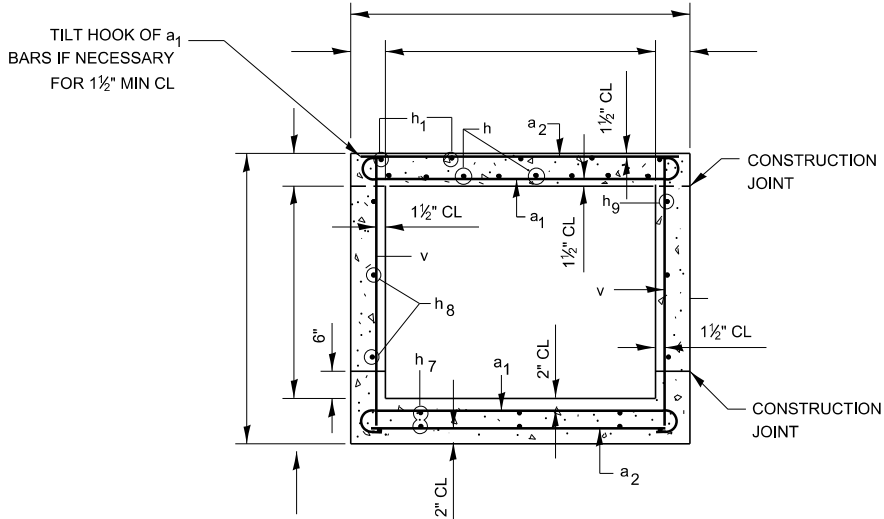
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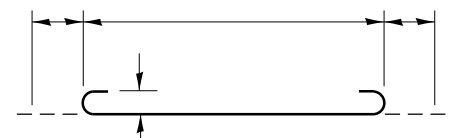
SIDEWALLS @ " CTS
TOP & BOTTOM @ " CTS

EXPANSION BOLT LOCATION

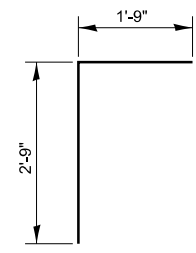
NOTE: EXPANSION BOLTS SHALL CONSIST OF SELF DRILL EXPANSION SHIELDS AND 3/4" DIAMETER HOOKED BOLTS. HOOKED BOLTS SHALL EXTEND A MINIMUM OF 9" INTO NEW CONCRETE. MINIMUM CERTIFIED PROOF LOAD = 4,080 LBS.



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			
v 1(E)			
v 2(E)			
v 3(E)			
v 4(E)			
v 5(E)			
v 6(E)			
v 7(E)			
v 8(E)			
w		#5	
w1		#5	
z			
CONCRETE			CU YD
BOX CULVERTS			
REINFORCEMENT BARS			LBS
REIN BARS (EPOXY CTD)			LBS
CONCRETE REMOVAL			CU YD
EXPANSION BOLTS			EACH

540-2B

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PLOT SCALE = 100,000 ' / in.	DRAWN -	REVISED -
PLOT DATE = 3/15/2024	CHECKED -	REVISED -
	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

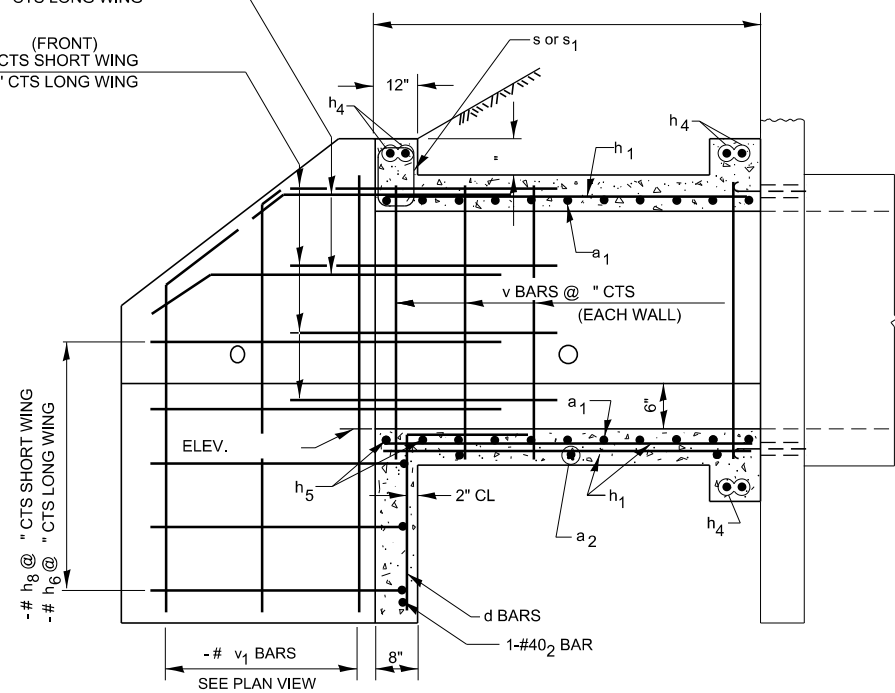
BOX CULVERT EXTENSION STATION

SCALE: SHEET OF SHEETS STA. TO STA.

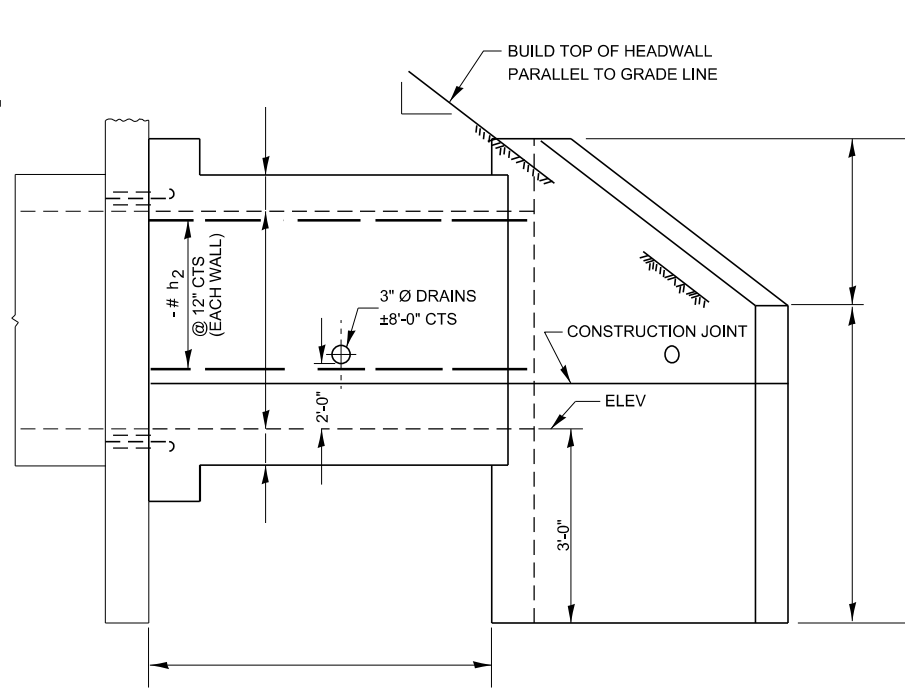
F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
CONTRACT NO.				
ILLINOIS FED. AID PROJECT				

(BACK)
 -# h₃ @ " CTS SHORT WING
 -# h₇ @ " CTS LONG WING

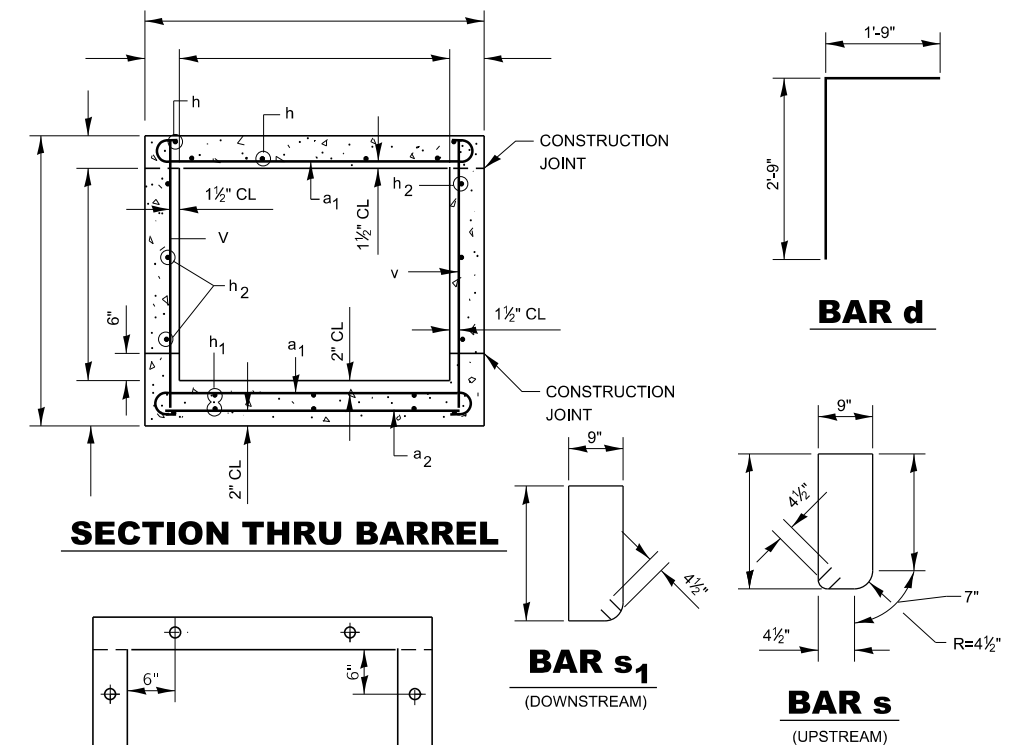
(FRONT)
 -# h₃ @ " CTS SHORT WING
 -# h₇ @ " CTS LONG WING



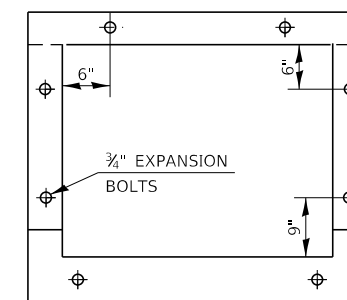
HALF LONG SECTION



HALF ELEVATION



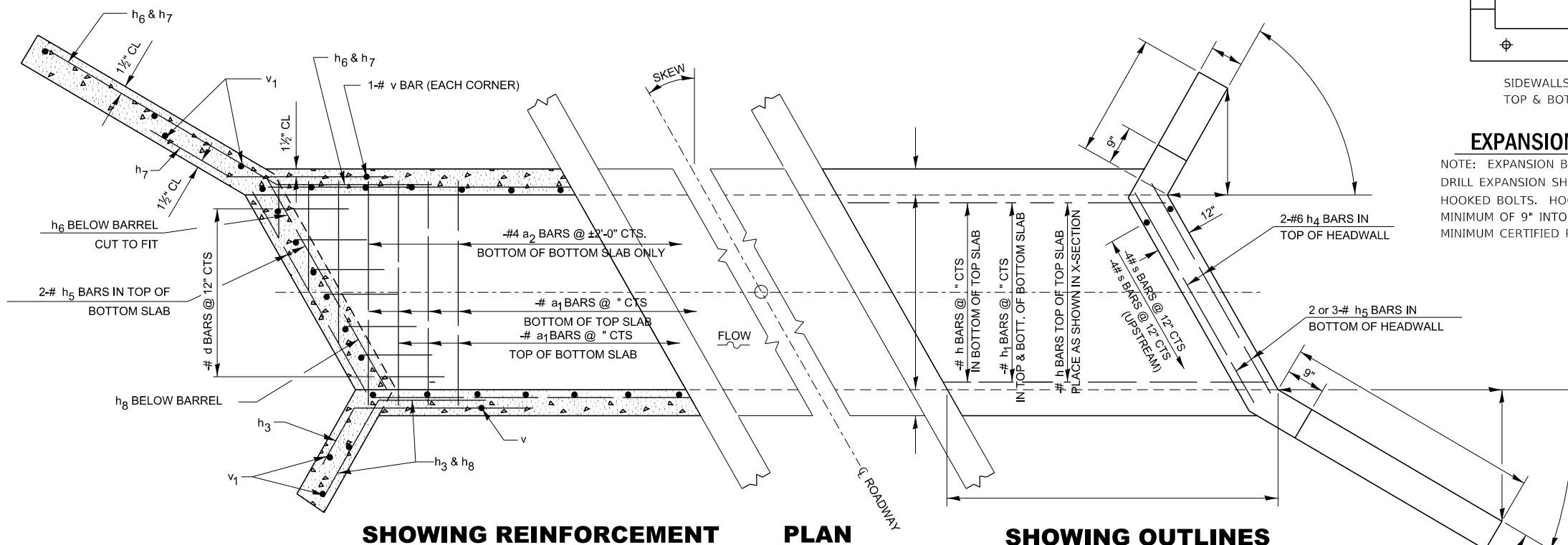
SECTION THRU BARREL



SIDEWALLS @ " CTS
 TOP & BOTTOM @ " CTS

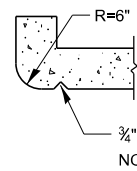
EXPANSION BOLT LOCATION

NOTE: EXPANSION BOLTS SHALL CONSIST OF SELF DRILL EXPANSION SHIELDS AND 3/8" DIAMETER HOOKED BOLTS. HOOKED BOLTS SHALL EXTEND A MINIMUM OF 9" INTO NEW CONCRETE. MINIMUM CERTIFIED PROOF LOAD = 4,080 LBS.



SHOWING REINFORCEMENT PLAN

SHOWING OUTLINES



SECTION THRU HEADWALL

(UP STREAM END ONLY)

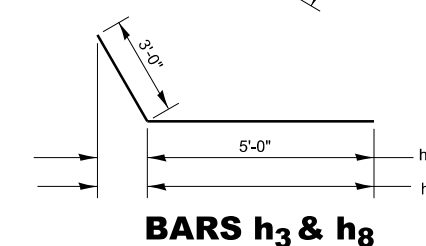
GENERAL NOTES

CLASS SI CONCRETE SHALL BE USED THROUGHOUT.
 AT LEAST SIX FEET OF BARREL SHALL BE POURED MONOLITHICALLY WITH WINGWALLS.
 EXPOSED EDGES SHALL BE BEVELED 3/8".
 FOR BACKFILLING AND EMBANKMENTS SEE STANDARD SPECIFICATIONS.
 TILT HOOK OF a₁ BARS, IF NECESSARY, TO OBTAIN 1 1/2" 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

f_y = 60,000 PSI
 f'c = 3,500 PSI

LOADING HS 20-44 & ALT



BARS h₃ & h₈

BILL OF MATERIALS

BAR	NUMBER	SIZE	LENGTH
a ₁		#4	
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	

540-3

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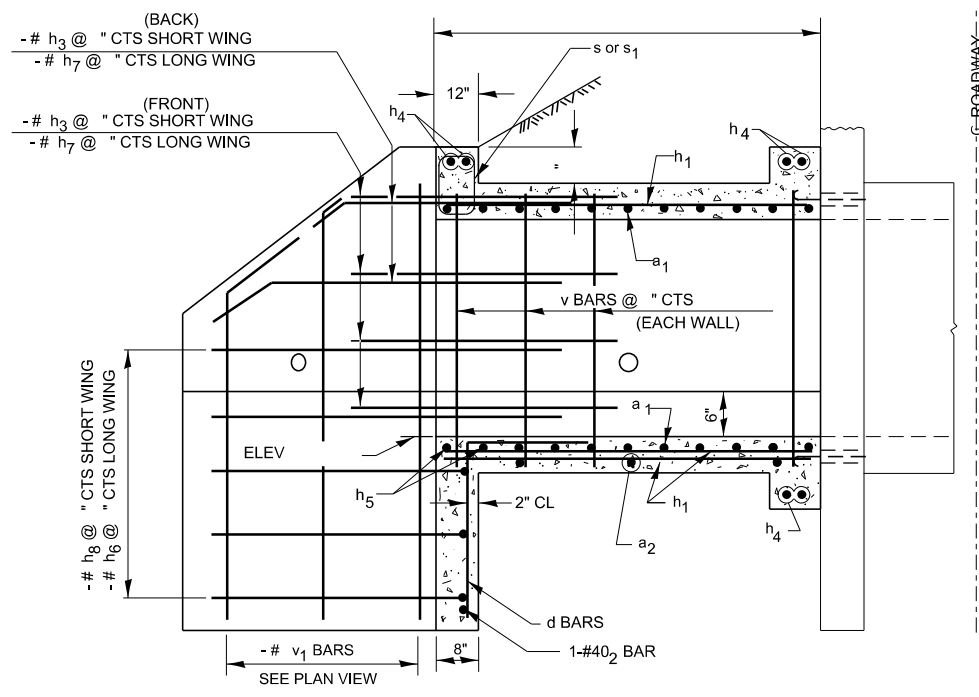
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	DATE -	REVISED -

**STATE OF ILLINOIS
 DEPARTMENT OF TRANSPORTATION**

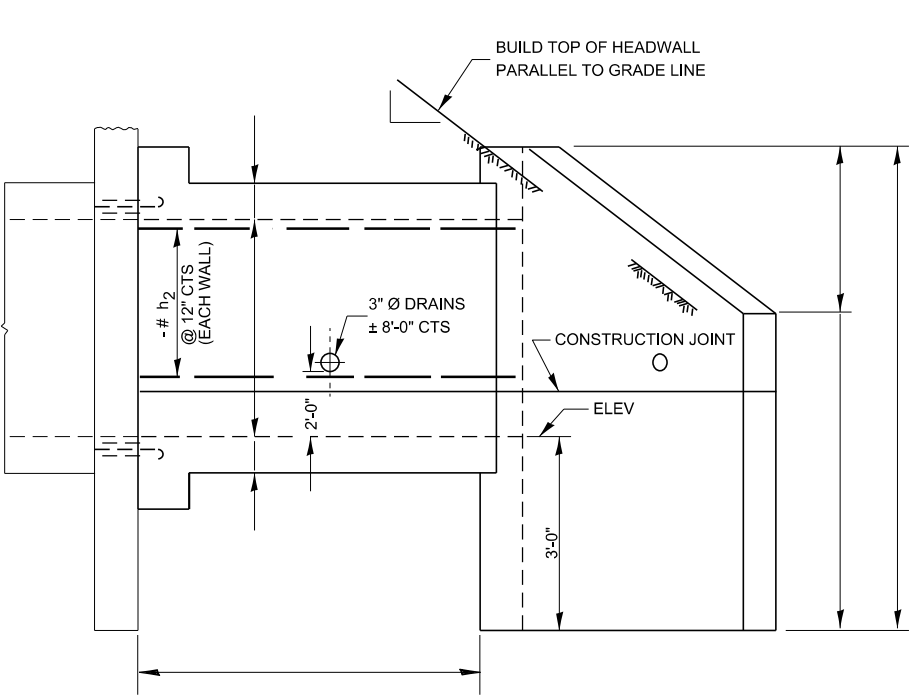
BOX CULVERT EXTENSION STATION

SCALE: SHEET OF SHEETS STA. TO STA.

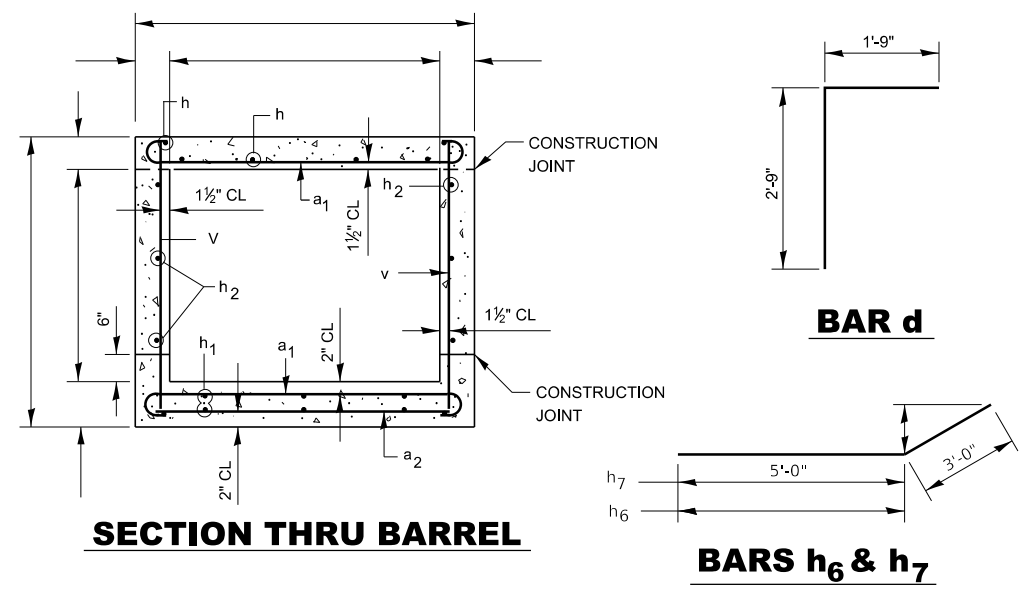
F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
CONTRACT NO.				
ILLINOIS FED. AID PROJECT				



HALF LONG SECTION



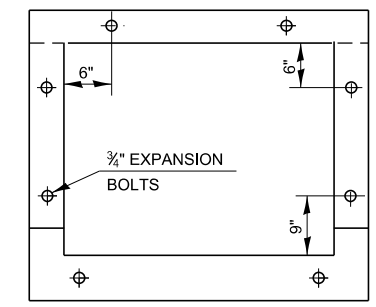
HALF ELEVATION



SECTION THRU BARREL

BAR d

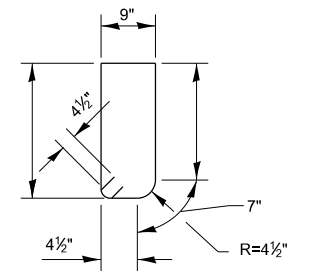
BARS h6 & h7



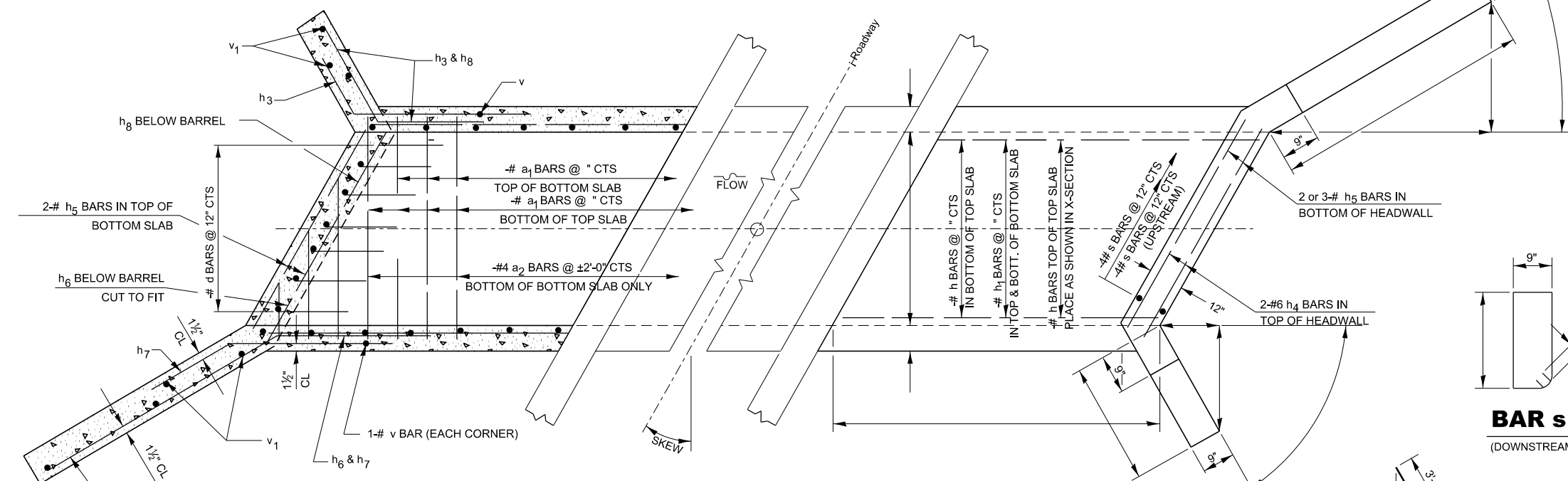
SIDEWALLS @ " CTS
TOP & BOTTOM @ " CTS

EXPANSION BOLT LOCATION

NOTE: EXPANSION BOLTS SHALL CONSIST OF SELF DRILL EXPANSION SHIELDS AND 3/4" DIAMETER HOOKED BOLTS. HOOKED BOLTS SHALL EXTEND A MINIMUM OF 9" INTO NEW CONCRETE. MINIMUM CERTIFIED PROOF LOAD = 4,080 LBS.



BAR s
(UPSTREAM)

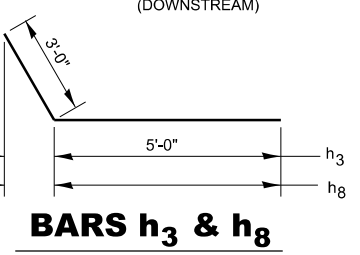


SHOWING REINFORCEMENT

PLAN

SHOWING OUTLINES

BAR s1
(DOWNSTREAM)



BARS h3 & h8

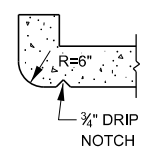
DESIGN STRESSES

fy = 60,000 PSI
fc = 3,500 PSI

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 3/4".
FOR BACKFILLING AND EMBANKMENTS SEE STANDARD SPECIFICATIONS.
TILT HOOK OF a1 BARS, IF NECESSARY, TO OBTAIN 1 1/2" 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.



SECTION THRU HEADWALL
(UP STREAM END ONLY)

BILL OF MATERIALS

BAR	NUMBER	SIZE	LENGTH
a1			
a2		#4	
d			
h			
h1			
h2			
h3			
h4		#6	
h5			
h6			
h7			
h8			
v			
v1			
s		#4	
s1		#4	
CONC BOX CULV		CU YDS	
REINFORCEMENT BARS		LBS	
EXPANSION BOLTS		EACH	

540-4

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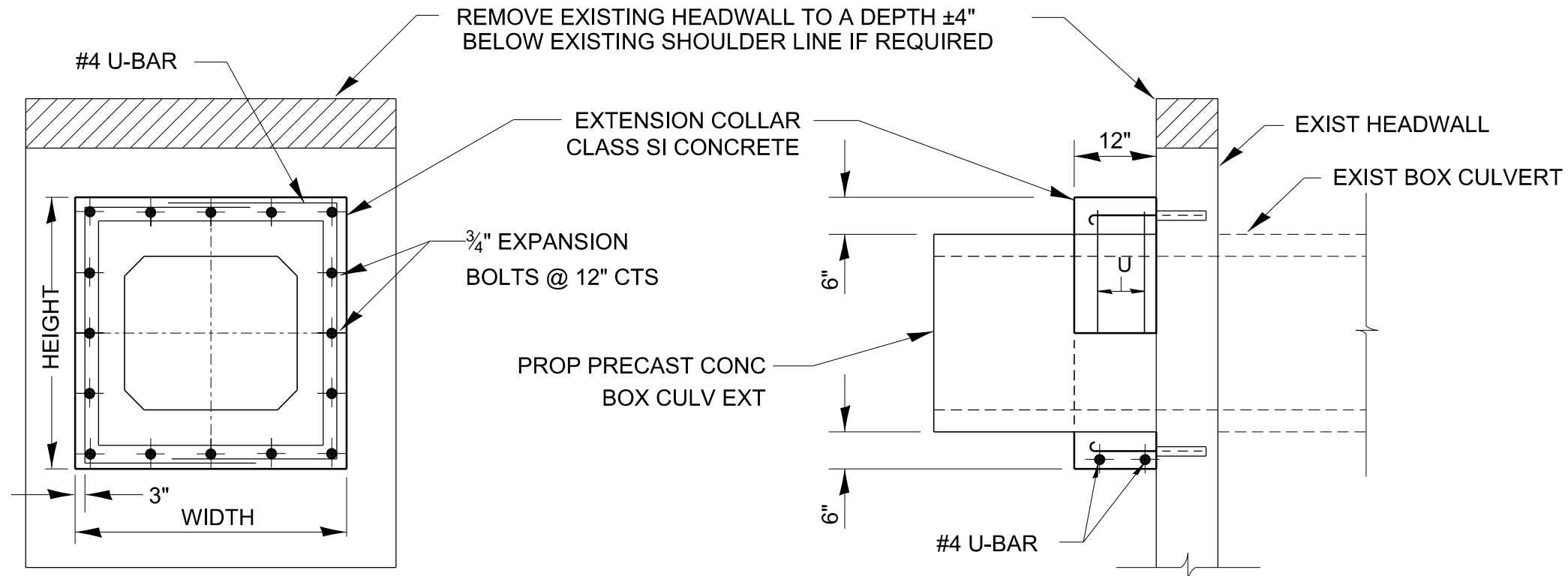
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STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

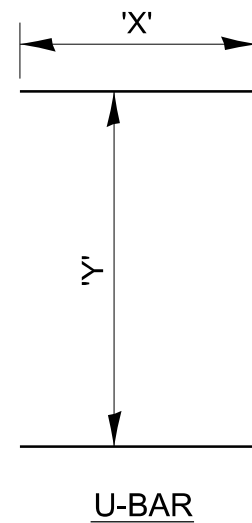
BOX CULVERT EXTENSION STATION

SCALE: SHEET OF SHEETS STA. TO STA.

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

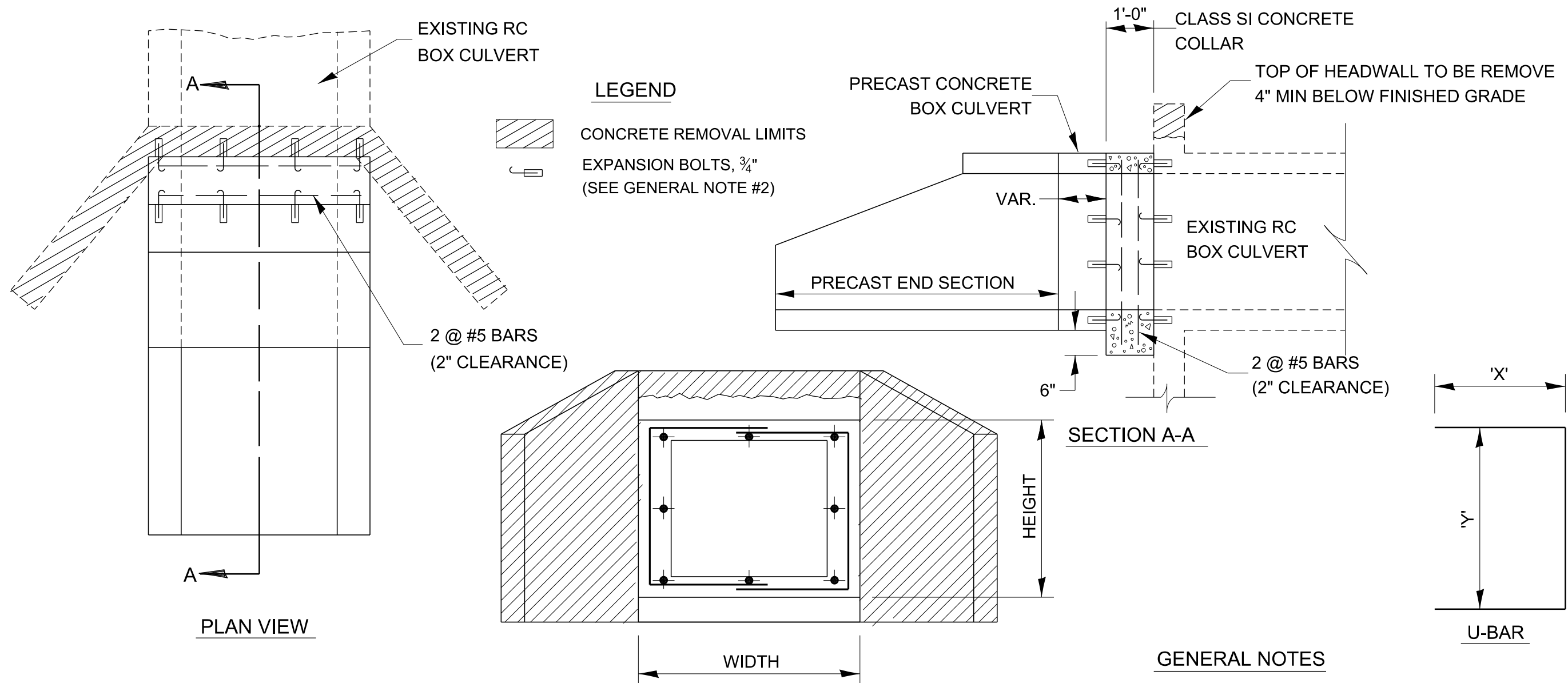


EXPANSION BOLTS SHALL CONSIST OF SELF DRILLING EXPANSION SHIELDS AND 3/4" DIA HOOKED BOLTS. HOOKED BOLTS SHALL EXTEND A MINIMUM OF 9" INTO NEW CONCRETE. BOLTS SHALL BE DRILLED IN THE CENTER OF THE EXISTING BOX CULVERT BARREL WALLS. MINIMUM CERTIFIED PROOF LOAD = 4,080 LBS.



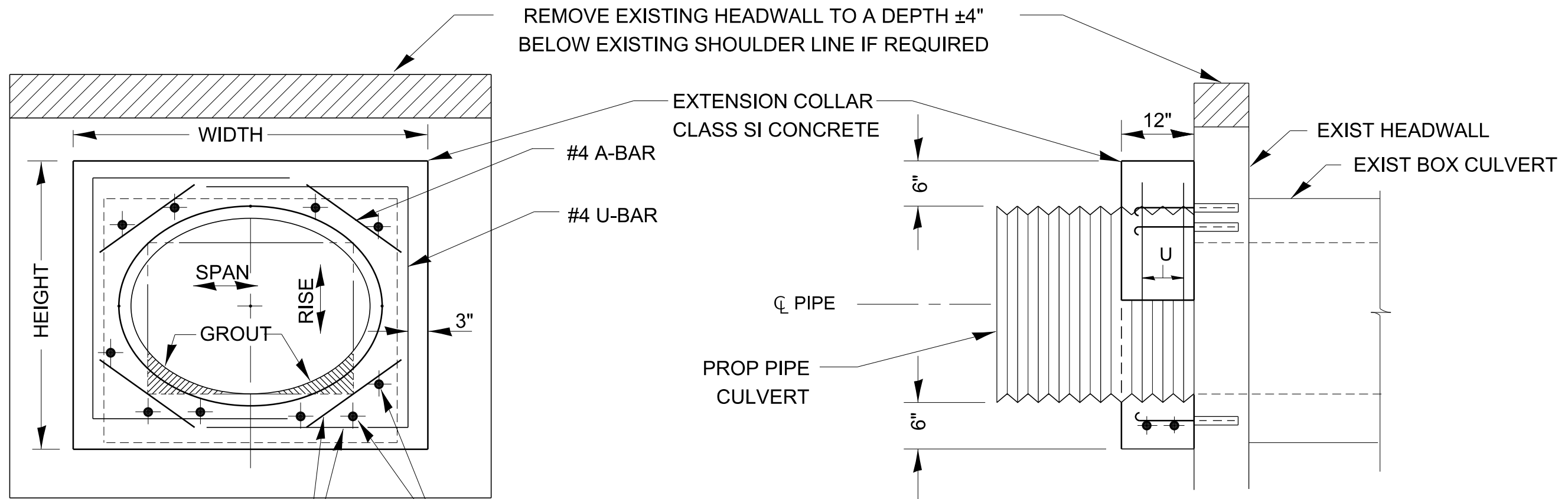
LOCATION	EXISTING CULVERT SIZE FT x FT	PRECAST CULVERT EXTENSION FT x FT	EXTENSION COLLAR		U-BAR		QUANTITIES ARE FOR ONE SIDE ONLY		
			WIDTH	HEIGHT	'X'	'Y'	CONC COLLAR	REINFORCEMENT BARS	3/4" DIA EXPANSION BOLTS
			IN	IN	IN	IN	CU YD	POUND	EACH

COLLAR DETAIL (PRECAST BOX CULVERT EXTENSION OF BOX CULVERT)



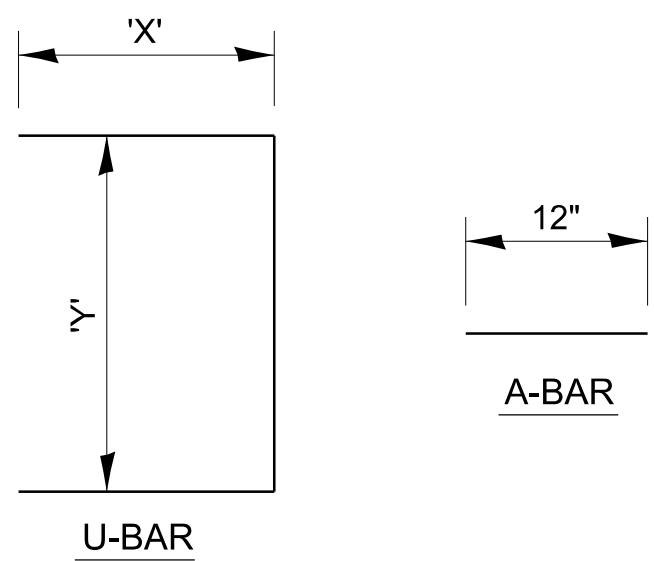
LOCATION	EXISTING CULVERT SIZE FT x FT	PRECAST CULV. EXTENSION IN	U-BAR		CONC COLLAR CU YD	REINFORCEMENT BARS POUND	3/4" DIA EXPANSION BOLTS EACH
			'X' IN	'Y' IN			

COLLAR DETAIL (PRECAST BOX CULVERT EXTENSION OF BOX CULVERT)



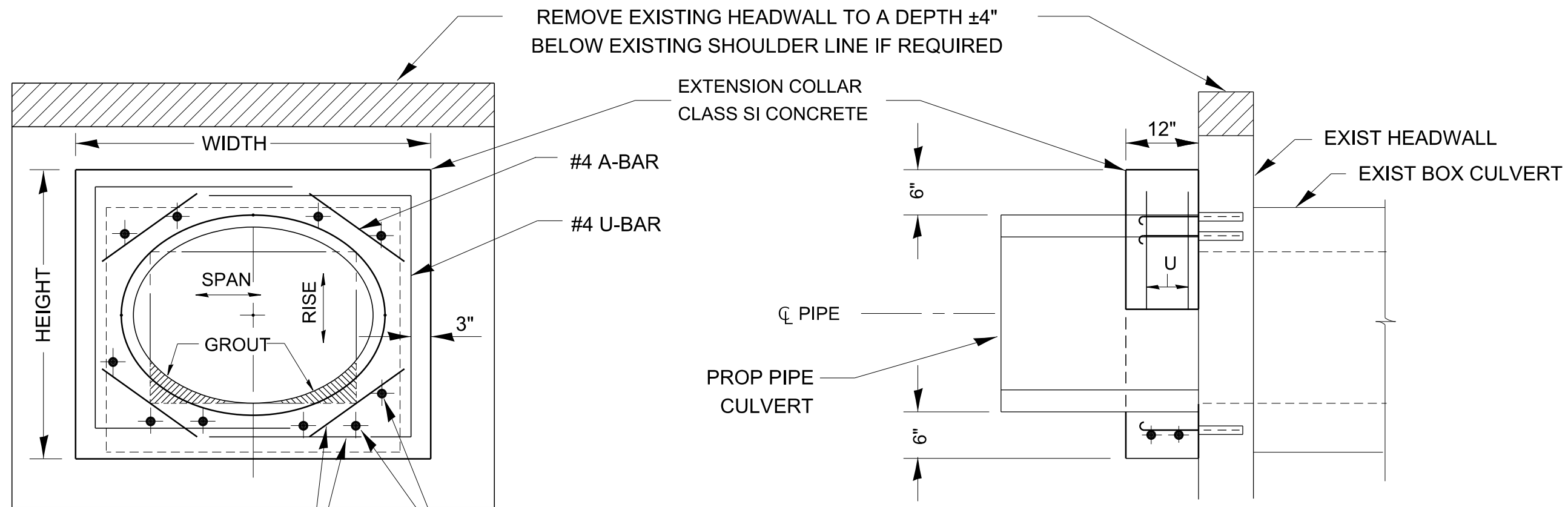
3/4" EXPANSION BOLTS
EQUALLY SPACED
2-#4 BARS
EACH LOCATION

EXPANSION BOLTS SHALL CONSIST OF SELF DRILLING EXPANSION SHIELDS AND 3/4" 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 CERTIFIED PROOF LOAD = 4,080 LBS.



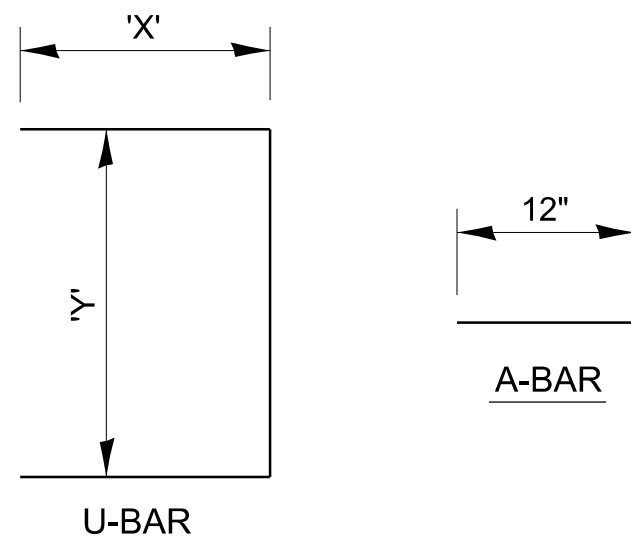
LOCATION	EXISTING CULVERT SIZE FT x FT	PIPE DIMENSION (ELLIPTICAL) IN	EXTENSION COLLAR		A-BAR 305 IN	U-BAR		CONC COLLAR CU YD	REINFORCEMENT BARS POUND	3/4" DIA EXPANSION BOLTS EACH
			WIDTH IN	HEIGHT IN		'X' IN	'Y' IN			

COLLAR DETAIL (ELLIP. CMP EXTENSION OF BOX CULVERT)



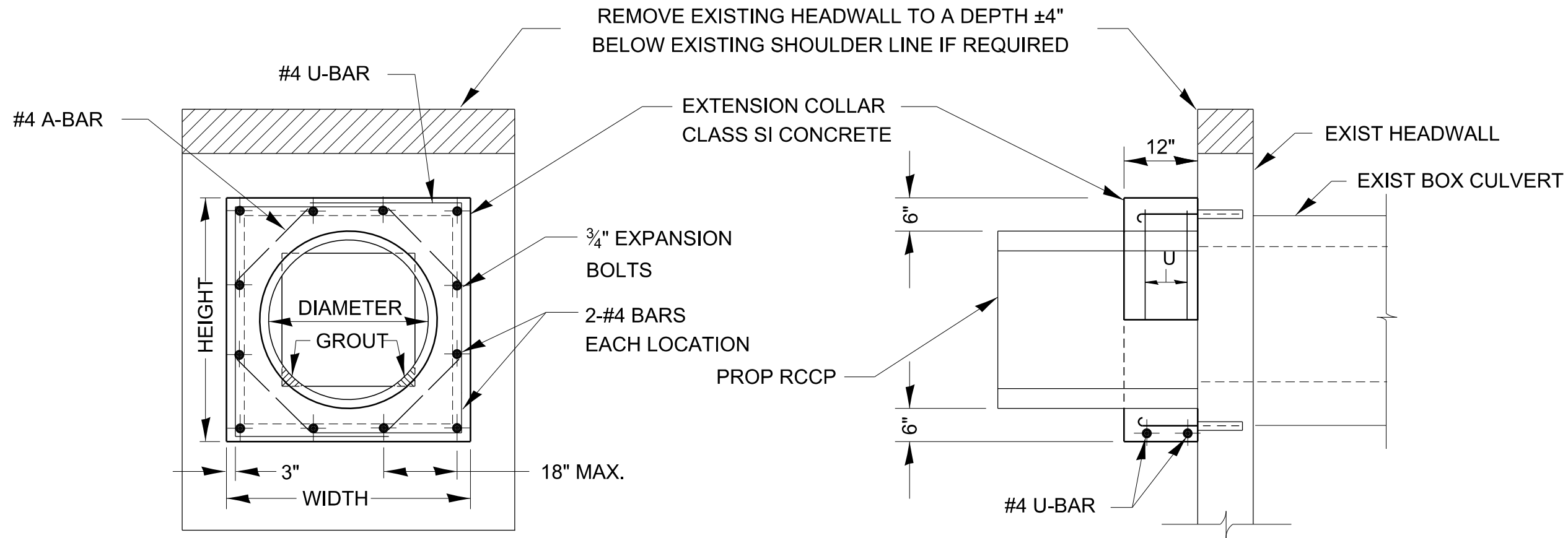
3/4" EXPANSION BOLTS
EQUALLY SPACED
2-#4 BARS
EACH LOCATION

EXPANSION BOLTS SHALL CONSIST OF SELF DRILLING EXPANSION SHIELDS AND 3/4" 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 CERTIFIED PROOF LOAD = 4,080 LBS.

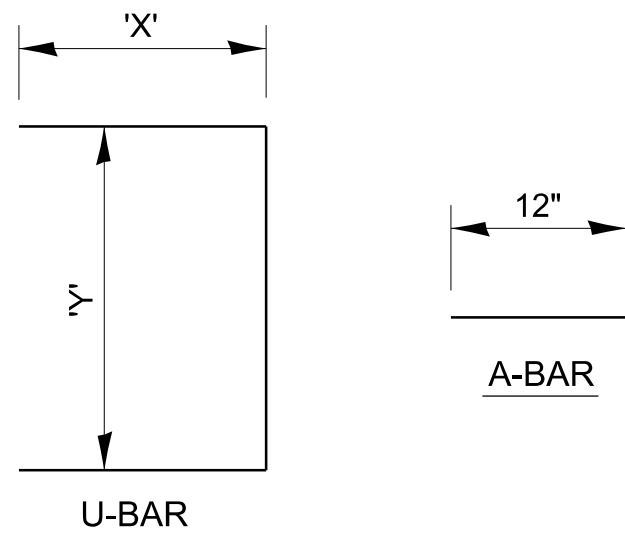


LOCATION	EXISTING CULVERT SIZE FT x FT	PIPE DIMENSION (ELLIPTICAL) IN	EXTENSION COLLAR		A-BAR 305 IN	U-BAR		CONC COLLAR CU YD	REINFORCEMENT BARS POUND	3/4" DIA EXPANSION BOLTS EACH
			WIDTH IN	HEIGHT IN		'X' IN	'Y' IN			

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

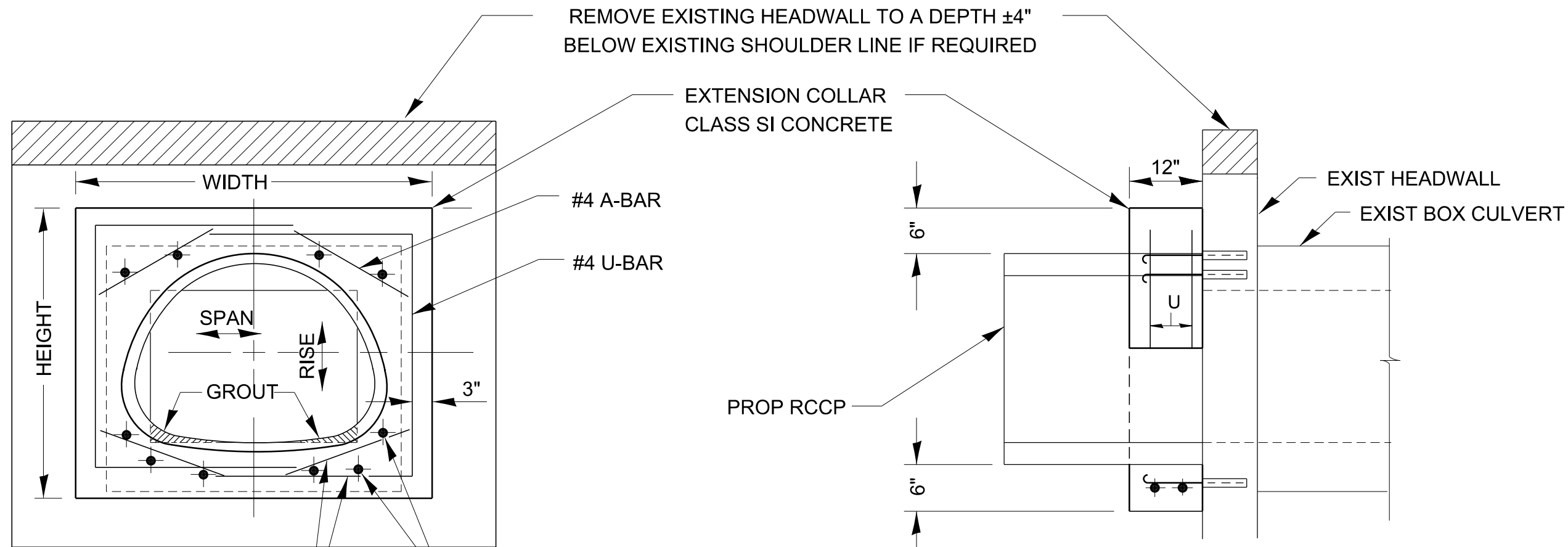


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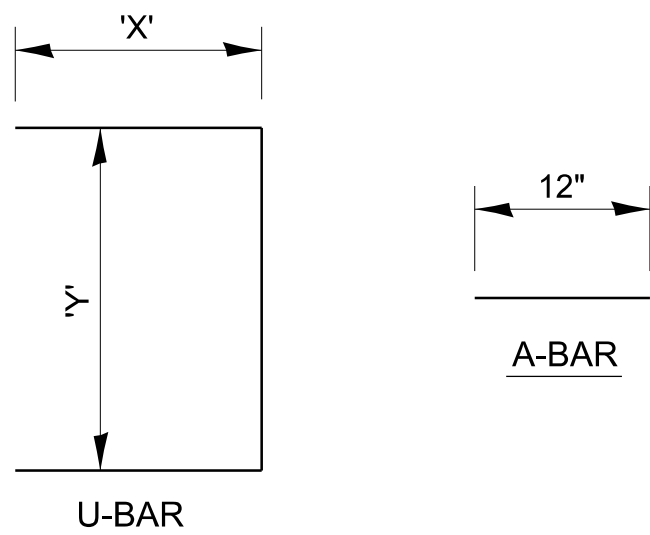


LOCATION	EXISTING CULVERT SIZE FT x FT	PIPE DIMENSION DIA IN	PIPE AREA SQ FT	EXTENSION COLLAR		A-BAR 305 IN	U-BAR		QUANTITIES ARE FOR ONE SIDE ONLY		
				WIDTH IN	HEIGHT IN		'X' IN	'Y' IN	CLASS SI CONC COLLAR CU YD	REINFORCEMENT BARS POUND	3/4" DIA EXPANSION BOLTS EACH

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

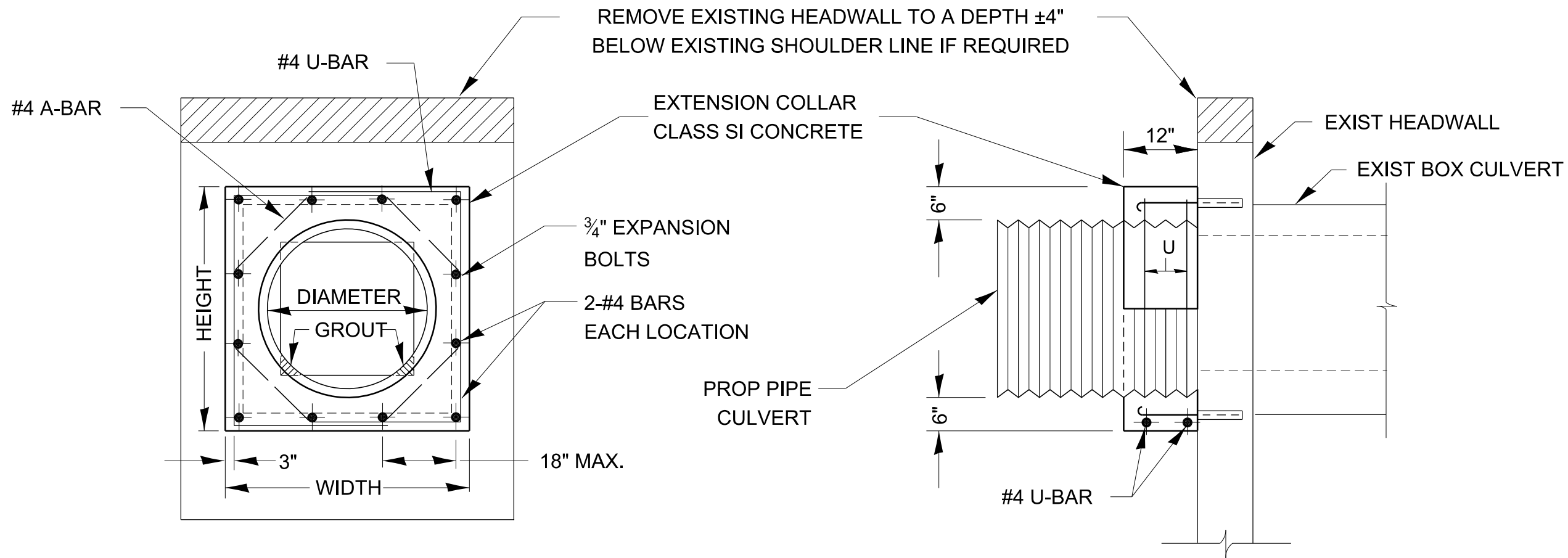


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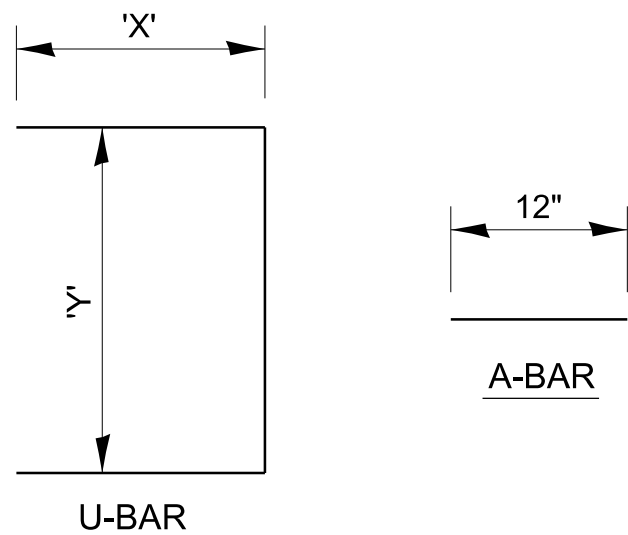


LOCATION	EXISTING CULVERT SIZE FT x FT	PIPE DIMENSION			PIPE AREA SQ FT	EXTENSION COLLAR		A-BAR 380 IN	U-BAR		QUANTITIES ARE FOR ONE SIDE ONLY			
		SPAN	RISE	EQUIV		WIDTH	HEIGHT		'X'	'Y'	CLASS SI CONC COLLAR	REINFORCEMENT BARS	3/4" DIA EXPANSION BOLTS	
		IN	IN	IN		IN	IN		IN	IN	IN	CU YD	POUND	EACH

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

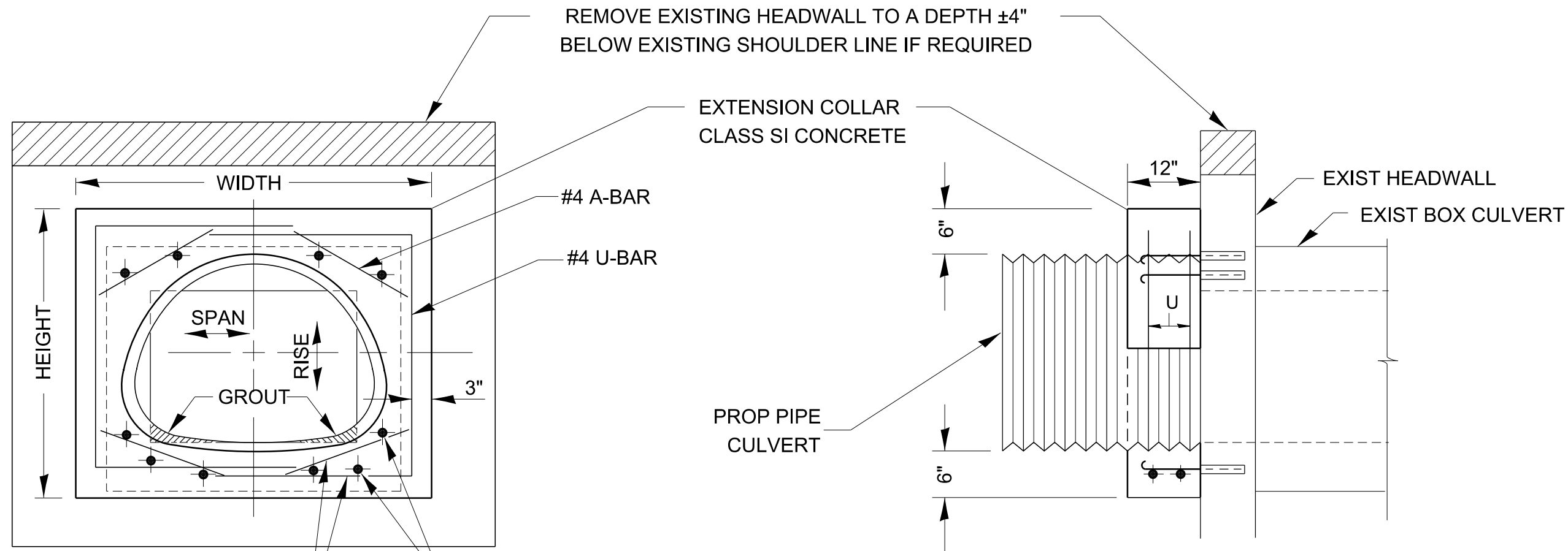


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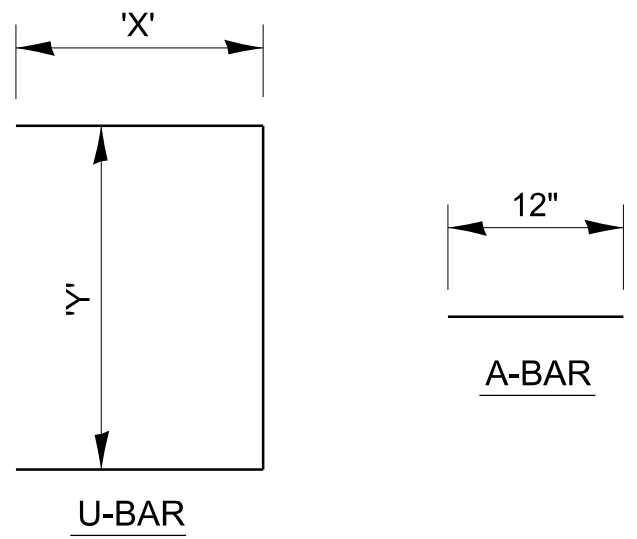


LOCATION	EXISTING CULVERT SIZE FT x FT	PIPE DIMENSION DIA IN	PIPE AREA SQ FT	EXTENSION COLLAR		A-BAR 305 IN	U-BAR		QUANTITIES ARE FOR ONE SIDE ONLY			
				WIDTH IN	HEIGHT IN		'X' IN	'Y' IN	CLASS SI CONC COLLAR CU YD	REINFORCEMENT BARS POUND	3/4" DIA EXPANSION BOLTS EACH	

COLLAR DETAIL (CMP EXTENSION OF BOX CULVERT)

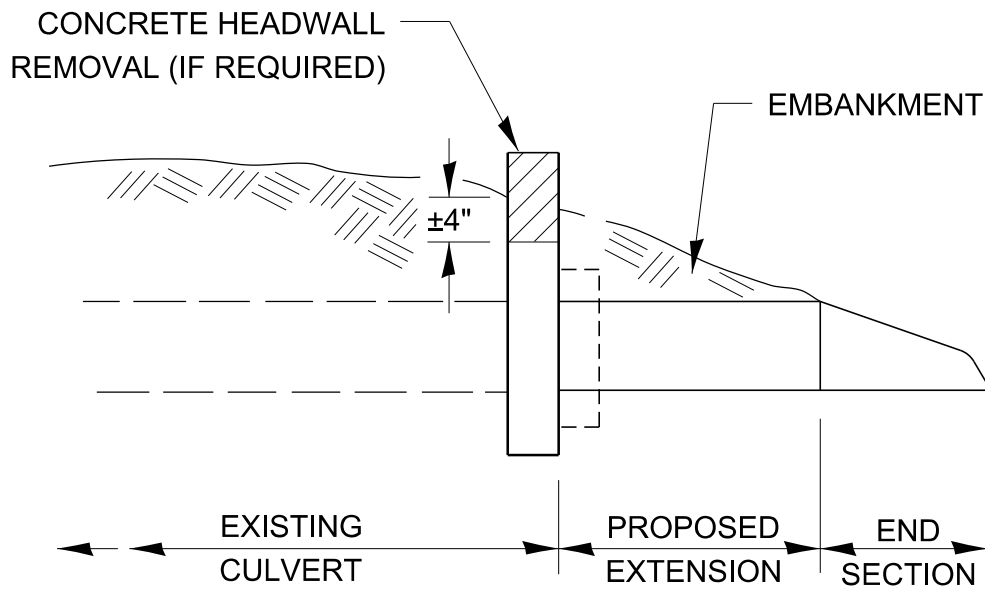
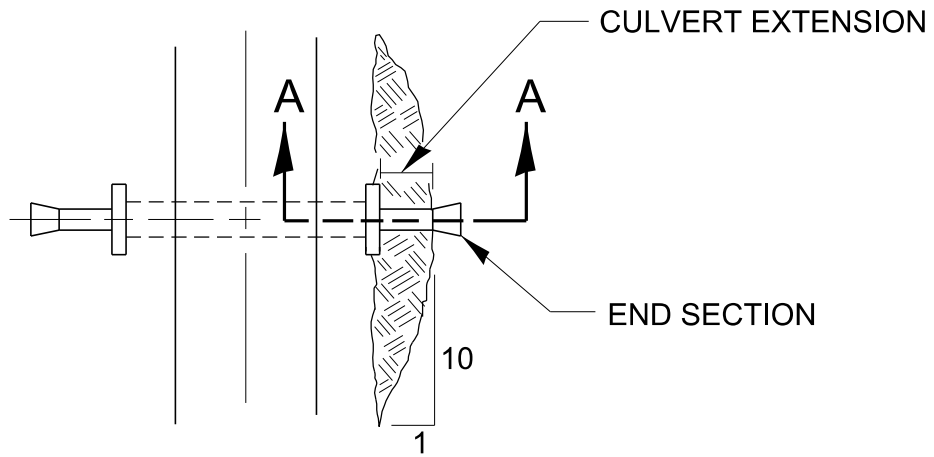


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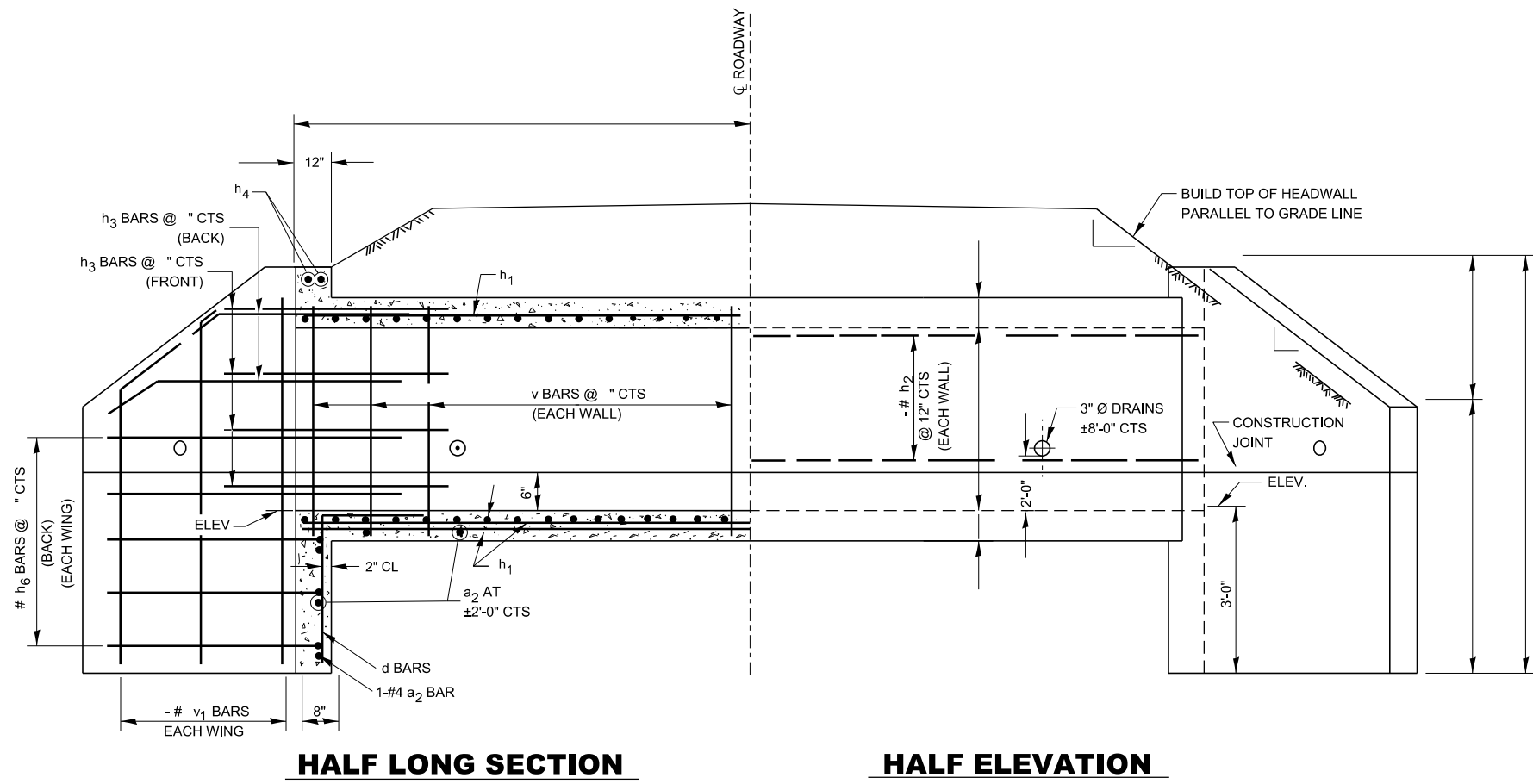
LOCATION	EXISTING CULVERT SIZE FT x FT	PIPE DIMENSION			PIPE AREA SQ FT	EXTENSION COLLAR		A-BAR 380 IN	U-BAR		QUANTITIES ARE FOR ONE SIDE ONLY			
		SPAN	RISE	EQUIV		WIDTH	HEIGHT		'X'	'Y'	CLASS SI CONC COLLAR	REINFORCEMENT BARS	3/4" DIA EXPANSION BOLTS	
		IN	IN	IN		IN	IN		IN	IN	IN	CU YD	POUND	EACH

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



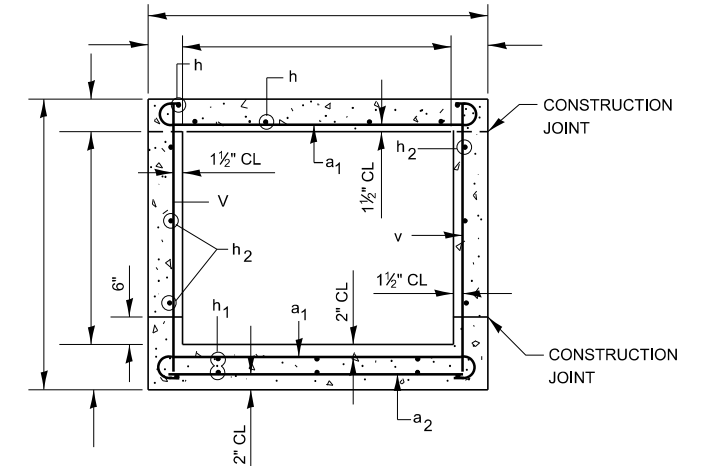
SECTION A-A

PLAN AT CULVERT EXTENSIONS

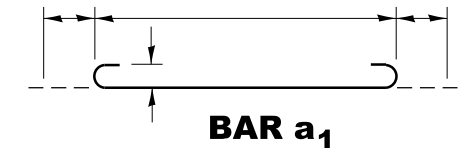


HALF LONG SECTION

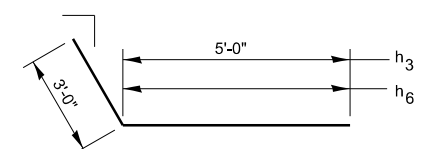
HALF ELEVATION



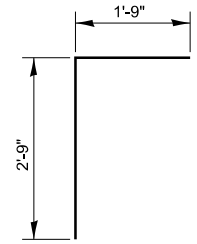
SECTION THRU BARREL



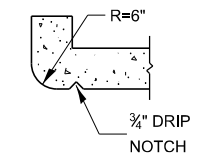
BAR a₁



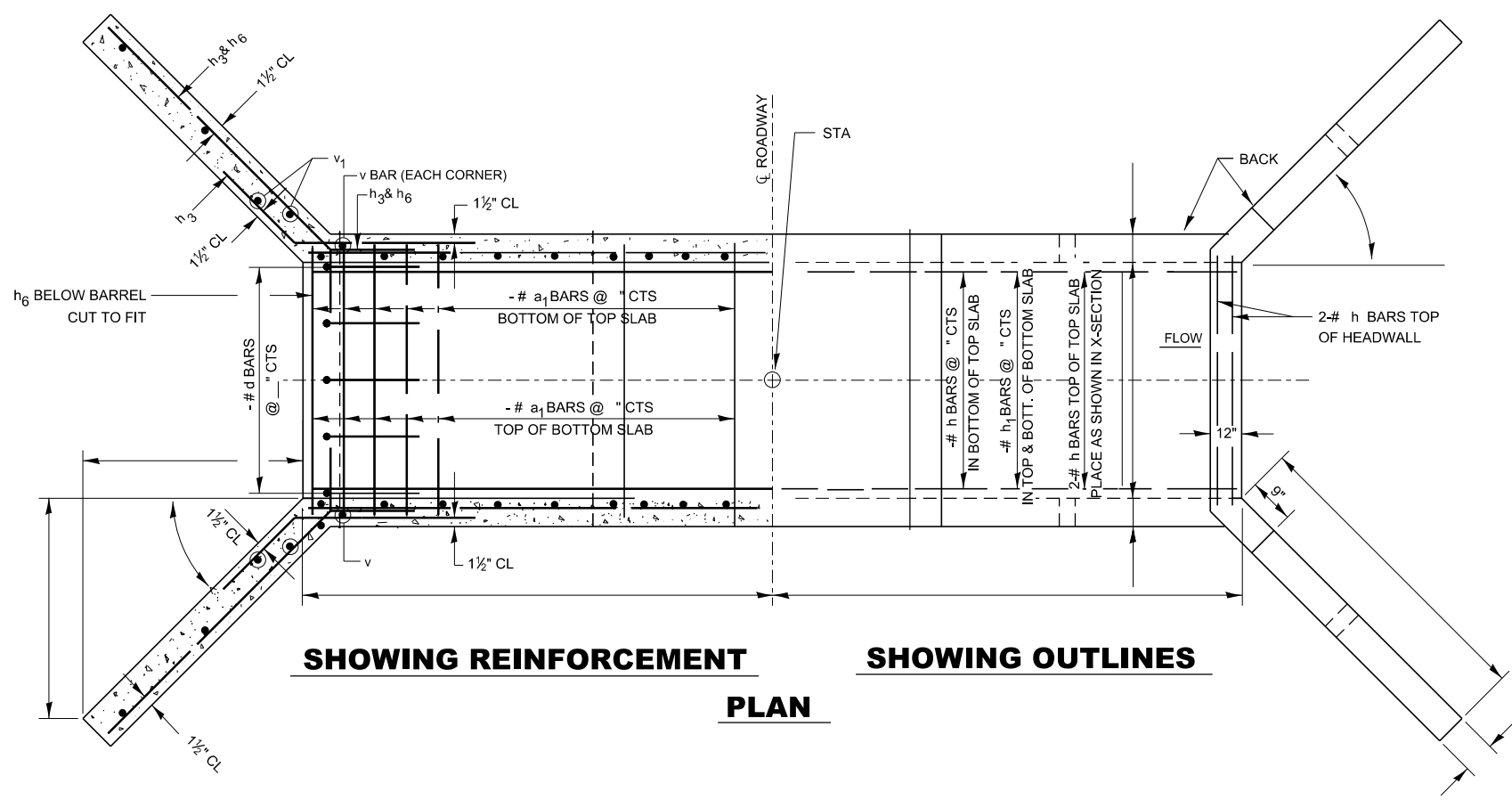
BARS h₃ & h₆



BAR d



SECTION THRU HEADWALL
(UP STREAM END ONLY)



SHOWING REINFORCEMENT PLAN

SHOWING OUTLINES

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 YD	
REINFORCEMENT BARS		LBS	

GENERAL NOTES

CLASS SI CONCRETE SHALL BE USED THROUGHOUT.
 AT LEAST SIX FEET OF BARREL SHALL BE POURED MONLITHICALLY WITH WINGWALLS.
 EXPOSED EDGES SHALL BE BEVELED 3/4".
 FOR BACKFILLING AND EMBANKMENTS SEE STANDARD SPECIFICATIONS.
 TILT HOOK OF a₁ BARS, IF NECESSARY, TO OBTAIN 1 1/2" MINIMUM CLEARANCE AT TOP OF HOOK.

DESIGN STRESSES

f_y = 60,000 PSI
 f'_c = 3,500 PSI

LOADING HS 20-44 & ALT.

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USER NAME = ronald.pohar	DESIGNED -	REVISED -
PLOT SCALE = 100,000 ' / in.	DRAWN -	REVISED -
PLOT DATE = 3/18/2024	CHECKED -	REVISED -
	DATE -	REVISED -

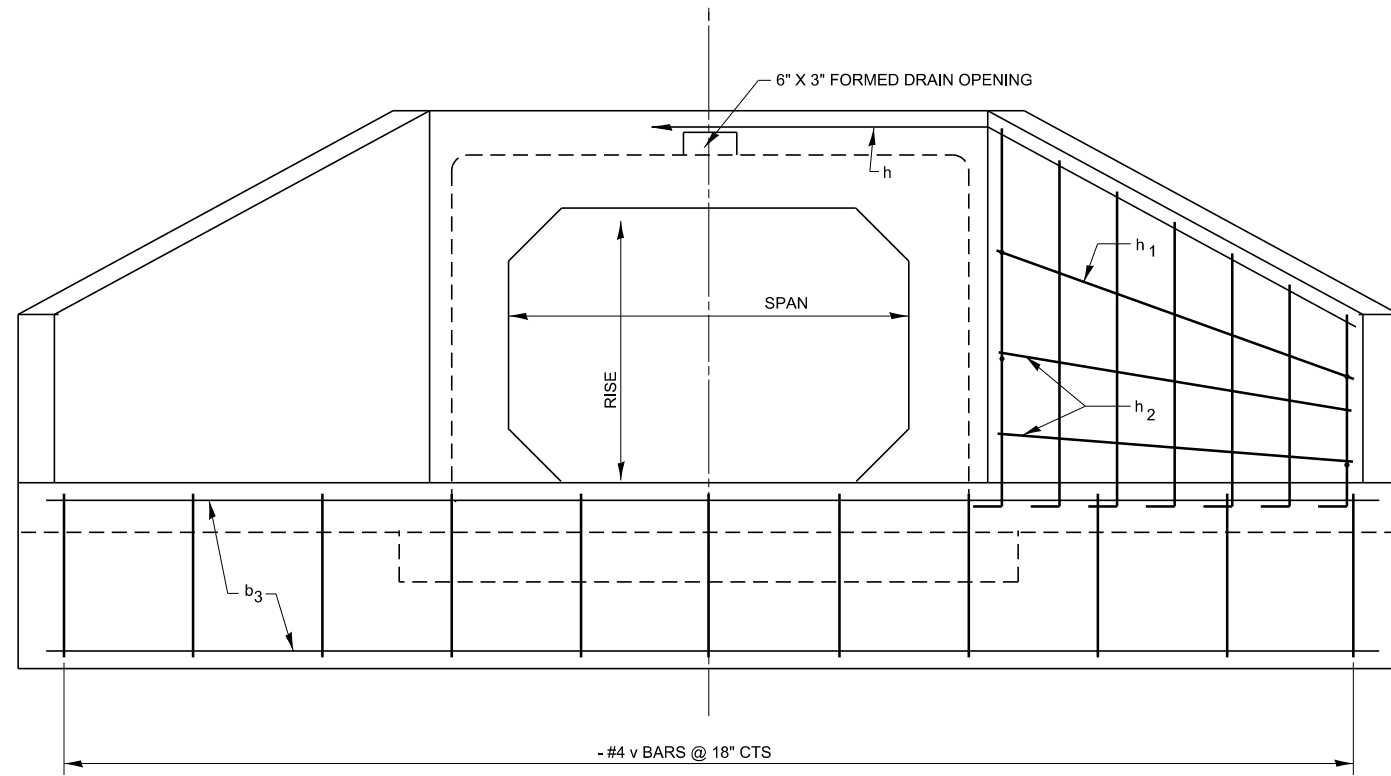
**STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION**

BOX CULVERT STATION

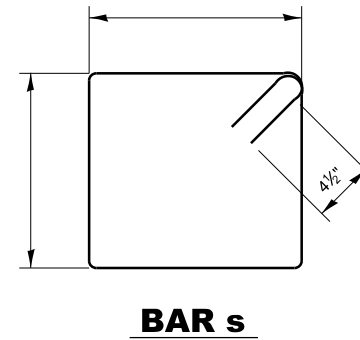
SCALE: SHEET OF SHEETS STA. TO STA.

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

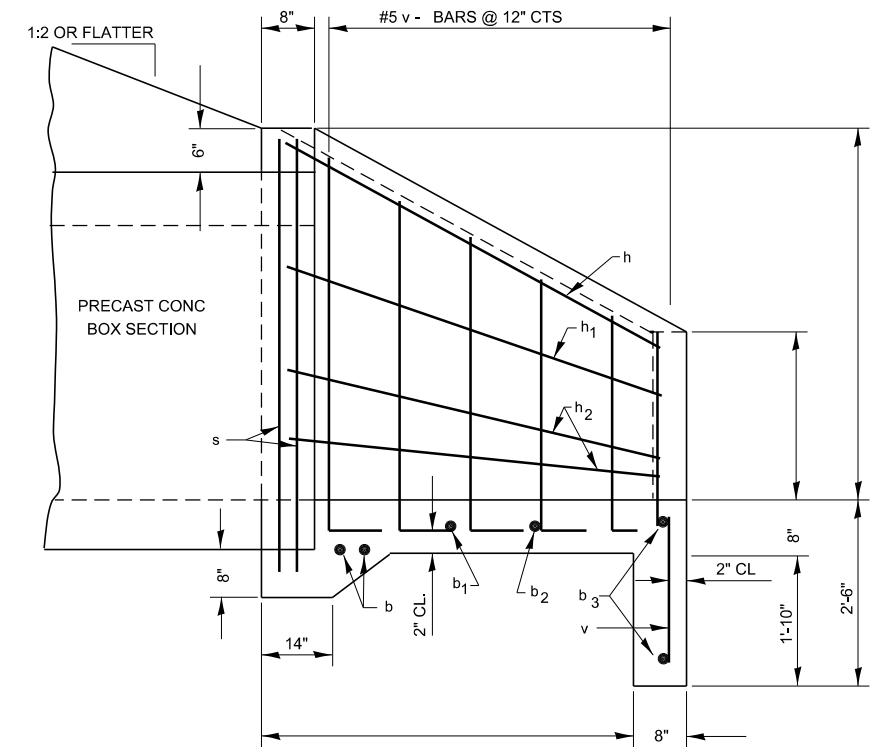
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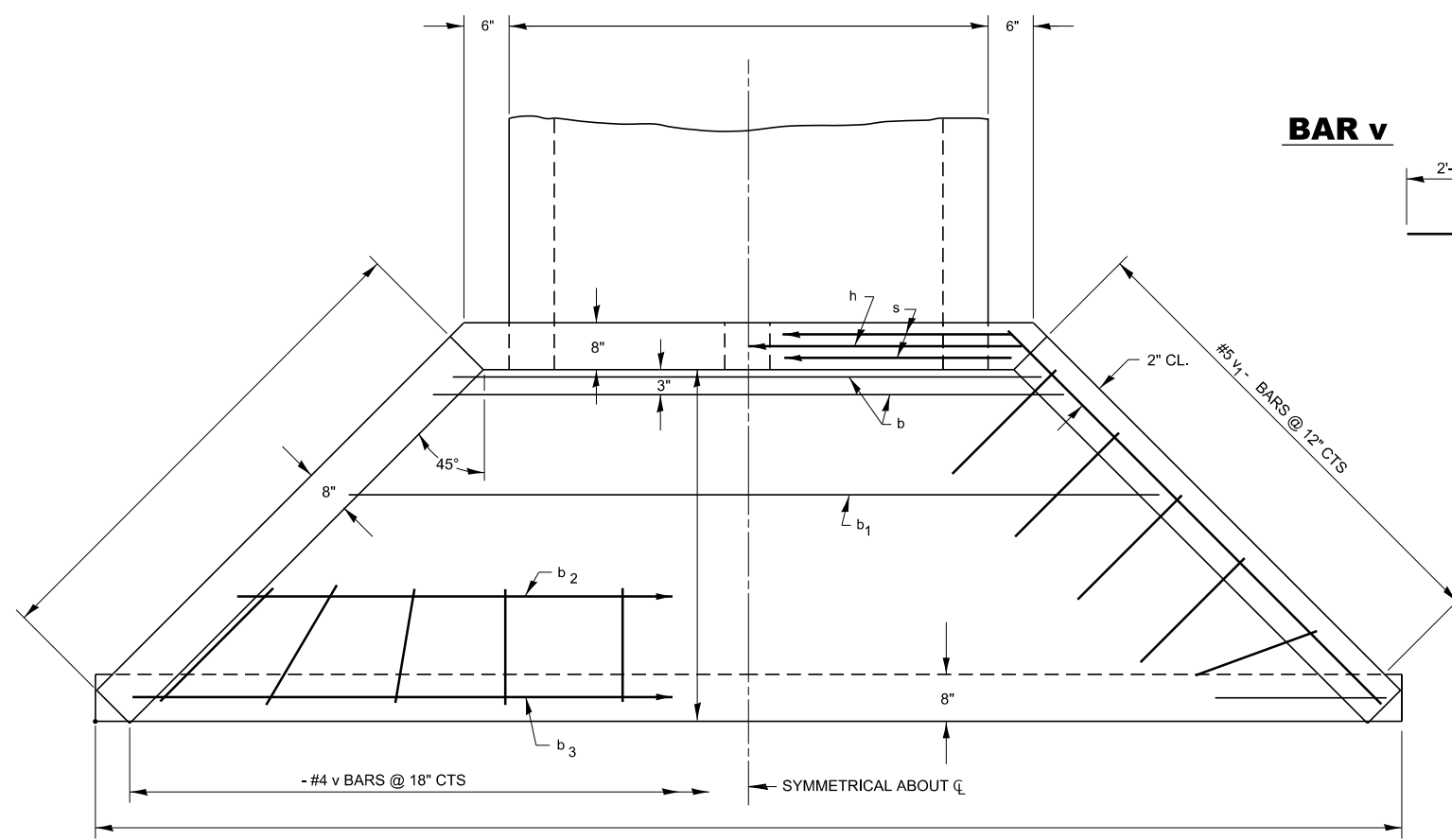
END ELEVATION



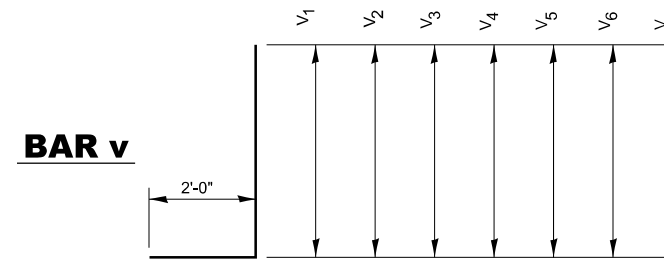
BAR s



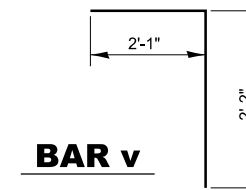
HALF SIDE ELEVATION



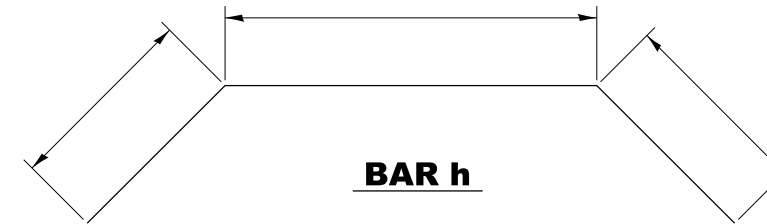
PLAN



BAR v



BAR v



BAR h

GENERAL NOTES

CLASS SI CONCRETE SHALL BE USED THROUGHOUT.
 EXPOSED EDGES SHALL BE BEVELED 3/8\".

REINFORCEMENT BARS SHALL CONFORM TO THE
 REQUIREMENTS OF AASHTO M-31, M-42, OR M-53, GRADE 60.

DESIGNER NOTE:
 WHEN RISE 5', V₁ TO V₇
 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			CU YD	
REINFORCEMENT BARS			LBS	
REIN BARS (EPOXY CTD)			LBS	

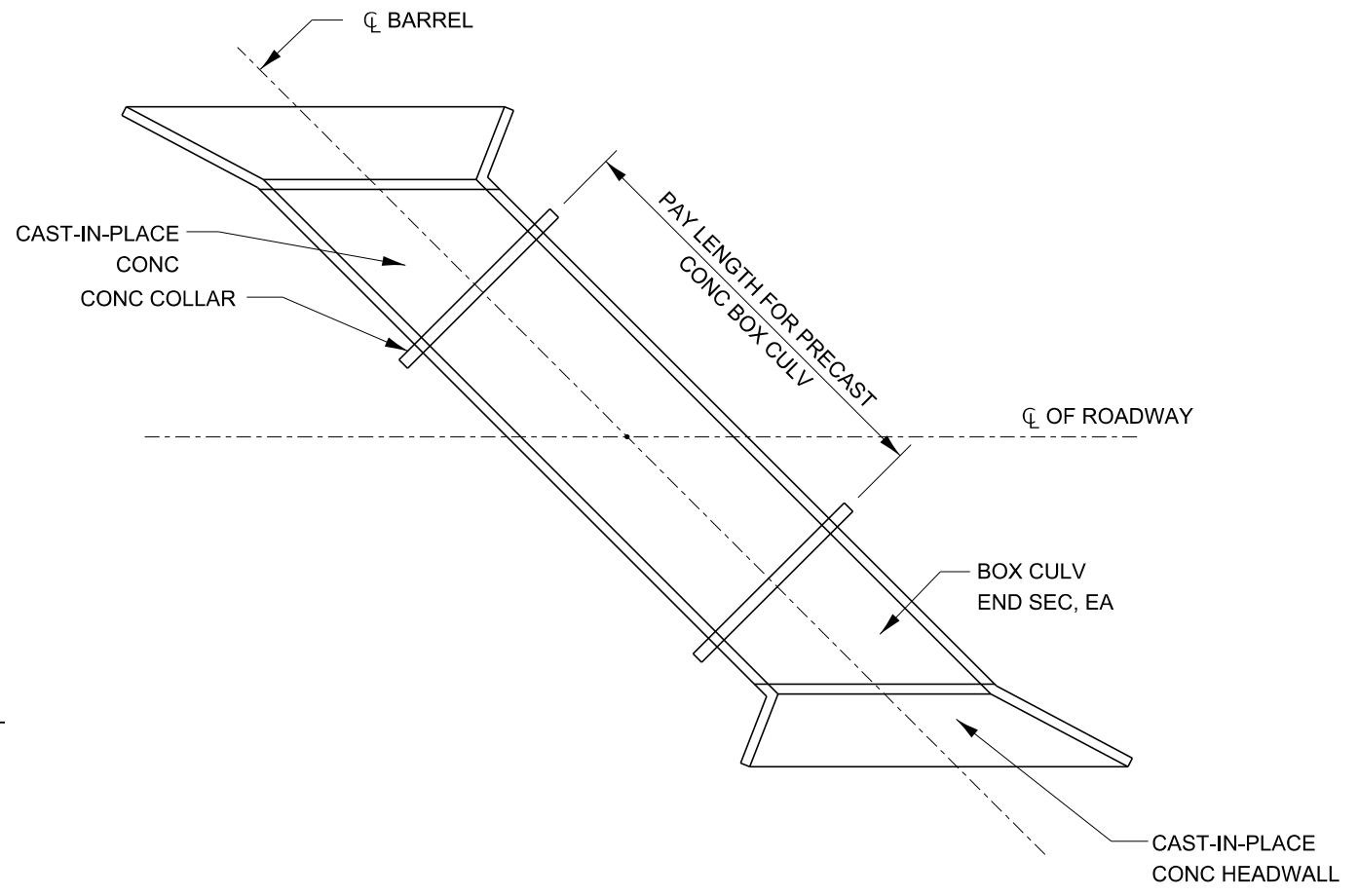
TABLE FOR ONE (1) HEADWALL

USER NAME = ronald.pohar	DESIGNED -	REVISED -
PLOT SCALE = 100,000' / in.	DRAWN -	REVISED -
PLOT DATE = 3/18/2024	CHECKED -	REVISED -
	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

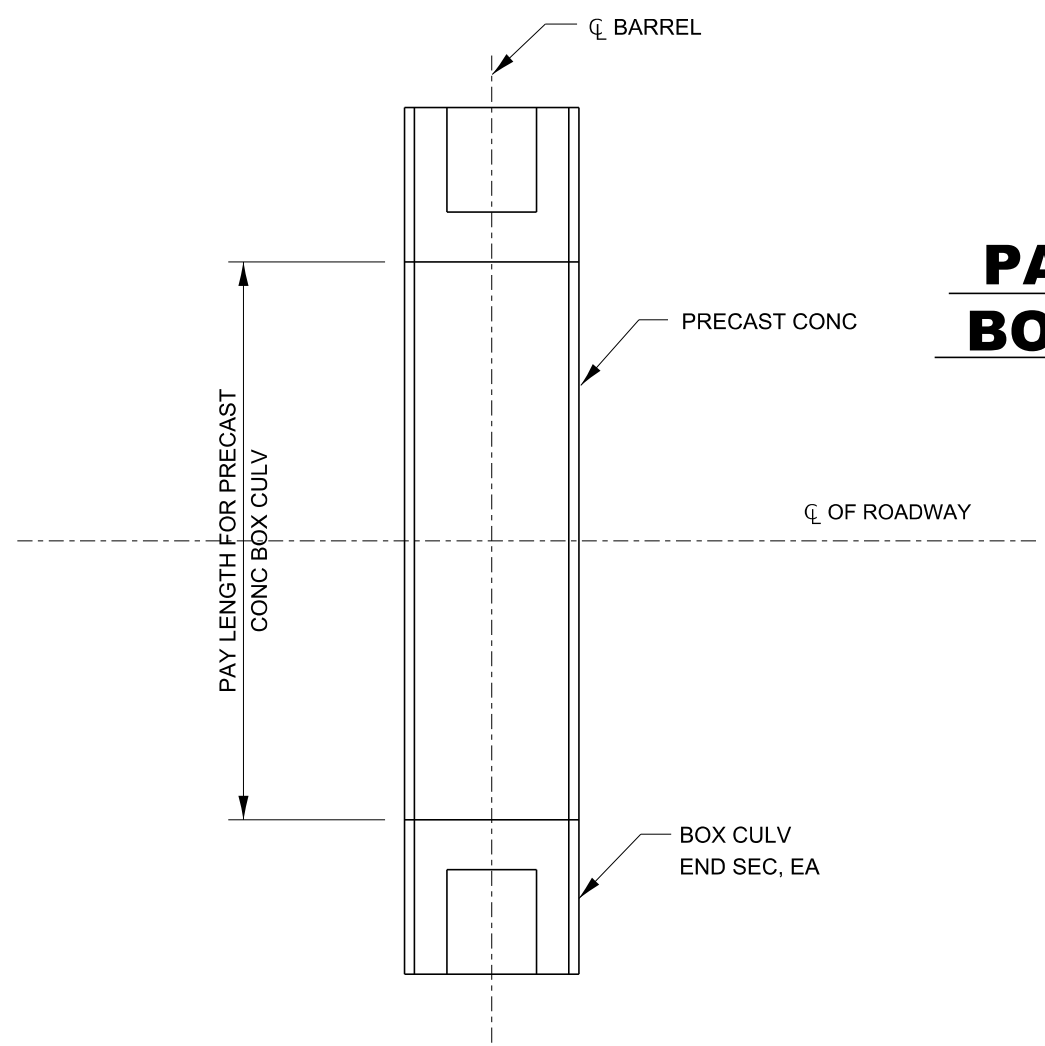
SCALE: SHEET OF SHEETS STA. TO STA.

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



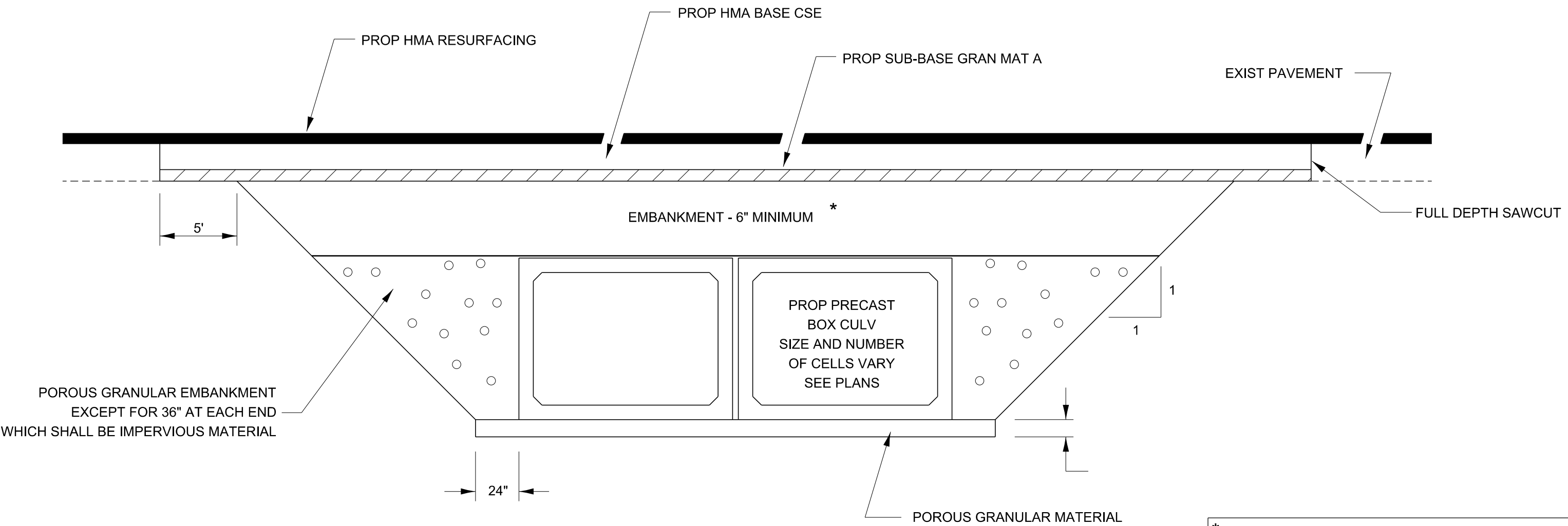
PAY LENGTH FOR PRECAST CONCRETE BOX CULVERT SKEWED WITH ROADWAY

NTS



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

NTS

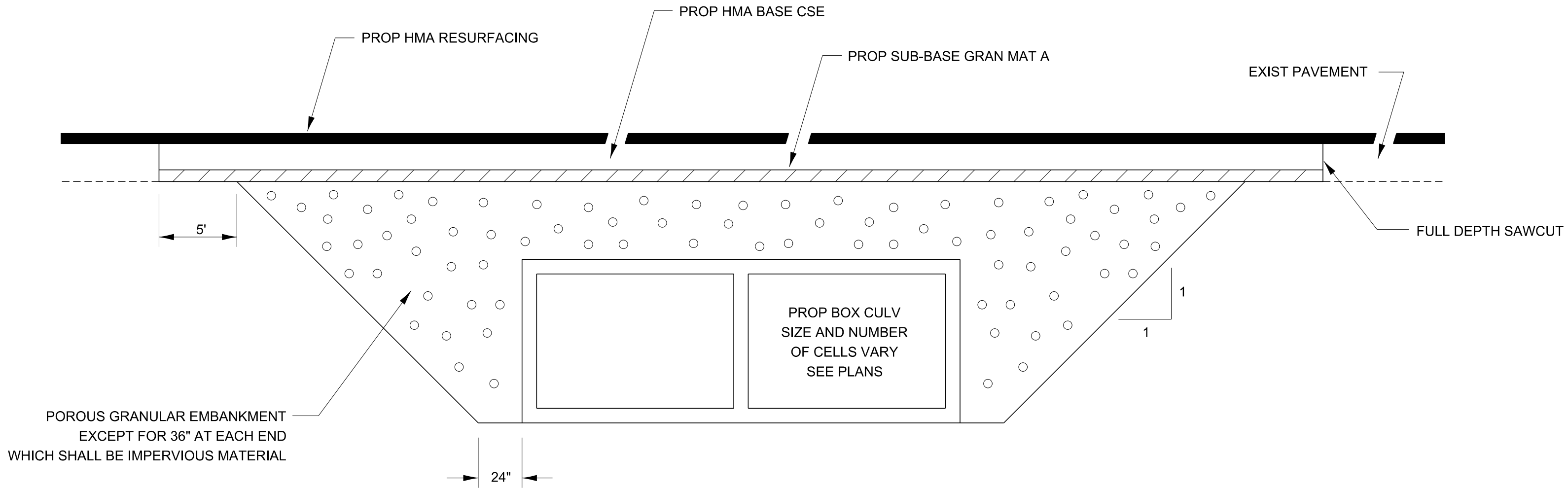


DESIGNER NOTE: SHOW EXISTING STRUCTURE TO BE REMOVED.

* DESIGNER NOTE: NO EMBANKMENT REQUIRED FOR PCC PAVEMENT ON TOP OF CULVERT.

SECTION THROUGH PRECAST BOX CULVERT

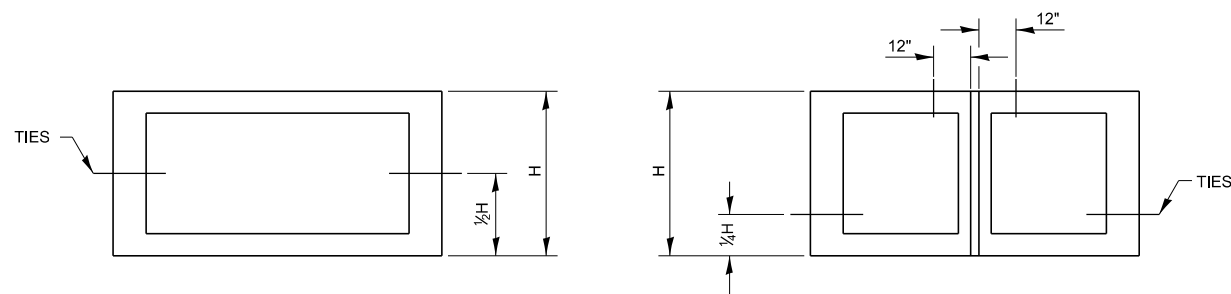
540-20



DESIGNER NOTE: SHOW EXISTING STRUCTURE TO BE REMOVED.

SECTION THROUGH CAST-IN-PLACE BOX CULVERT

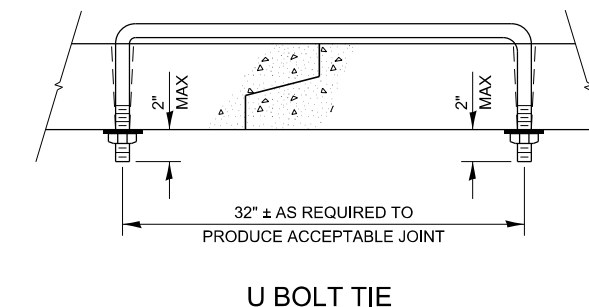
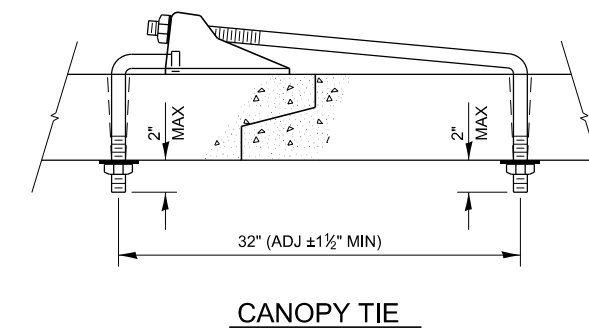
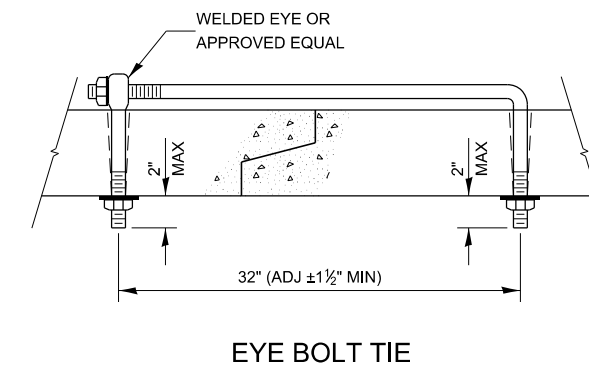
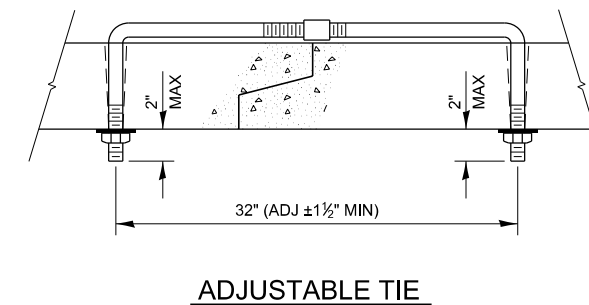
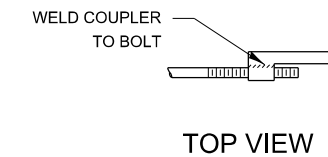
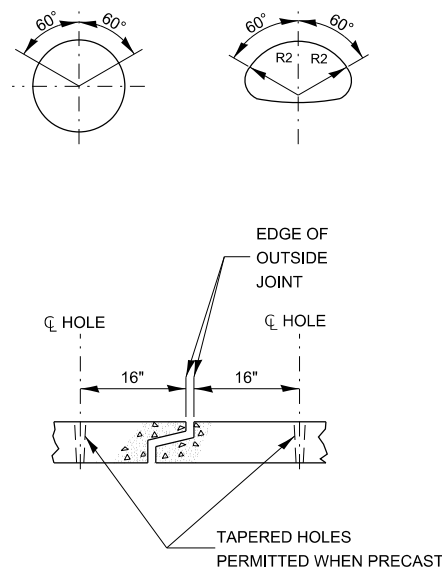
THE CULVERT TIES SHALL BE INCLUDED IN THE COST OF THE CONCRETE PIPE CULVERTS OR THE PRECAST CONCRETE BOX CULVERT. THE MECHANICAL TIES SHALL BE ON THE OUTSIDE OF THE CULVERT. THE NUTS AND WASHERS SHALL BE PLACED ON THE INSIDE OF THE CULVERT AND COVERED WITH MASTIC JOINT SEALER CONFORMING TO ARTICLES 1055 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
	15	ROLLED THREADS (SEE NOTE 4)
	18	
	21	
	24	
	27	
	30	
3 x 2	33	3/4 CUT OR ROLLED
3 x 3	36	
4 x 2	42	
4 x 3	48	
4 x 4	54	
5 x 3	60	1 CUT OR ROLLED
5 x 4	66	
5 x 5	72	
6 x *	78	
7 x *	84	
8 x *	90	
9 x *	96	
10 x *	102	
	108	
	120	
	132	1 1/4
11 x * AND GREATER	138 AND GREATER	

NOTES:

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



MODEL: det 3 det.tbl
FILE: \\p101\share\paw\benetey.com\PIV\DOT\Documents\DOT Office\District 3\Standards - District 3\DETAILS\SUBSTRUCT 3_STANDARD DETAILS.DGN\500-599_STRUCTURES.dgn

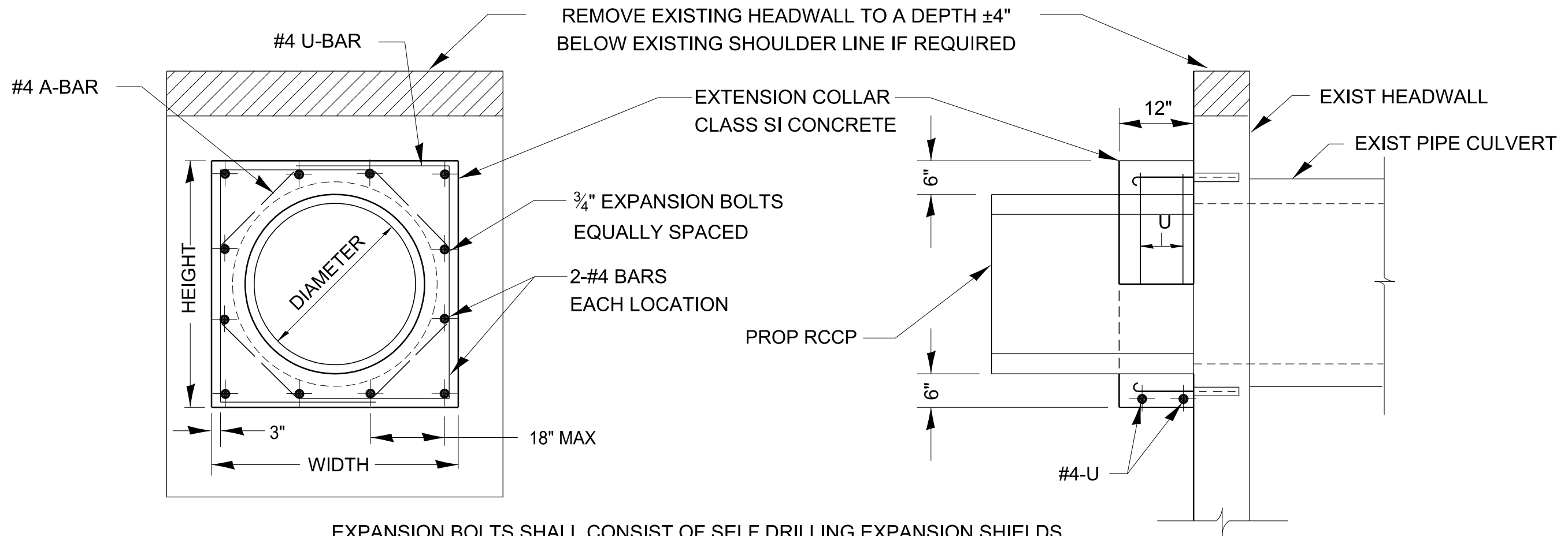
USER NAME = ronald.pohar	DESIGNED -	REVISED -
PLOT SCALE = 100,000 ' / in.	DRAWN -	REVISED -
PLOT DATE = 3/18/2024	CHECKED -	REVISED -
	DATE -	REVISED -

**STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION**

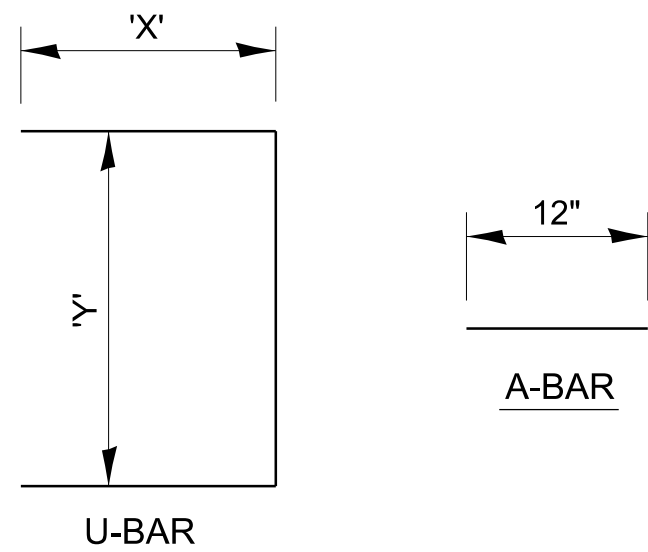
**MECHANICAL JOINTS FOR CONCRETE
PIPE AND BOX CULVERTS**

SCALE: SHEET OF SHEETS STA. TO STA.

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

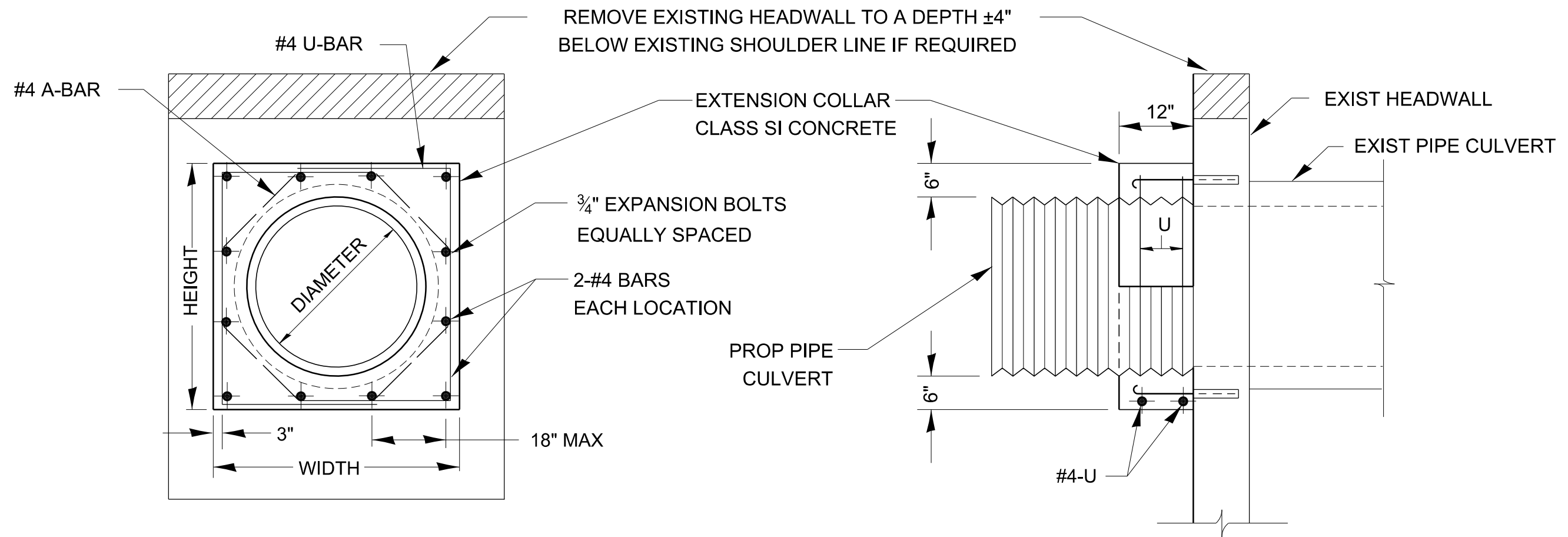


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 MINIMUM CERTIFIED PROOF LOAD = 4,080 LBS

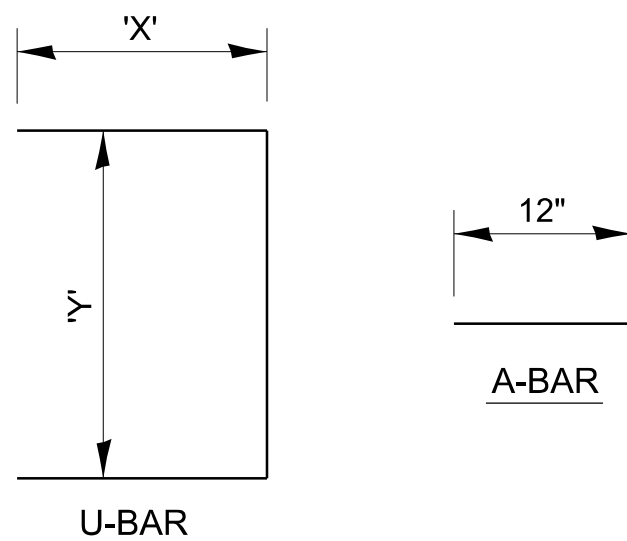


LOCATION	EXISTING CULVERT SIZE	PIPE DIMENSION	PIPE AREA	EXTENSION COLLAR		A-BAR	U-BAR		QUANTITIES ARE FOR ONE SIDE ONLY		
				WIDTH	HEIGHT		12	'X'	'Y'	CLASS SI CONC COLLAR	REINFORCEMENT BARS
	DIA IN	DIA IN	SQ FT	IN	IN	IN	IN	IN	CU YD	POUND	EACH

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

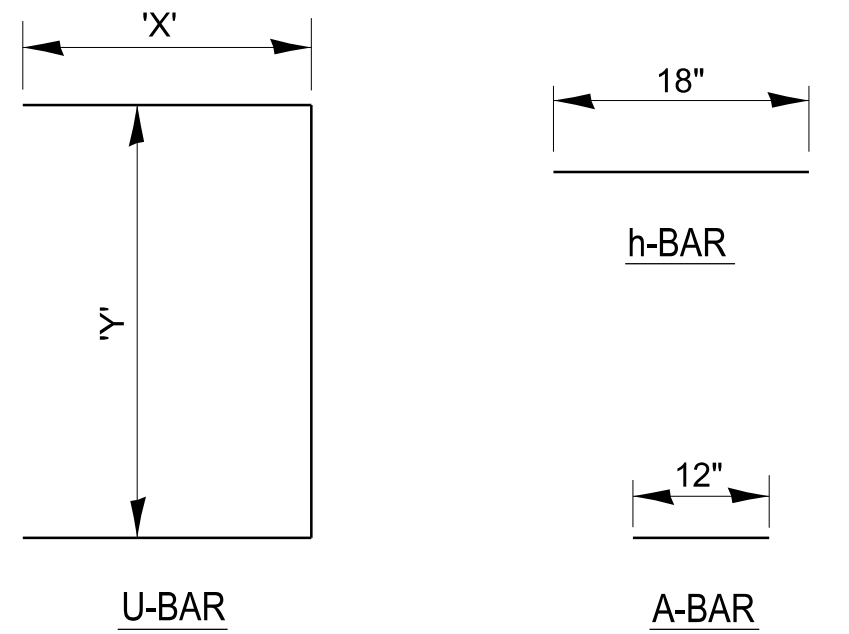
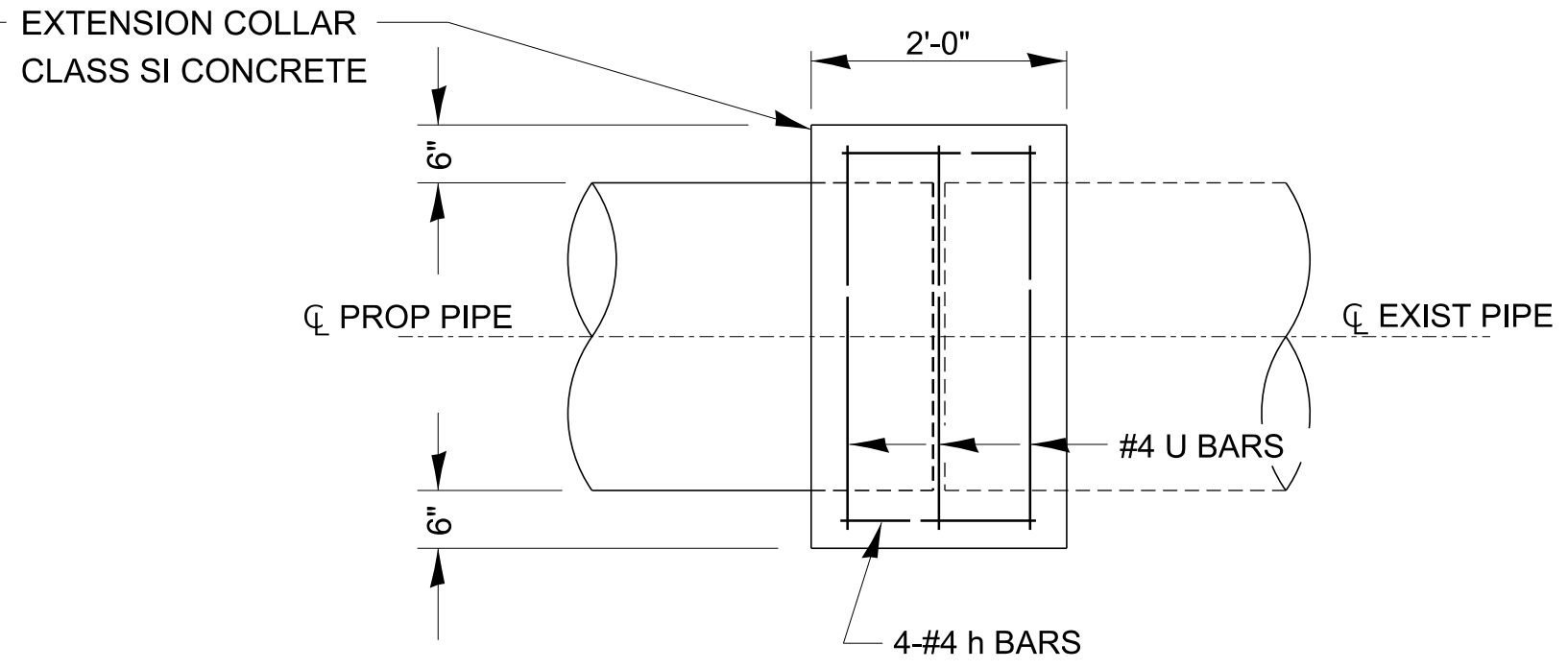
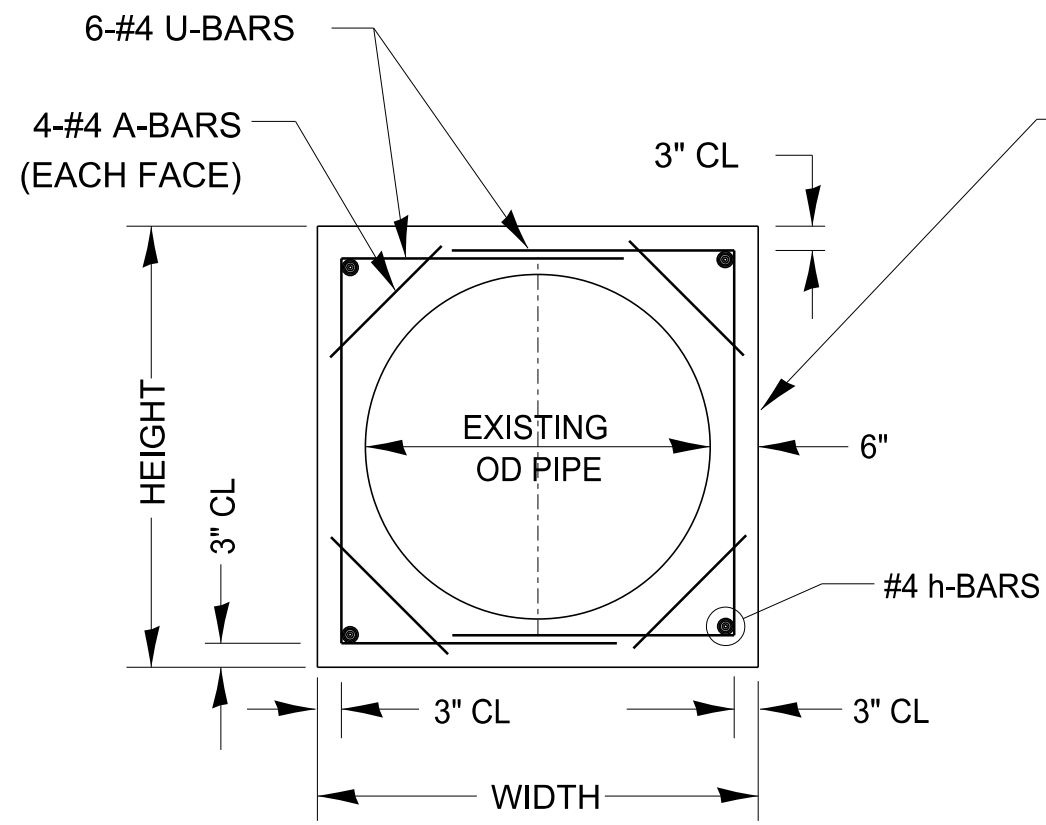


EXPANSION BOLTS SHALL CONSIST OF SELF DRILLING EXPANSION SHIELDS AND 3/4" DIA HOOKED BOLTS. HOOKED BOLTS SHALL EXTEND A MINIMUM OF 9" INTO NEW CONCRETE.
 MINIMUM CERTIFIED PROOF LOAD = 4,080 LBS



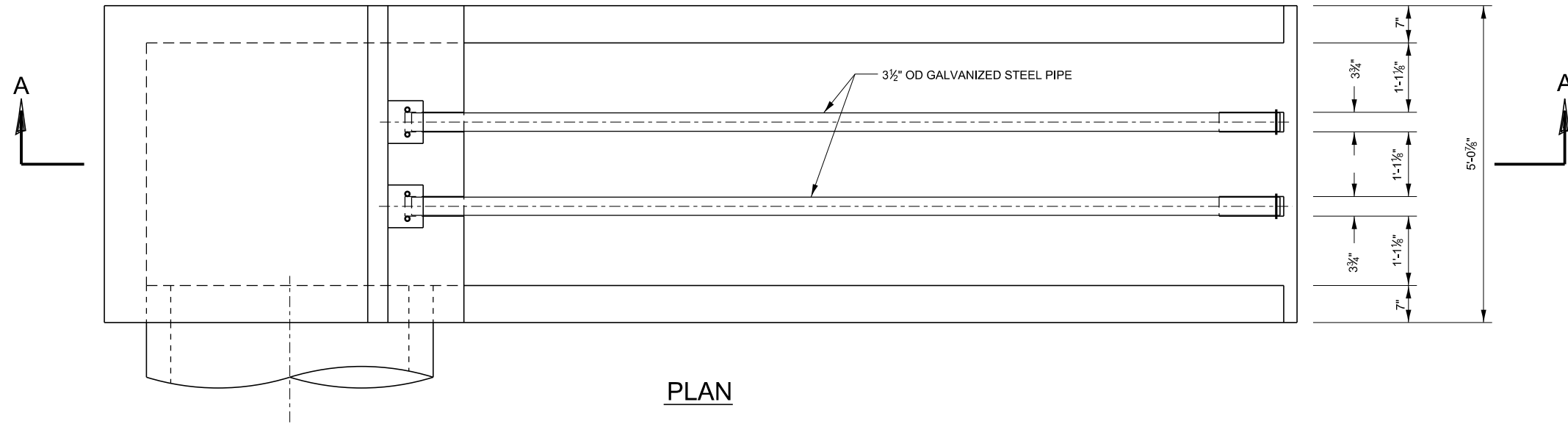
LOCATION	EXISTING CULVERT SIZE	PIPE DIMENSION	PIPE AREA	EXTENSION COLLAR		A-BAR			U-BAR			QUANTITIES ARE FOR ONE SIDE ONLY					
				WIDTH	HEIGHT	12	'X'	'Y'	CLASS SI CONC COLLAR	REINFORCEMENT BARS	3/4" DIA EXPANSION BOLTS						
												IN	IN	IN	IN	IN	CU YD
	DIA IN	DIA IN	SQ FT														

COLLAR DETAILS (CMP EXTENSION OF PIPE CULVERT)

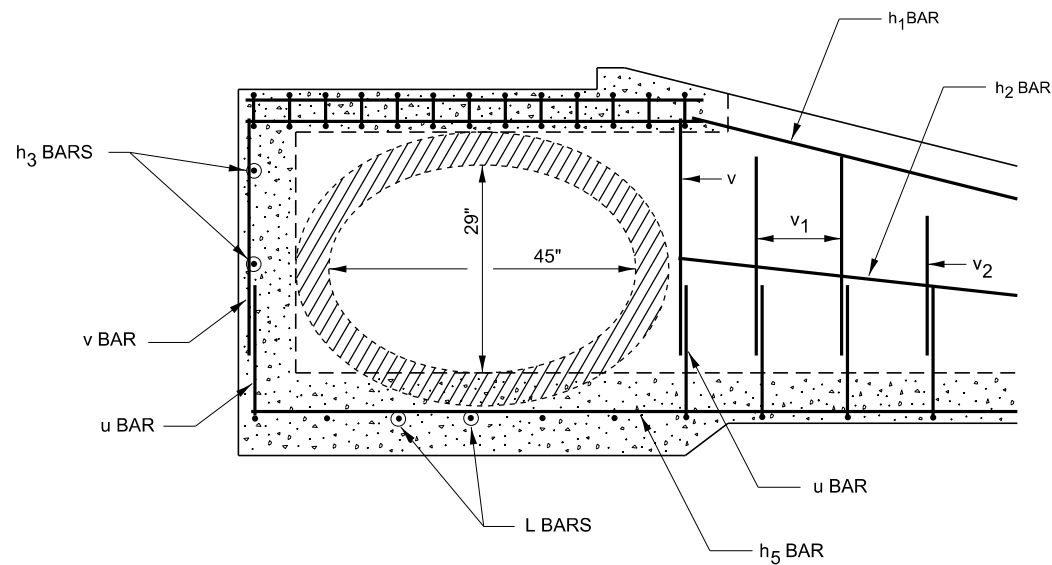
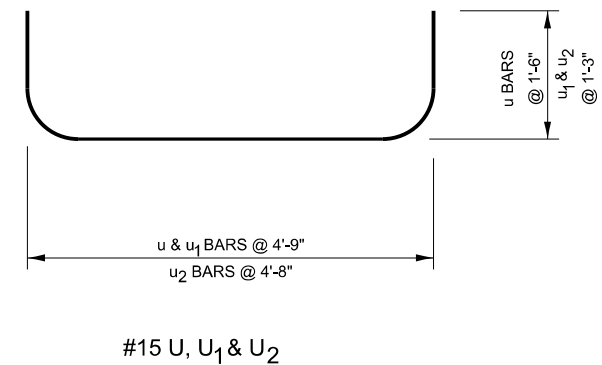
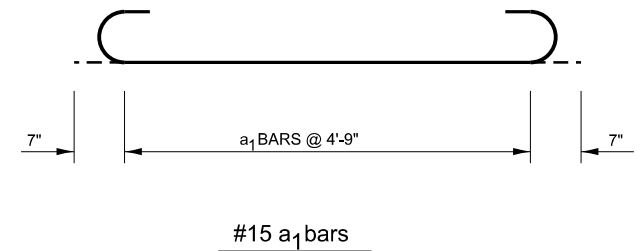
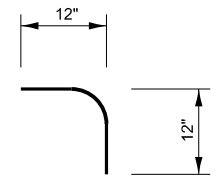
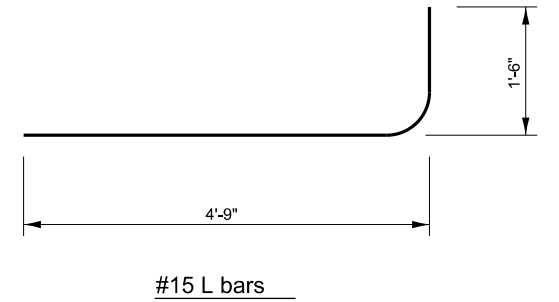


LOCATION	EXISTING CULVERT SIZE FT x FT	EXTENSION COLLAR		A-BAR	U-BAR		h-BAR	CONC COLLAR	REINFORCEMENT BARS
		WIDTH IN	HEIGHT IN	12 IN	'X' IN	'Y' IN	18 IN.	CU YD	POUND

COLLAR DETAIL (DIRECT PIPE CULVERT EXTENSION)



PLAN



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 3/4".

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.

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

INLET BOX, SPECIAL

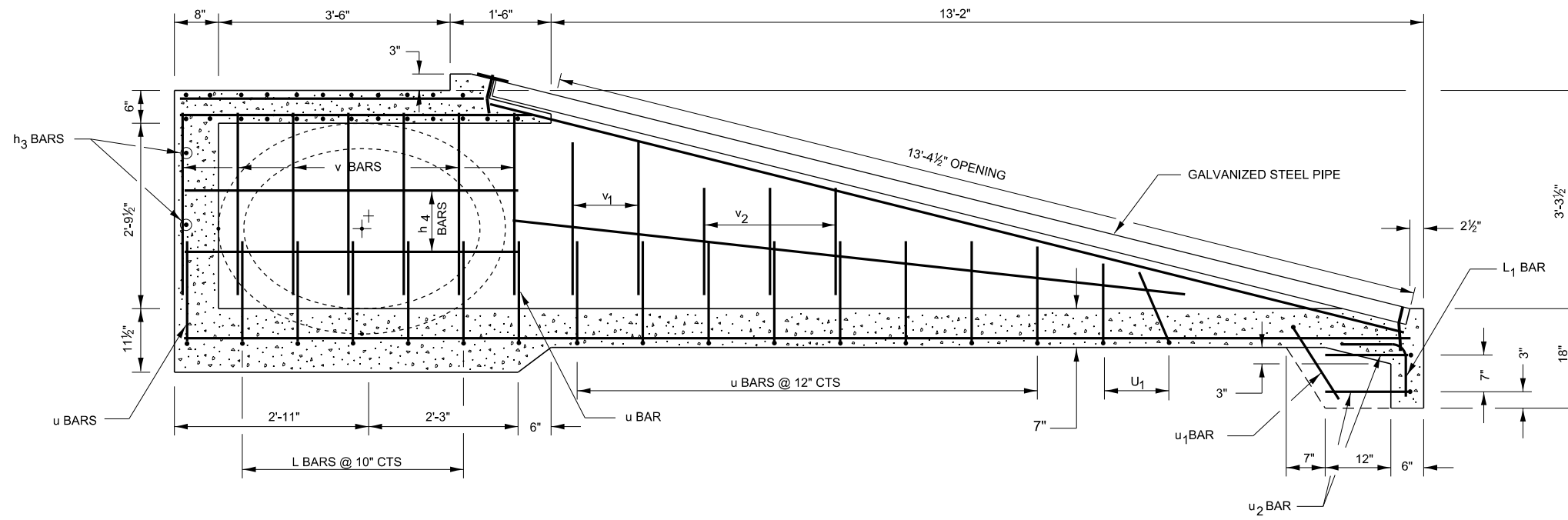
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F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
CONTRACT NO.				
ILLINOIS FED. AID PROJECT				

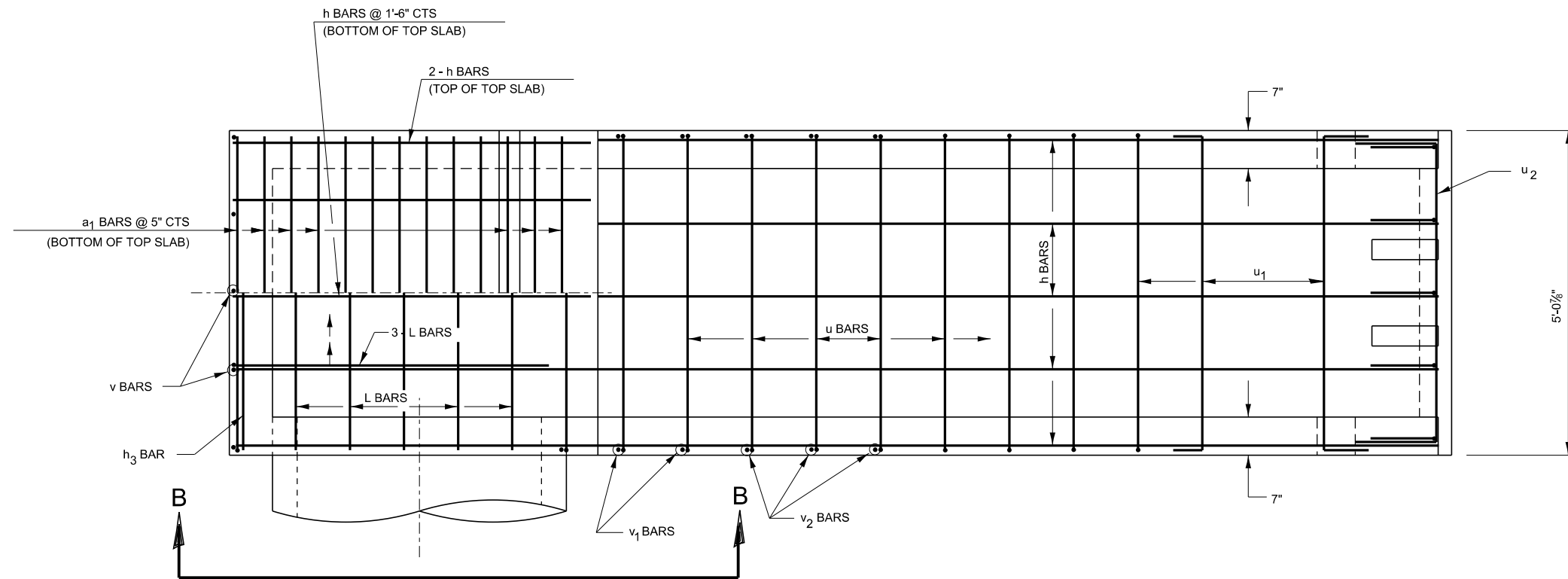
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PLOT SCALE = 100,000 ' / in.	DRAWN -	REVISED -
PLOT DATE = 3/18/2024	CHECKED -	REVISED -
	DATE -	REVISED -



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 3 1/2" OD	2	LENGTH	14'-3"
REINFORCEMENT BARS		LBS	323
CLASS SI CONCRETE		CU YD	4.9

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	DATE -	REVISED -

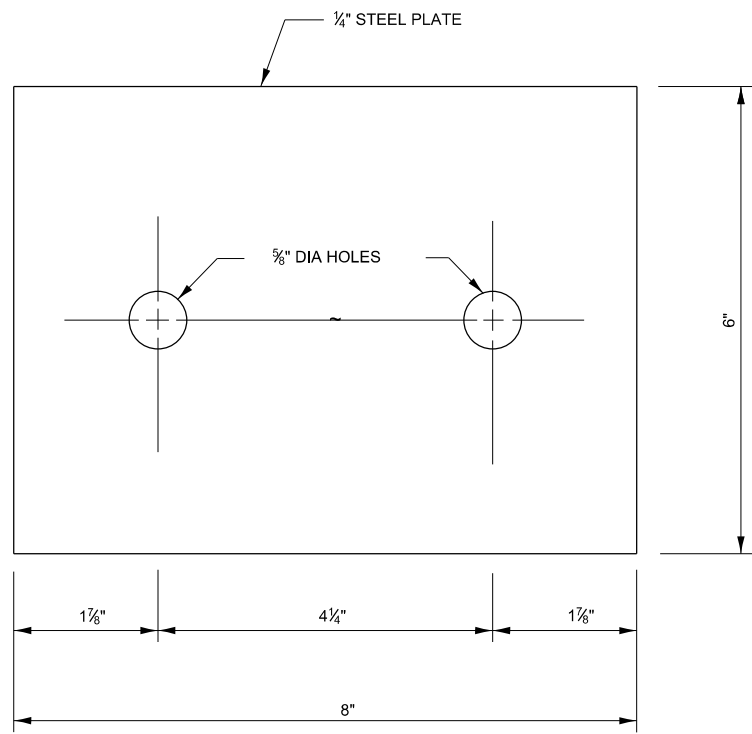
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

INLET BOX, SPECIAL

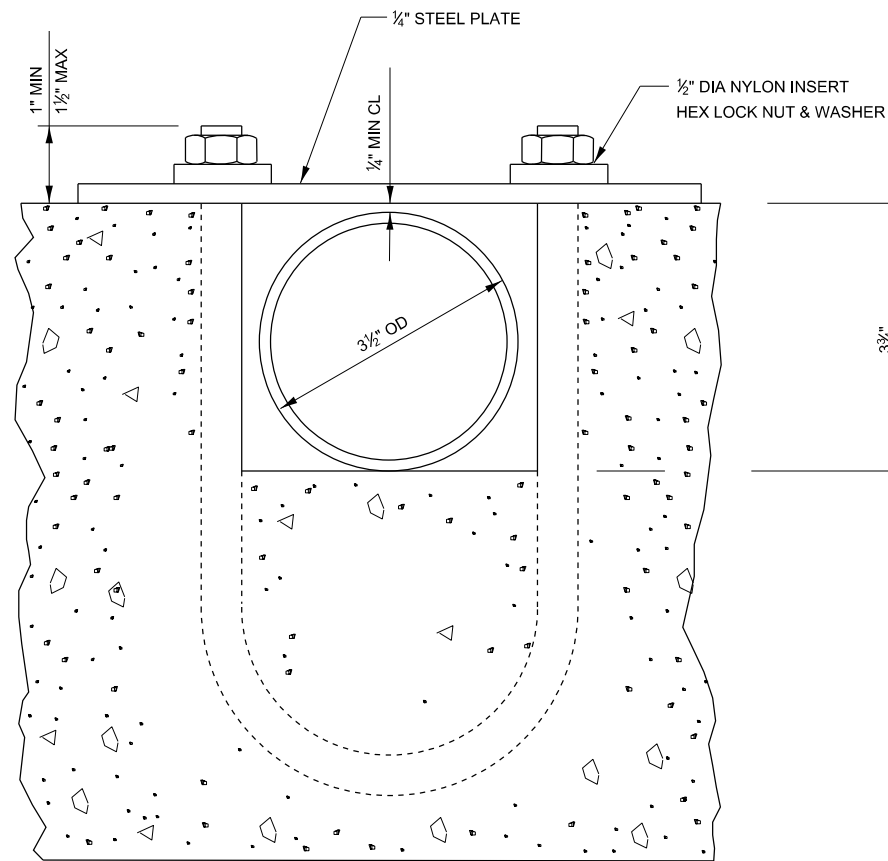
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CONTRACT NO.				
ILLINOIS FED. AID PROJECT				

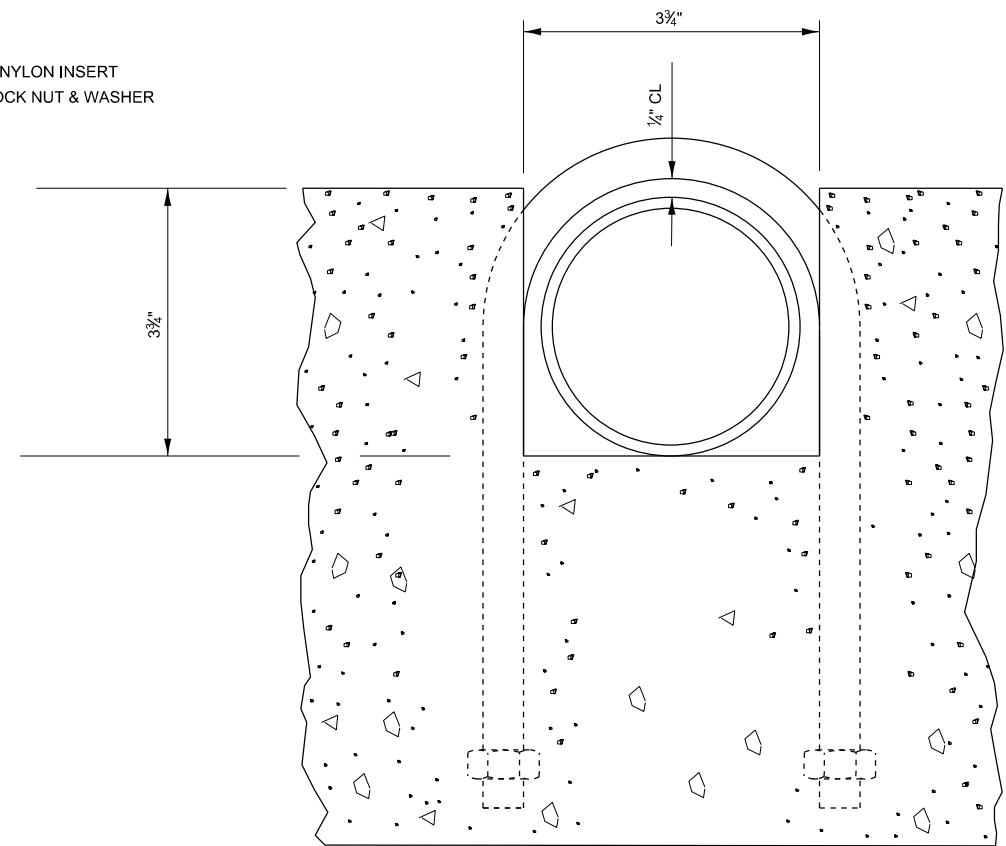
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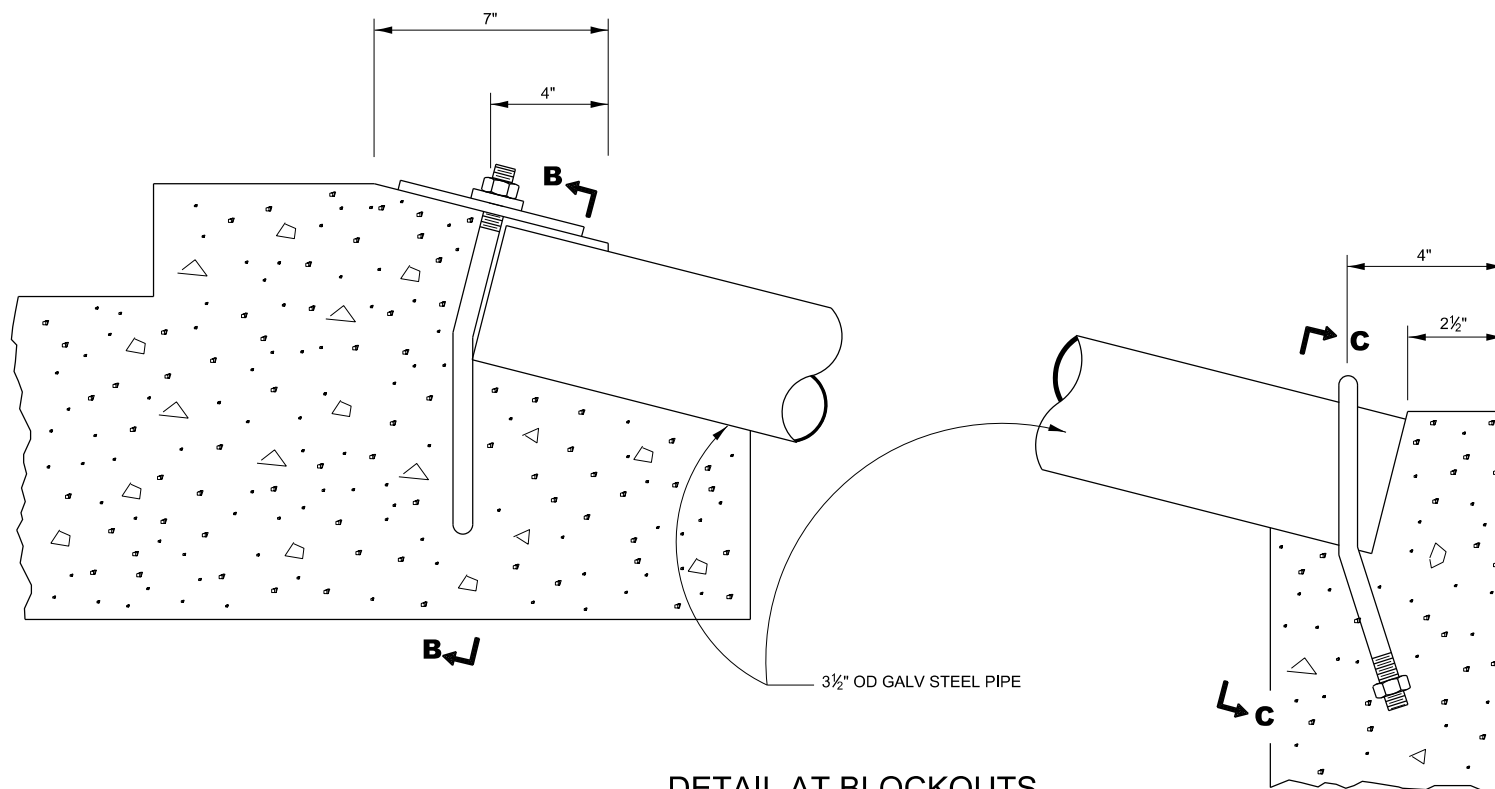
TOP ANCHOR PLATE
(1 - REQUIRED)



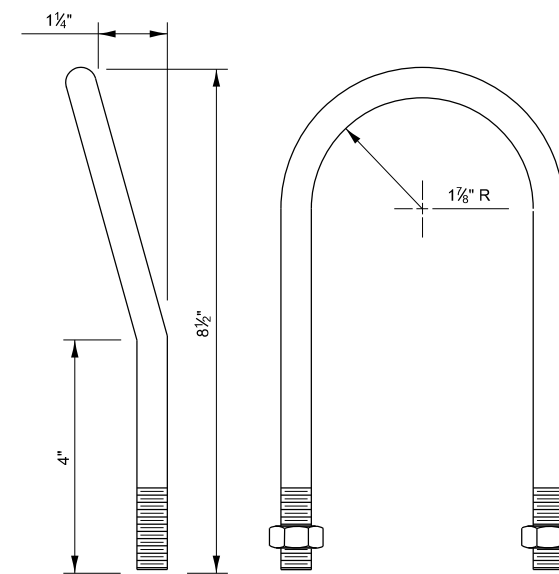
SECTION B-B



SECTION C-C



DETAIL AT BLOCKOUTS



1/2" DIA U BOLT
(2 - REQUIRED)

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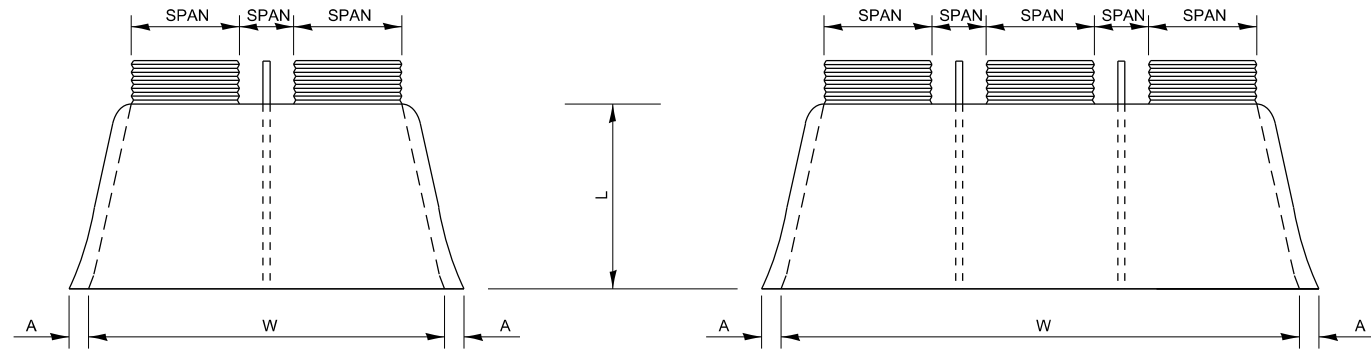
**STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION**

INLET BOX, SPECIAL

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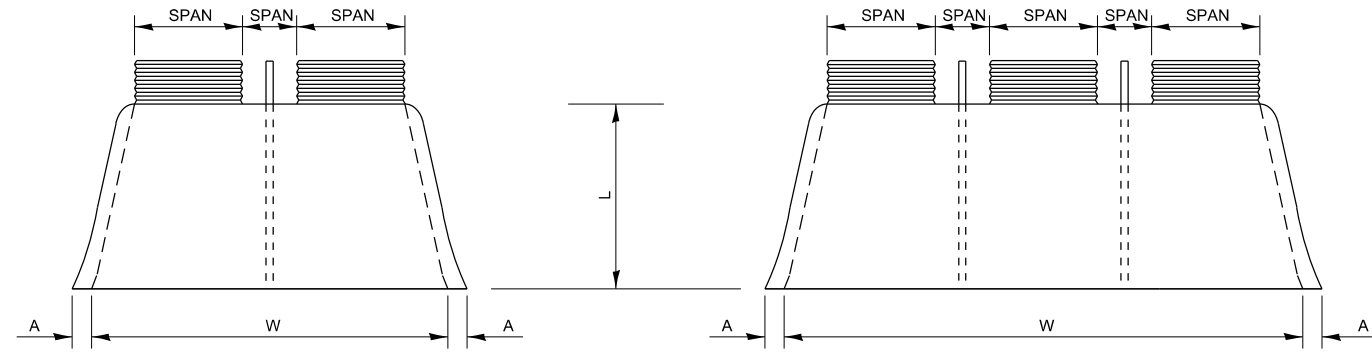
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ILLINOIS FED. AID PROJECT				

542-4C



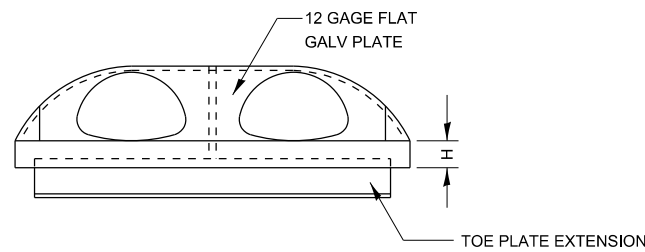
PLAN

PLAN

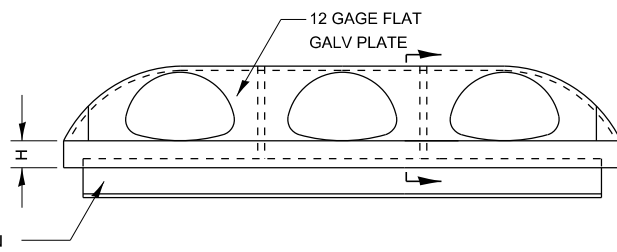


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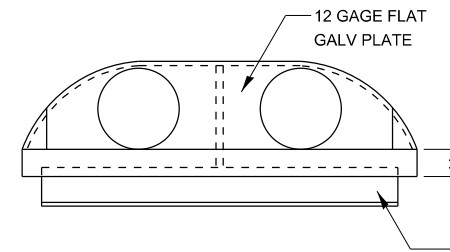
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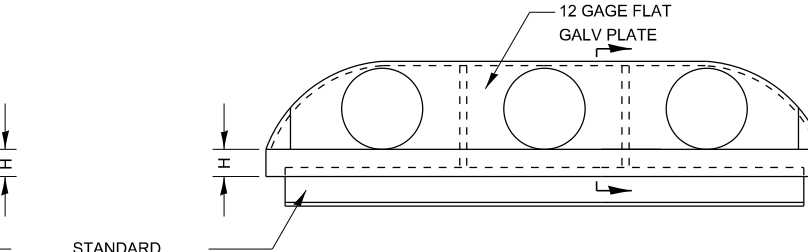
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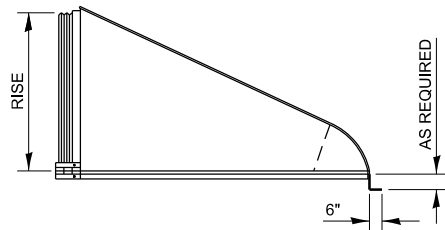
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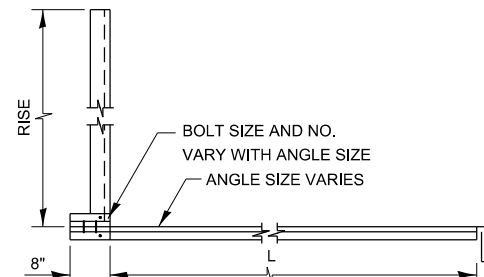
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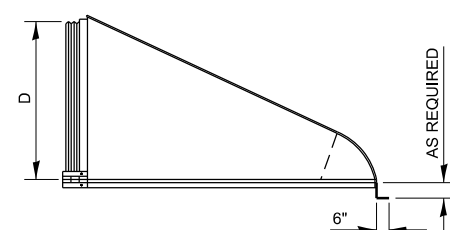
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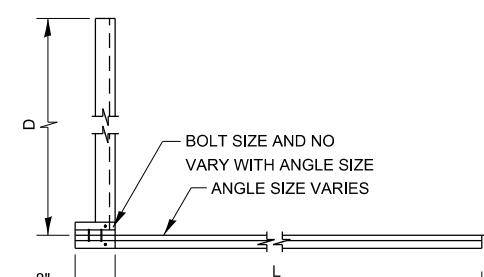
SIDE VIEW



SECTION VIEW



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 1/16
54	12	27	18 1/2	12	84	183	264	6 x 4 x 1/16
60	12/10	30	18	12	88	204	294	6 x 4 x 1/16
66	12/10	33	18	12	87	219	318	6 x 4 x 1/16
72	12/10	36	18	12	88 1/2	228	336	6 x 4 x 1/16
78	12/10	36	18	12	87 1/2	252	366	6 x 4 x 1/16
84	12/10	36	18	12	87 1/2	254	384	6 x 4 x 1/16

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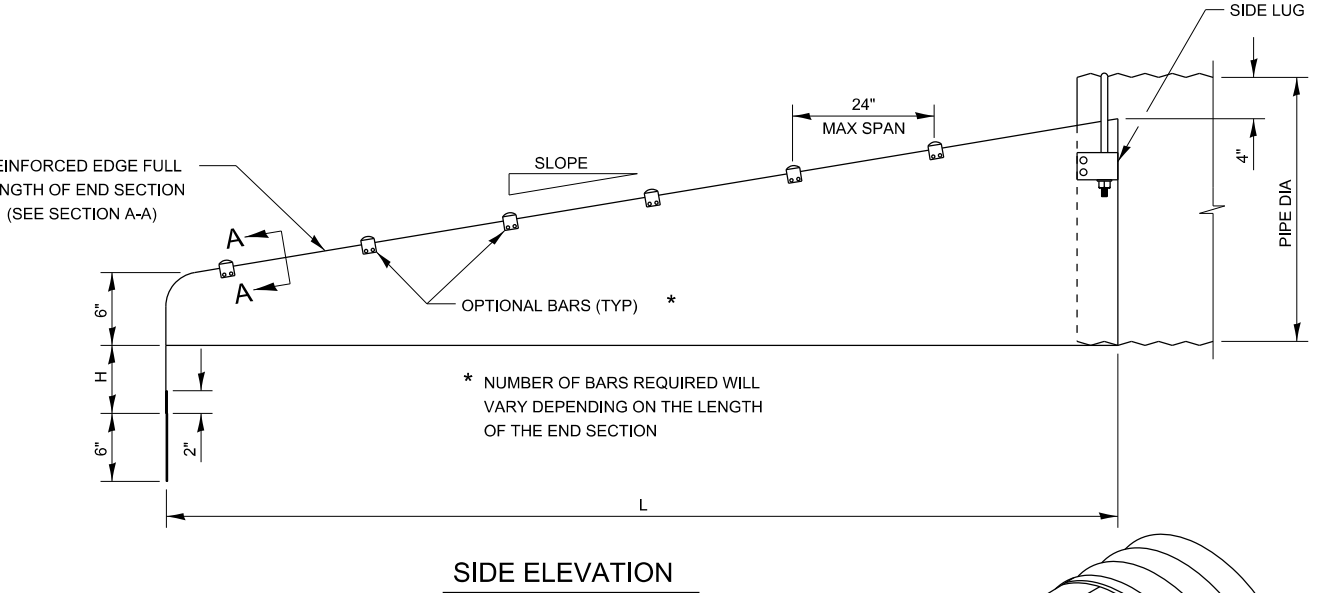
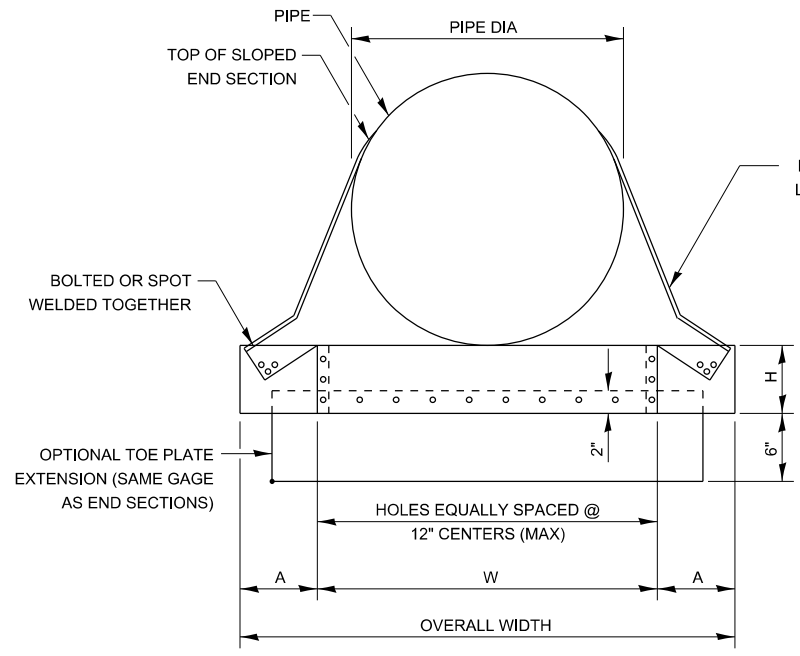
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PLOT SCALE = 100.000 ' / in.	CHECKED -	REVISED -
PLOT DATE = 3/18/2024	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

CORRUGATED STEEL PIPE MULTIPLE END SECTIONS

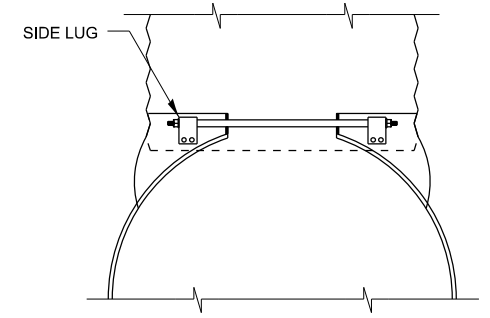
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F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
CONTRACT NO.				
ILLINOIS FED. AID PROJECT				



GENERAL NOTES

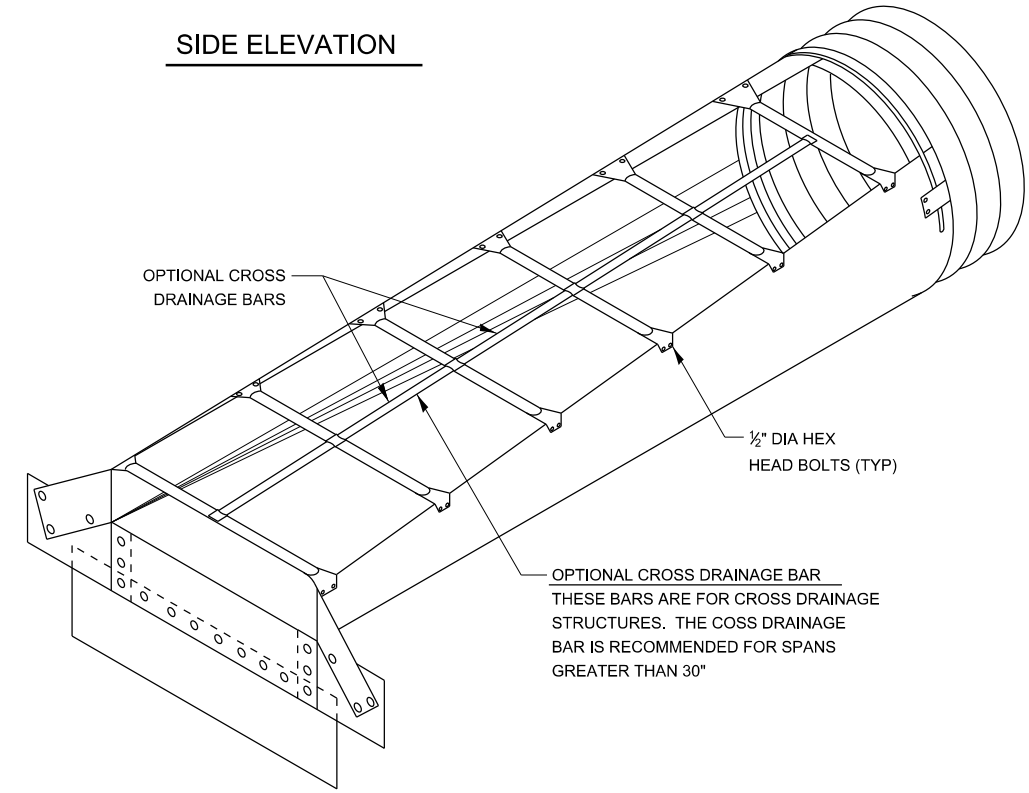
- CONNECTORS - ROUND SIZES THRU 24" ATTACH TO PIPE WITH TYPE #1 STRAPS, ALL OTHER SIZES ATTACH WITH TYPE #2 RODS AND LUGS.
- TOE PLATE EXTENSIONS - WHEN REQUIRED, TOE PLATE EXTENSIONS ARE TO BE THE SAME GAGE AS END SECTIONS. DIMENSIONS SHALL BE OVERALL WIDTH LESS 6 INCHES BY 8 INCHES HIGH.
- OPTIONAL BARS - BARS WHEN SPECIFIED, SHALL BE SCHEDULE 40 GALVANIZED STEEL PIPE.
- TYPICALLY PARALLEL BARS ARE PLACED ON 24" CENTERS.
- TYPICALLY THE CROSS BARS ARE USED ON CROSS DRAIN APPLICATIONS.
- HOLES FOR BAR ATTACHMENTS SHALL BE PROVIDED ON ALL END SECTIONS.
- DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
- 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 #1 CONNECTOR DETAILS THRU 24" GALVANIZED STRAP

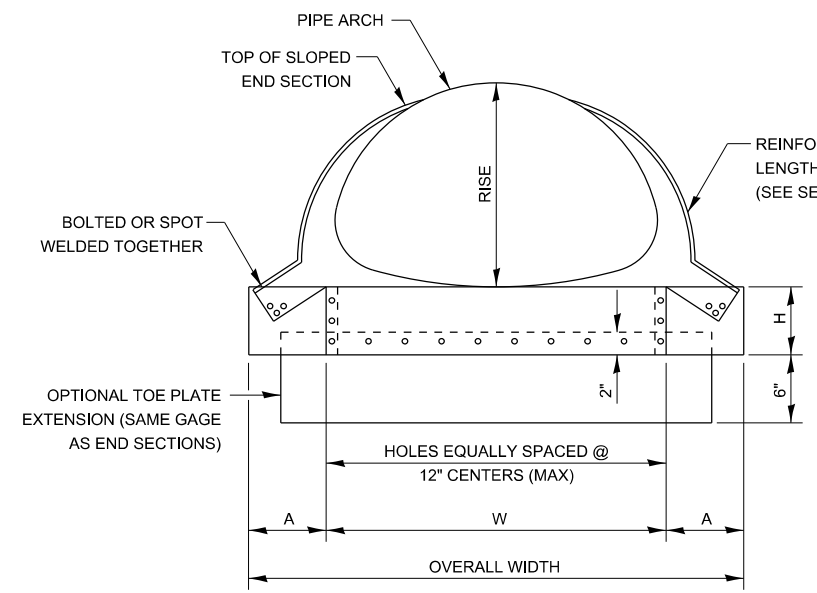
TYPE #2 CONNECTOR DETAILS (SHOWN) FOR 30" AND LARGER 21" x 15" AND LARGER 1/2" THREADED ROD W/FLANGED NUT AND SIDE LUG

TYPE #2 CONNECTOR DETAIL

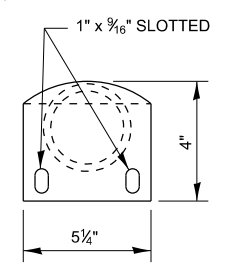


CIRCULAR PIPE ISOMETRIC VIEW

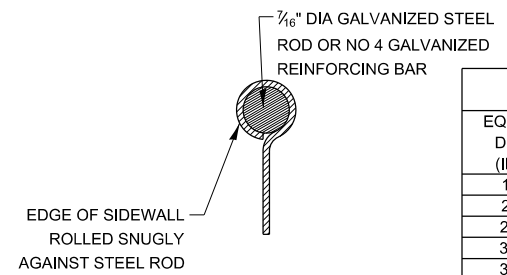
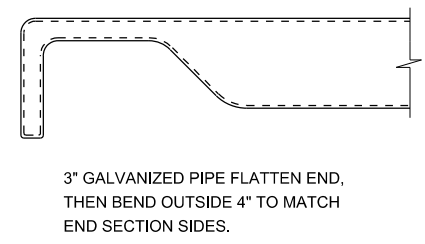
METAL END SECTIONS FOR ROUND PIPE										
PIPE DIA (IN)	MIN THICK IN	GAGE	DIMENSIONS (INCHES)			L DIMENSIONS				
			A	H	W	OVERALL WIDTH	SLOPE	LENGTH (IN)	SLOPE	LENGTH (IN)
15	.064	16	8	6	21	37	6:1	30	4:1	20
18	.064	16	8	6	24	40	6:1	48	4:1	32
21	.064	16	8	6	27	43	6:1	66	4:1	44
24	.064	16	8	6	30	46	6:1	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



FRONT VIEW PIPE ARCH



DETAIL OF OPTIONAL BARS



SECTION A-A

METAL END SECTIONS FOR PIPE ARCH												
EQUIV DIA (IN)	(INCHES)		MIN THICK IN	GAGE	DIMENSIONS (INCHES)			L DIMENSIONS				
	SPAN	RISE			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

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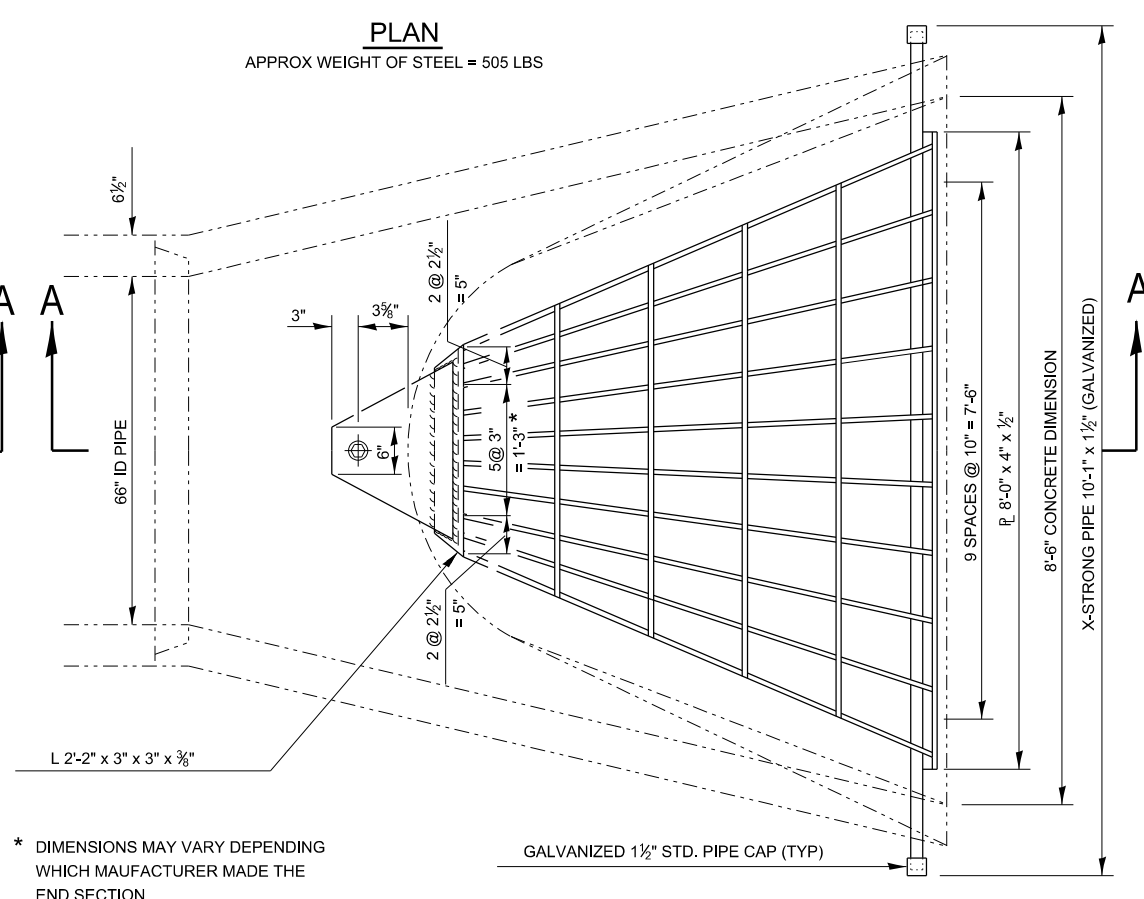
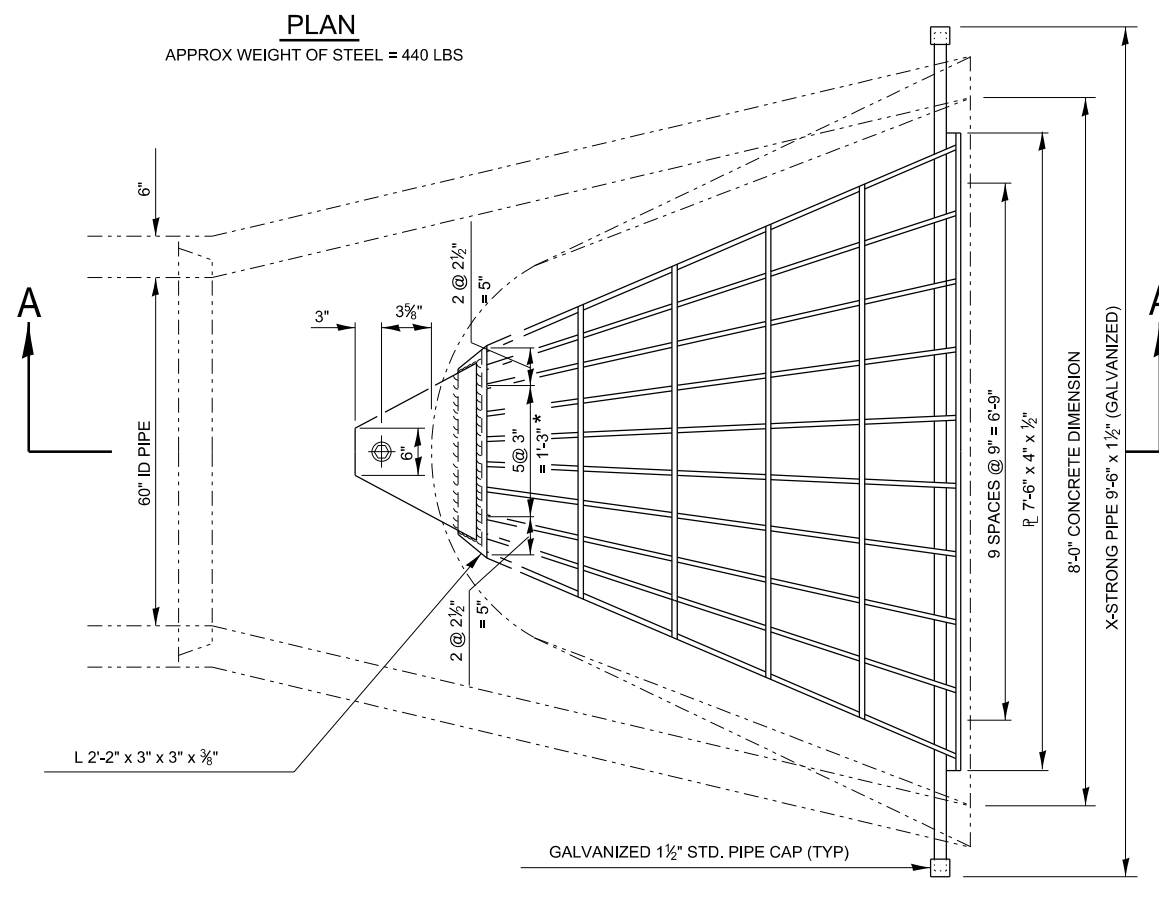
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PLOT DATE = 3/18/2024	DATE -	REVISED -

**STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION**

SLOPED METAL END SECTIONS WITH GRATE

SCALE: SHEET OF SHEETS STA. TO STA.

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



GENERAL NOTES

GRATING DETAILS SHOWN ARE INTENDED FOR USE WITH PARTICULAR SIZES OF PRECAST REINFORCED CONCRETE FLARED END SECTIONS AS SHOWN ON STANDARD 542001 & 542011.

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.

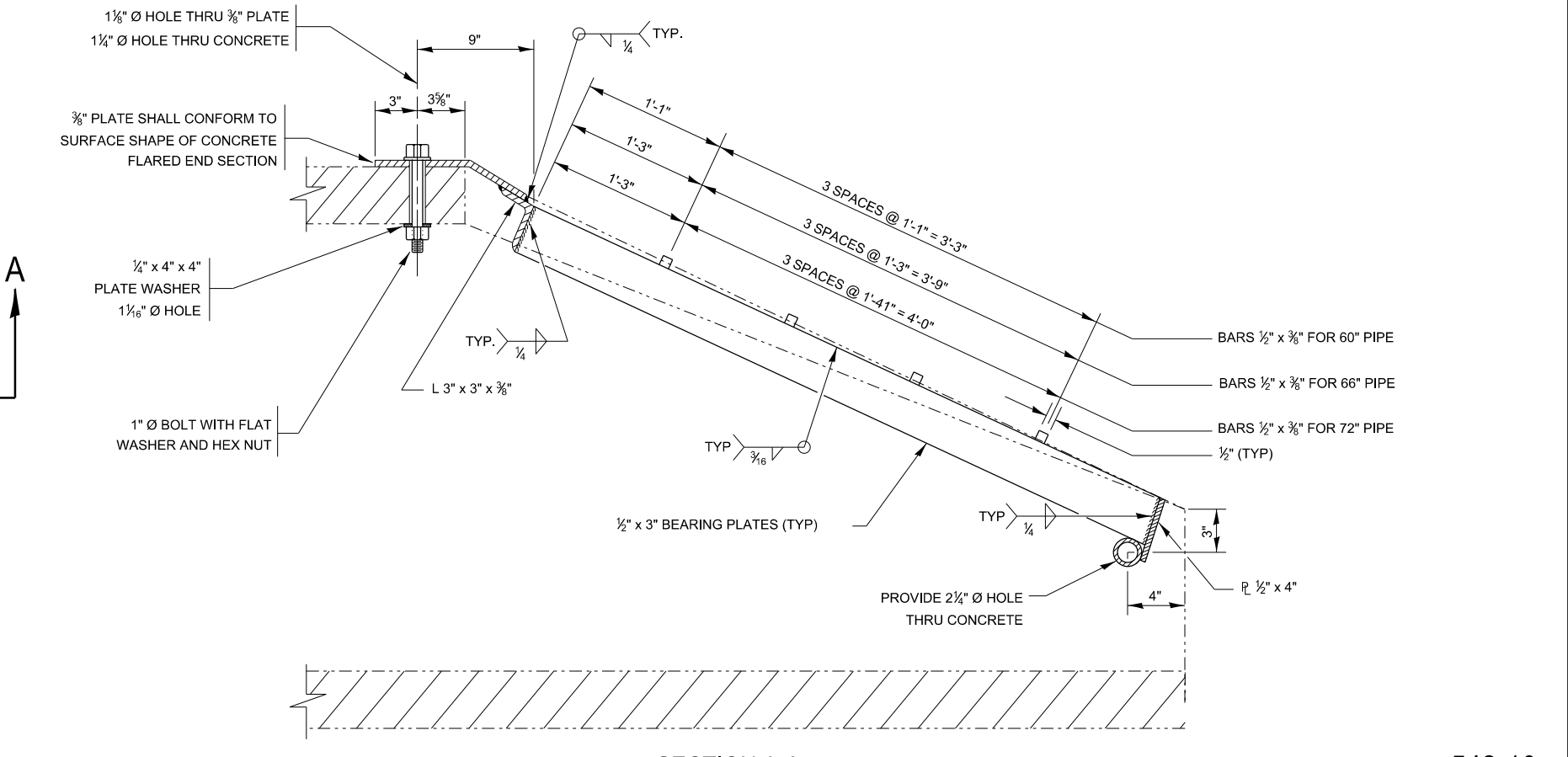
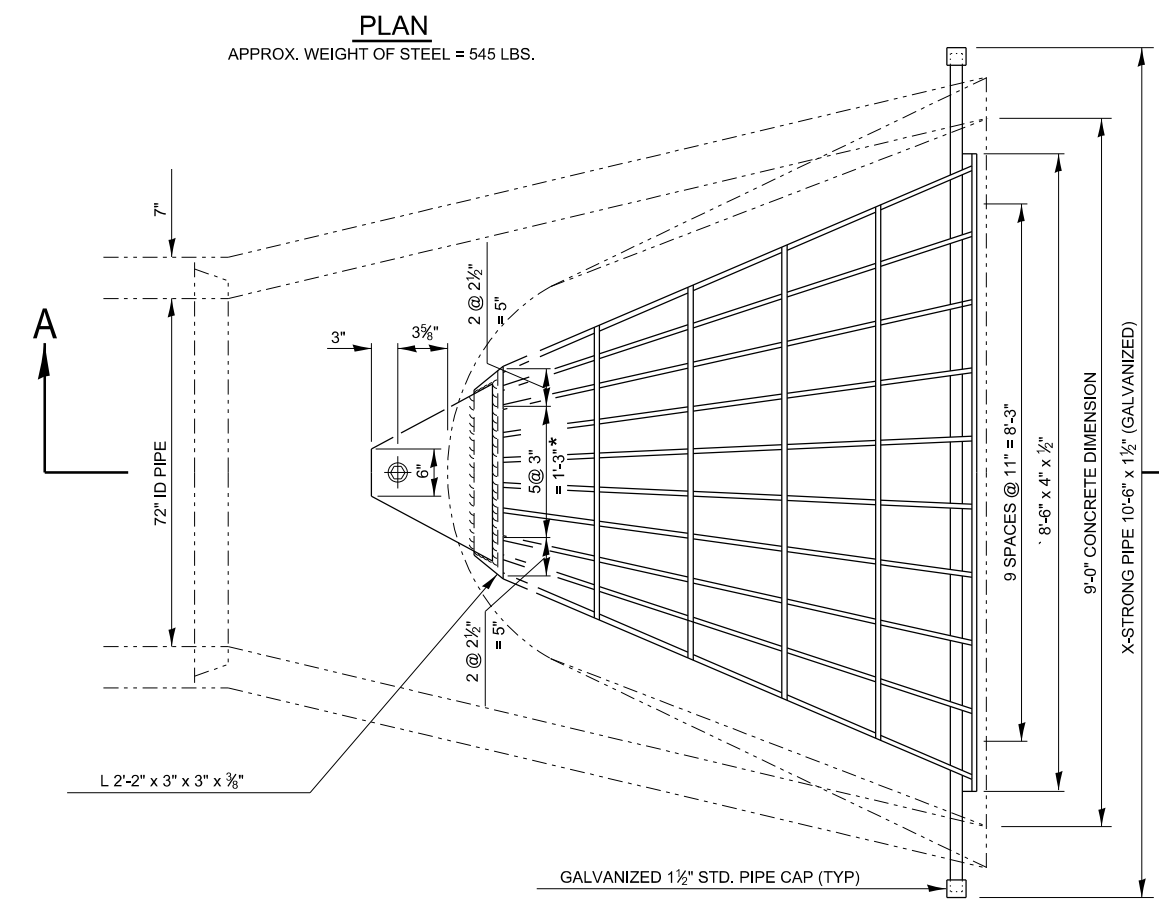
BOLTS, NUTS AND WASHERS SHALL BE IN ACCORDANCE WITH ARTICLE 1006.08 OF THE STANDARD SPECIFICATIONS.

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.



* DIMENSIONS MAY VARY DEPENDING WHICH MANUFACTURER MADE THE END SECTION

MODEL det 3 dets1b
FILE Name: p:\illinois\paw_bentley.com\PI\DOT\Documents\DOT Office\District 3\Standards - District 3\DETAILS\SUBJECT 3 STANDARD DETAILS - DGN\542001-599 STRUCTURES.dgn

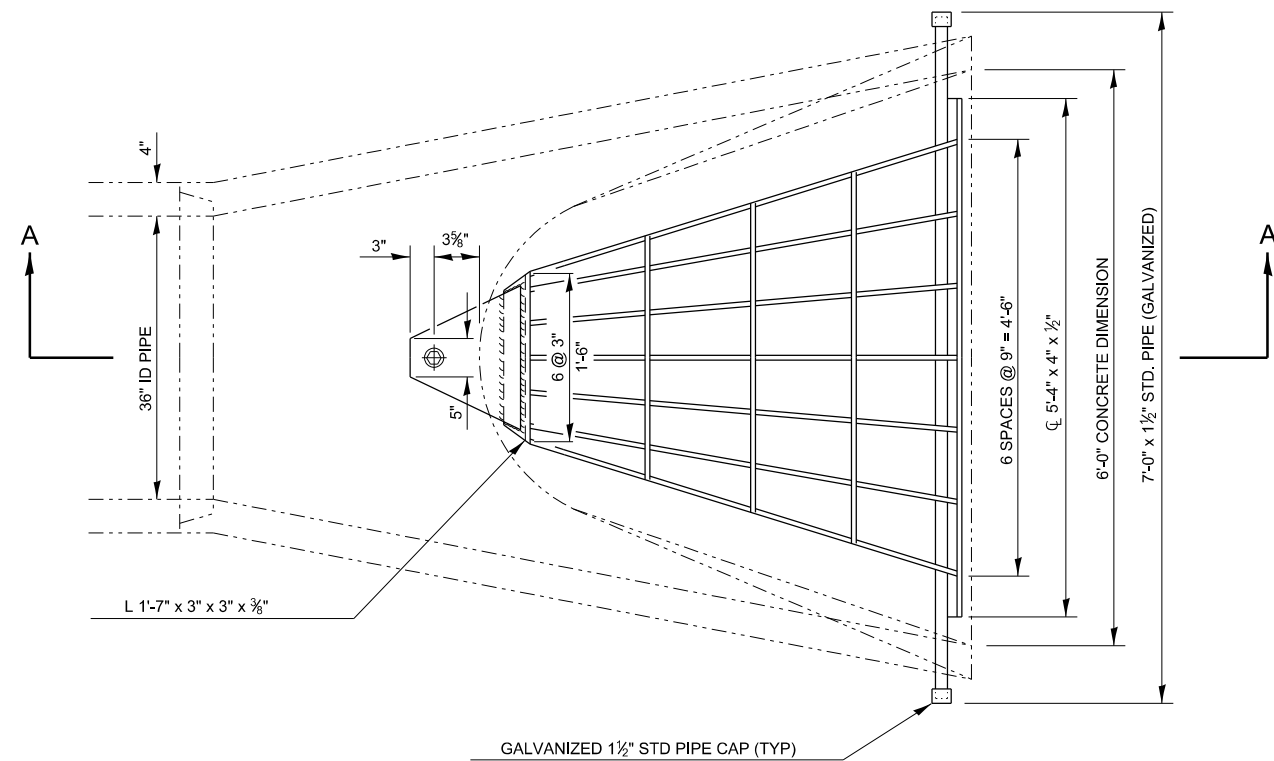
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PLOT SCALE = 100,000 ' / in.	DRAWN -	REVISED -
PLOT DATE = 3/18/2024	CHECKED -	REVISED -
	DATE -	REVISED -

**STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION**

**GRATING FOR CONCRETE FLARED END SECTIONS
(FOR 60", 66" & 72" PIPE)**

SCALE: SHEET OF SHEETS STA. TO STA.

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



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.

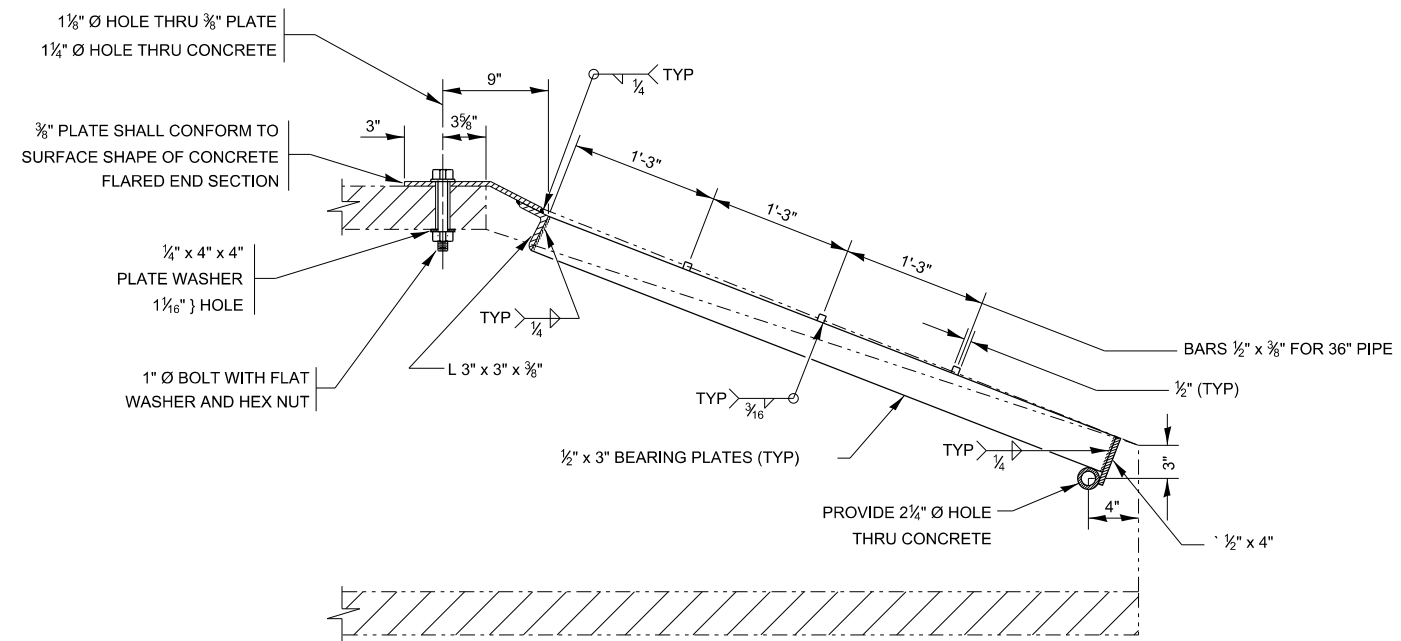
BOLTS, NUTS AND WASHERS SHALL BE IN ACCORDANCE WITH ARTICLE 1006.08 OF THE STANDARD SPECIFICATIONS.

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

542-11

MODEL: det 3 dets11b
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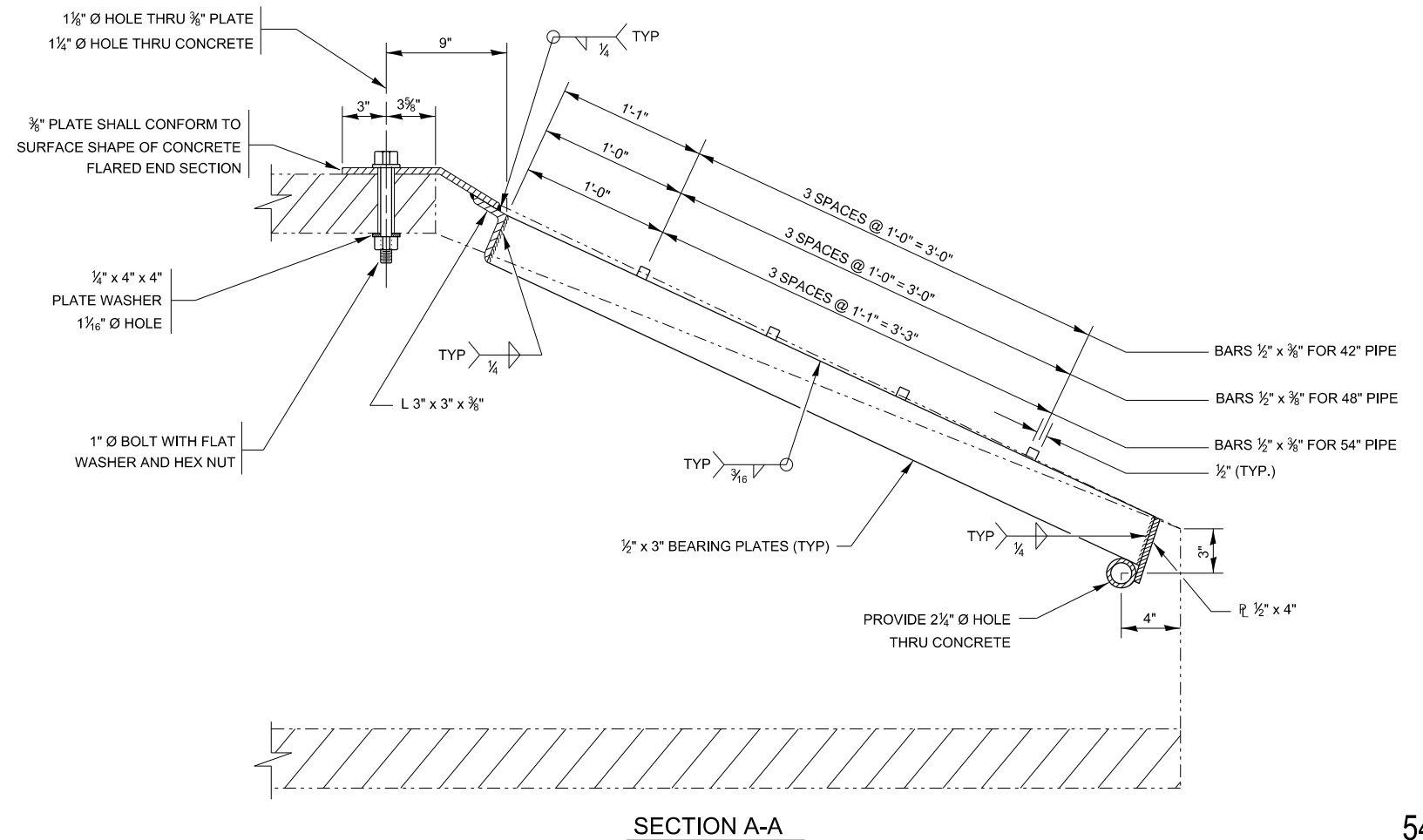
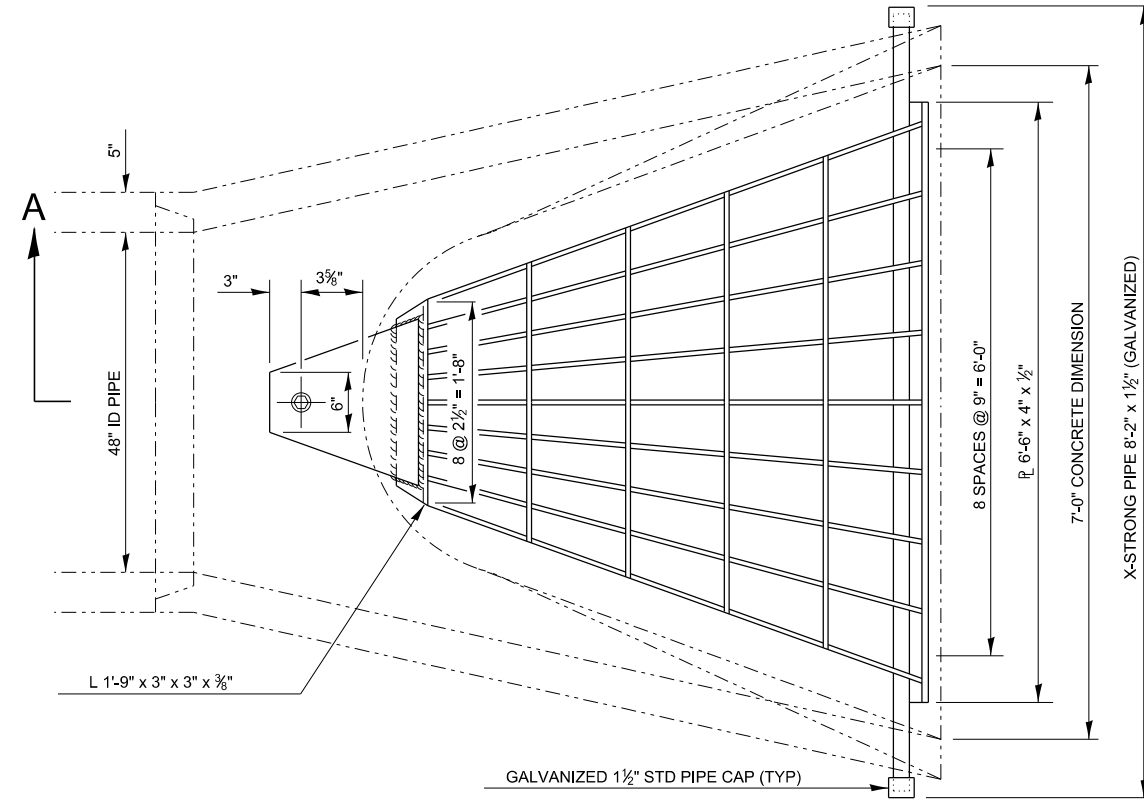
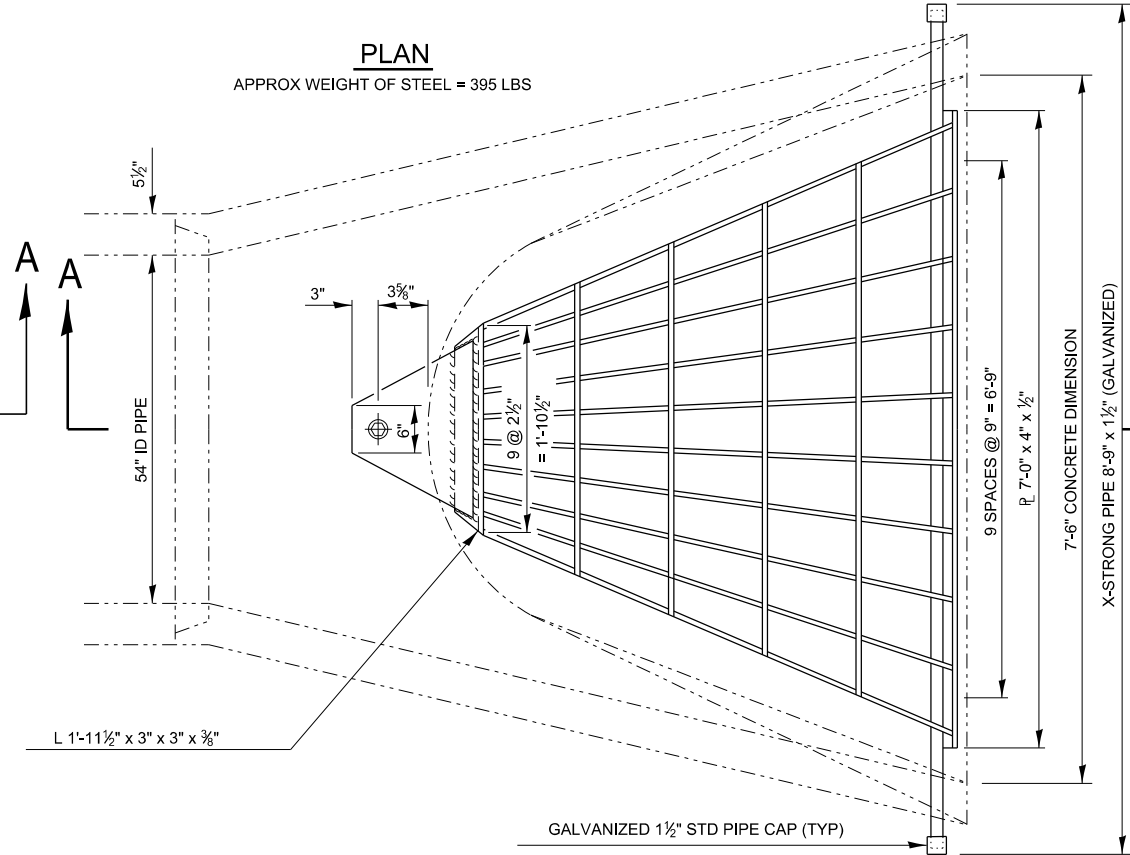
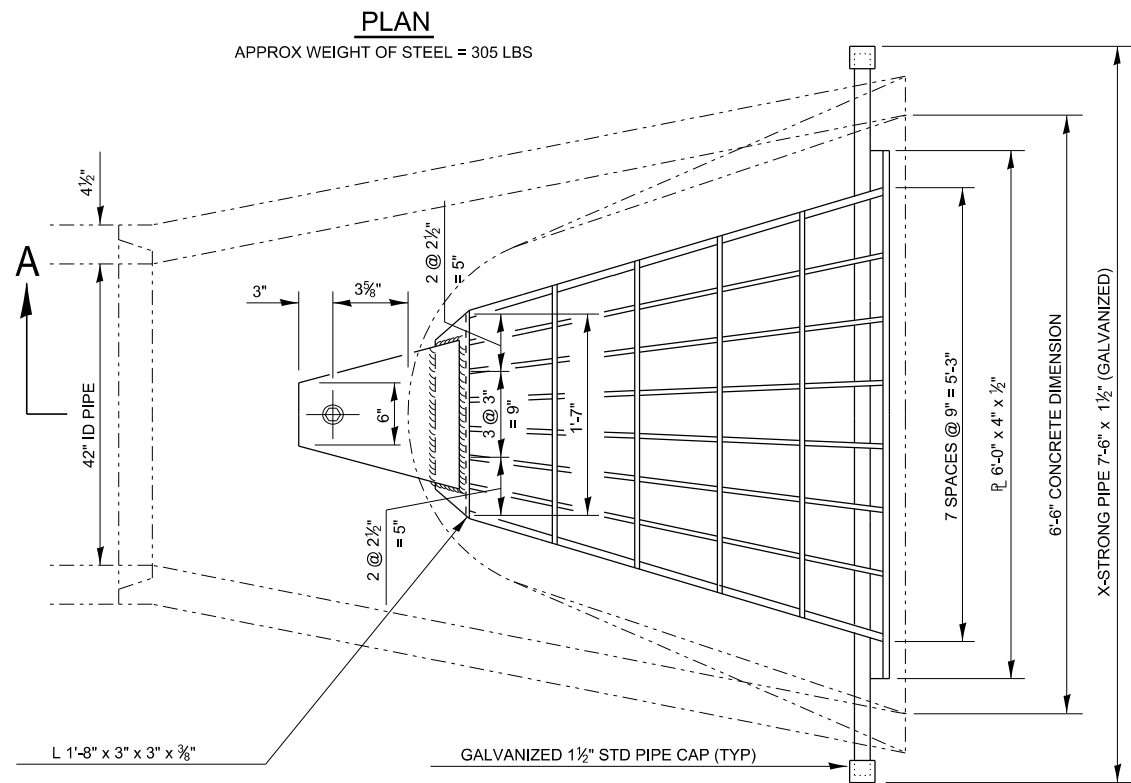
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PLOT SCALE = 100,000 ' / in.	DRAWN -	REVISED -
PLOT DATE = 3/18/2024	CHECKED -	REVISED -
	DATE -	REVISED -

**STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION**

**GRATING FOR HORIZONTAL ELLIPTICAL CONCRETE
FLARED END SECTION (FOR EQUIV. ROUND SIZE 36" PIPE)**

SCALE: SHEET OF SHEETS STA. TO STA.

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



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.

MODEL: det 3 details
FILE: \\paw.bentley.com\PWDOT\Documents\DOT Office\District 3Standards - District 3\DETAILS\DISTRICT 3 STANDARD DETAILS_DGN\500-599 STRUCTURES.dgn

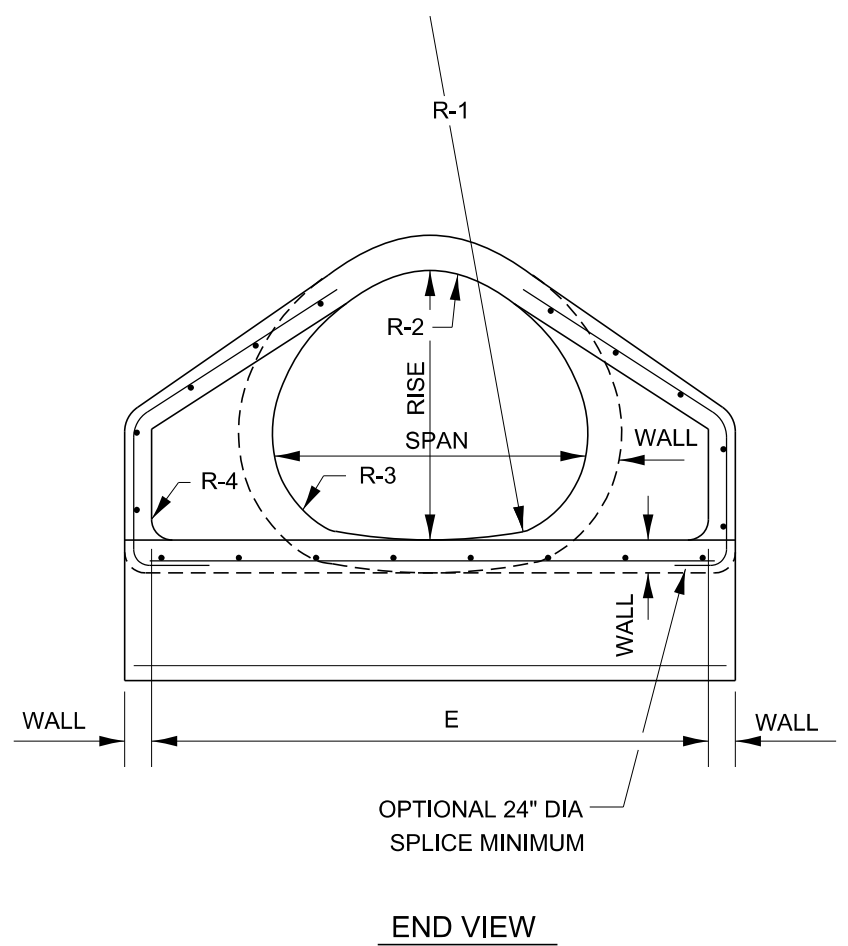
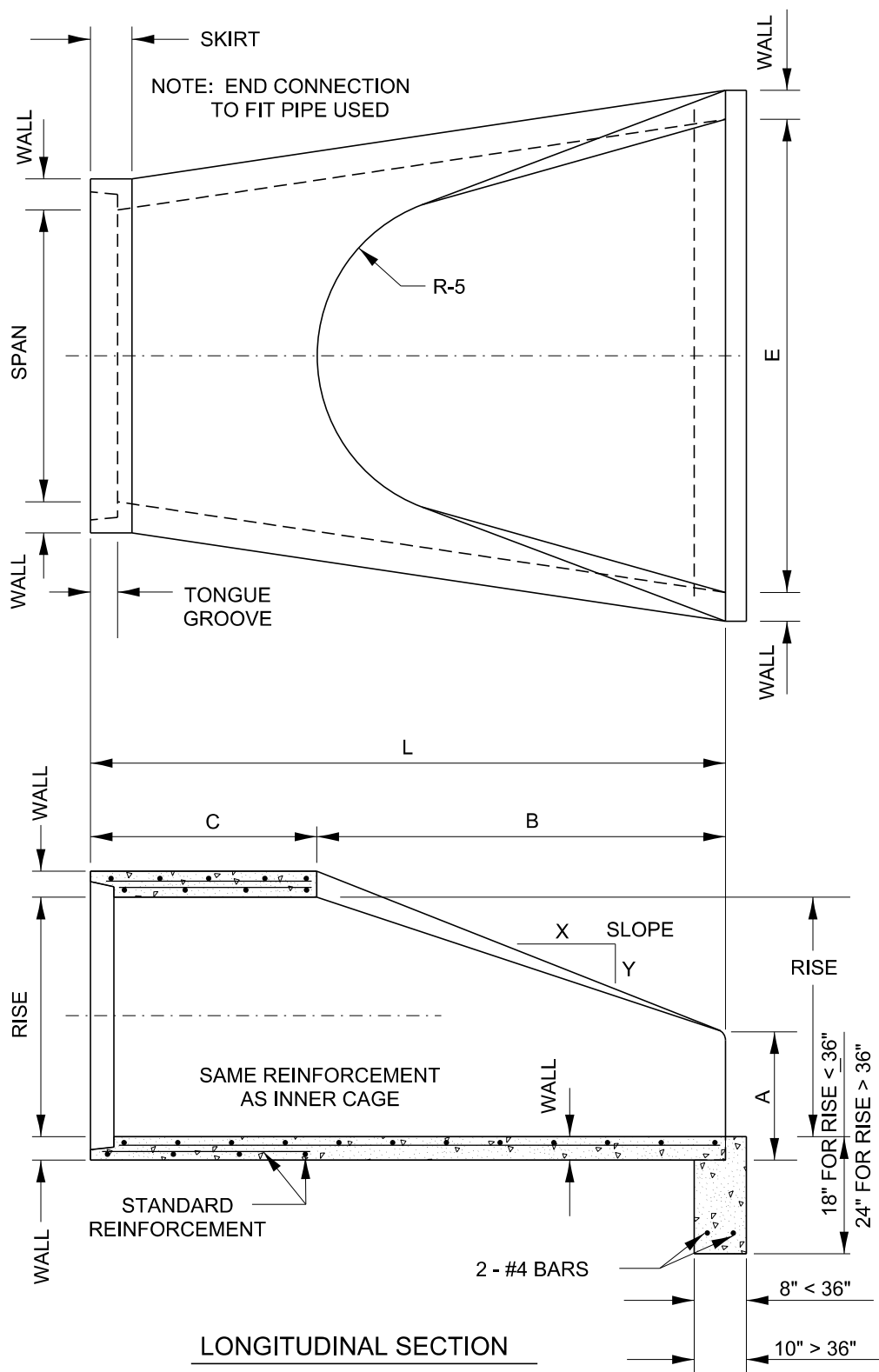
STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

GRATING FOR HORIZONTAL ELLIPTICAL CONCRETE FLARED END SECTION (FOR EQUIV. ROUND SIZE 42", 48" & 54" PIPE)

SCALE: SHEET OF SHEETS STA. TO STA.

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

SIZE	WALL	SPAN	RISE	L	B	C	E	A	SLOPE	R-1	R-2	R-3	R-4	R-5
18"	2½"	22"	13½"	72"	27"	45"	36"	7"	2.16:1	27½"	13¾"	5¼"	2"	12"
24"	3"	28½"	18"	72"	39"	33"	48"	8"	2.29:1	40¼"	14⅞"	4⅞"	3"	14"
30"	3½"	36¼"	22½"	72"	48"	24"	60"	10"	2.34:1	51"	18¾"	6⅞"	3"	15"
36"	4"	43¾"	26⅝"	96"	60"	36"	72"	10⅝"	2.4:1	62"	22½"	6½"	6"	20"
42"	4½"	51⅞"	31⅝"	96"	60"	36"	78"	15⅜"	2.35:1	73"	26¼"	7¾"	6"	22"
48"	5"	58½"	36"	96"	60"	36"	84"	21"	2.31:1	84"	30"	8⅞"	6"	22"
54"	5½"	65"	40"	96"	60"	36"	90"	25½"	2.26:1	92½"	33⅜"	10"	6"	24"
60"	6"	73"	45"	96"	75"	21"	96"	26"	2.34:1	105"	37½"	11¼"	6"	21"
72"	7"	88"	54"	100"	78"	22"	120"	35"	2.29:1	126"	45"	13⅝"	6"	24"



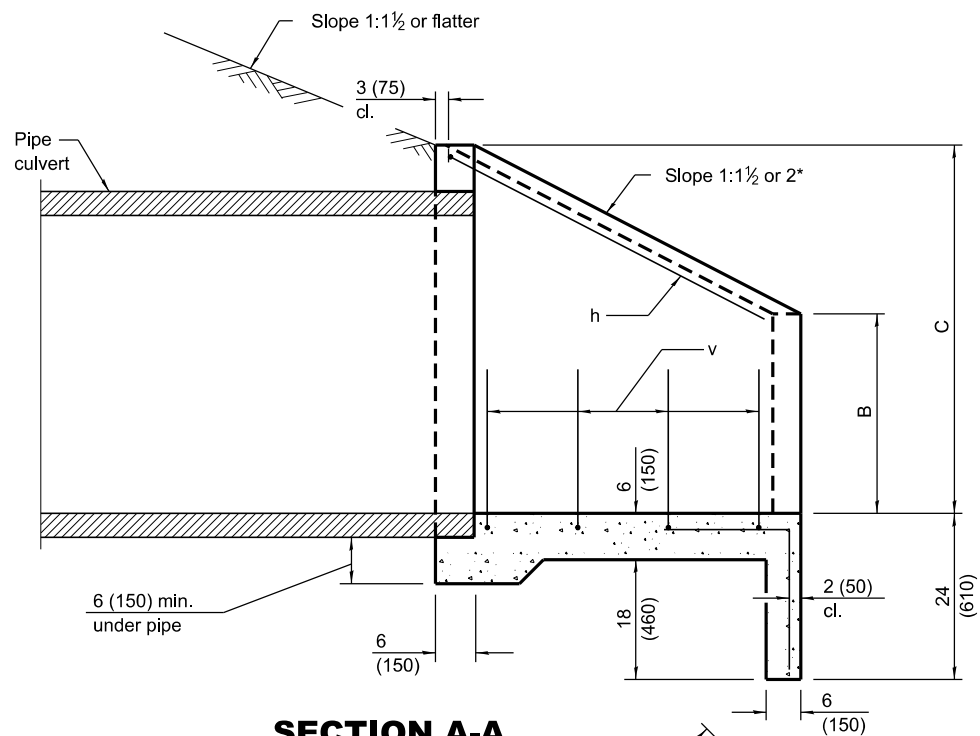
NOTES:

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.

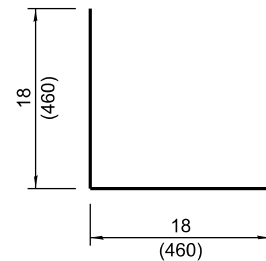
PRECAST REINFORCED CONCRETE ARCH DIAMETER FLARED END SECTION



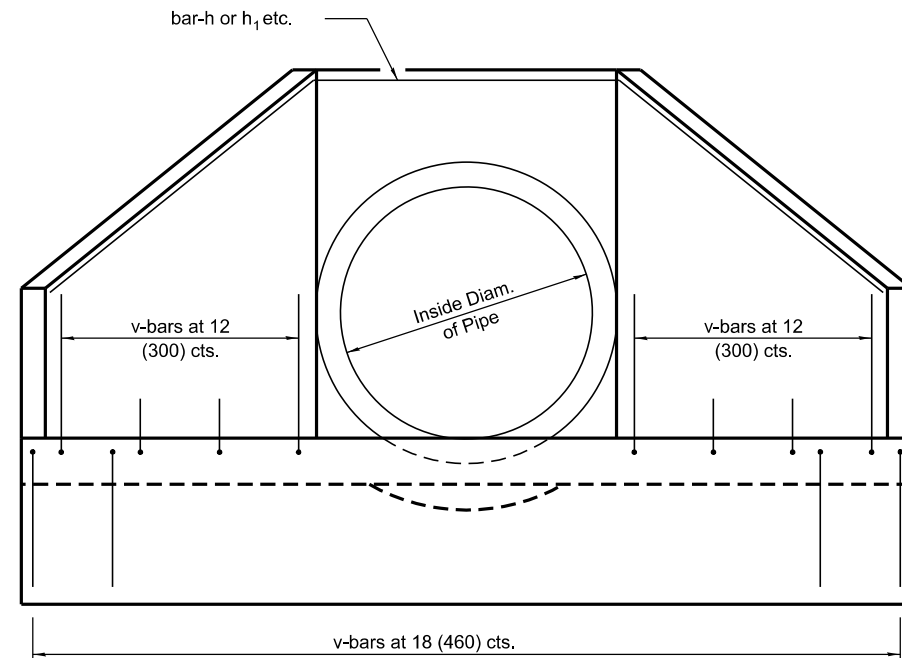
SECTION A-A

DIMENSIONS OF BARS-h to h₉

Bar	a	b
h	22 (560)	29 1/2 (750)
h ₁	22 (560)	38 1/2 (980)
h ₂	25 (640)	29 1/2 (750)
h ₃	25 (640)	38 1/2 (980)
h ₄	33 (840)	39 (990)
h ₅	33 (840)	4'-1 1/2" (1.26 m)
h ₆	39 (990)	3'-10 1/2" (1.18 m)
h ₇	39 (990)	4'-10 1/2" (1.50 m)
h ₈	3'-11" (1.19 m)	4'-8" (1.42 m)
h ₉	3'-11" (1.19 m)	5'-9 1/2" (1.77 m)



BAR v

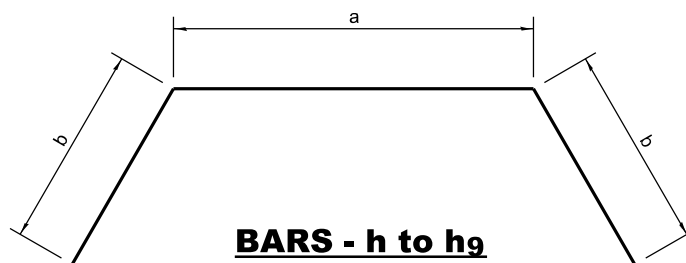


END VIEW

DIMENSIONS AND QUANTITIES

Design No.	Nominal Inside Dia. of Pipe	Slope of Wing Walls	Dimensions						Concrete 2 End Secs. cu. yds. (m ³)	Reinforcement Bars - No. 4 (No. 13)			
			A	B	C	D	E	F		h-Bars		Total Wt. 2 End Secs. lbs. (kg)	
										Bar	Length		
D15-1 1/2 (D375-1 1/2)	15 (375)	1:1 1/2	19 (485)	10 (260)	23 (590)	24 (610)	5'-5 1/2" (1.67 m)	29 1/2 (750)	0.9 (0.7)	h	6'-9" (2.06 m)	16	40 (18.1)
D15-2 (D375-2)	15 (375)	1:2	26 (660)	10 (260)	23 (590)	24 (610)	6'-7 1/2" (2.02 m)	3'-3 1/4" (1 m)	1.2 (0.9)	h ₁	8'-3" (2.52 m)	22	60 (27.2)
D18-1 1/2 (D450-1 1/2)	18 (450)	1:1 1/2	19 (485)	13 (330)	26 (660)	27 (690)	5'-8 1/2" (1.75 m)	29 1/2 (750)	1.3 (1.0)	h ₂	7'-0" (2.14 m)	16	40 (18.1)
D18-2 (D450-2)	18 (450)	1:2	26 (660)	13 (330)	26 (660)	27 (690)	6'-10 1/2" (2.11 m)	3'-3 1/4" (1 m)	1.3 (1.0)	h ₃	8'-6" (2.6 m)	22	60 (27.2)
D24-1 1/2 (D600-1 1/2)	24 (600)	1:1 1/2	25 (640)	16 (410)	33 (840)	35 (890)	7'-4 1/2" (2.26 m)	38 (970)	1.5 (1.1)	h ₄	9'-3" (2.82 m)	22	60 (27.2)
D24-2 (D600-2)	24 (600)	1:2	34 (865)	16 (410)	33 (840)	35 (890)	8'-10 1/2" (2.72 m)	4'-2 1/2" (1.29 m)	2.0 (1.5)	h ₅	11'-0" (3.24 m)	28	70 (31.8)
D30-1 1/2 (D750-1 1/2)	30 (750)	1:1 1/2	30 (770)	19 (480)	39 (990)	3'-5" (1.05 m)	8'-8 1/2" (2.68 m)	3'-9" (1.15 m)	2.0 (1.5)	h ₆	11'-0" (3.39 m)	28	70 (31.8)
D30-2 (D750-2)	30 (750)	1:2	3'-4" (1.01 m)	19 (480)	39 (990)	3'-5" (1.05 m)	10'-4 1/2" (3.17 m)	4'-11" (1.5 m)	2.6 (2.0)	h ₇	13'-0" (3.99 m)	34	80 (36.3)
D36-1 1/2 (D900-1 1/2)	36 (900)	1:1 1/2	36 (915)	22 (560)	3'-10" (1.17 m)	4'-1" (1.25 m)	10'-4 1/2" (3.17 m)	4'-5 1/2" (1.36 m)	2.6 (2.0)	h ₈	13'-3" (4.03 m)	30	80 (36.3)
D36-2 (D900-2)	36 (900)	1:2	4'-0" (1.22 m)	22 (560)	3'-10" (1.17 m)	4'-1" (1.25 m)	12'-4 1/2" (3.78 m)	5'-10 1/2" (1.79 m)	3.5 (2.7)	h ₉	15'-6" (4.73 m)	40	100 (45.4)

* If embankment slope above headwall is flatter than 1:2, provide wings for 1:2 slope.



BARS - h to h₉

Bend in field one required in each headwall

GENERAL NOTES

All slope ratios are expressed as units of vertical displacement to units of horizontal displacement (V:H).

All dimensions are in inches (millimeters) unless otherwise shown.

MODEL: det 3 details
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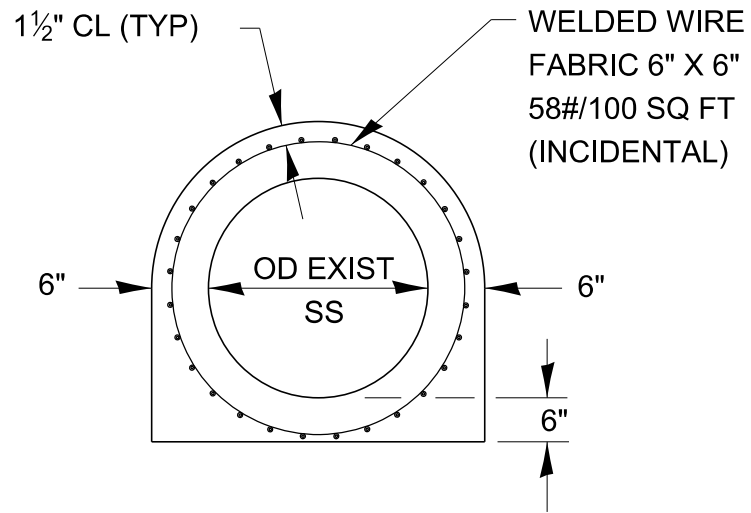
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	DRAWN -	REVISED -
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PLOT DATE = 3/25/2024	DATE -	REVISED -

STATE OF ILLINOIS
DEPARTMENT OF TRANSPORTATION

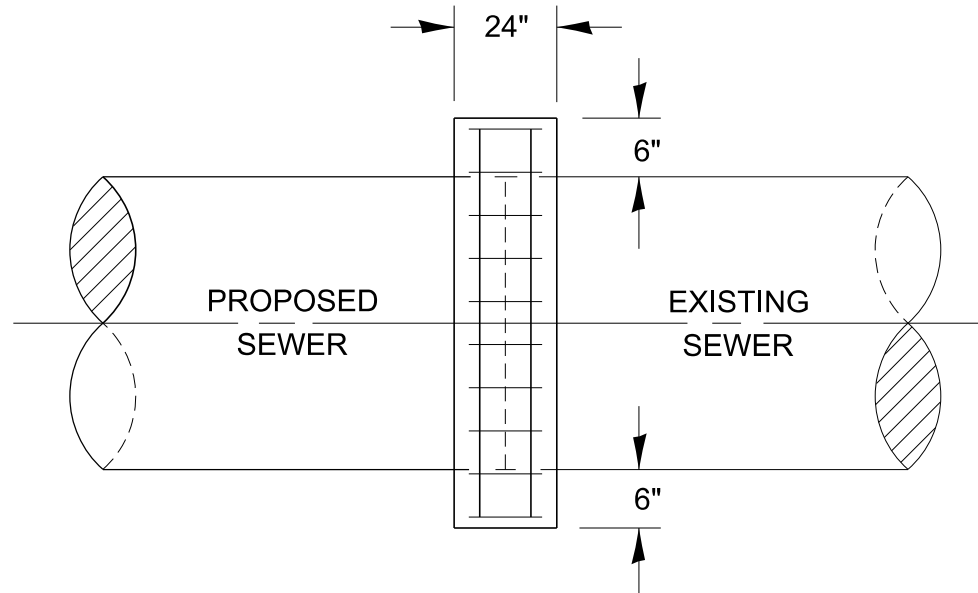
REINFORCED CONCRETE END SECTIONS FOR PIPE CULVERTS
15" (375 mm) THRU 36" (900 mm) DIA. AT RIGHT ANGLES WITH ROADWAY

SCALE: SHEET OF SHEETS STA. TO STA.

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



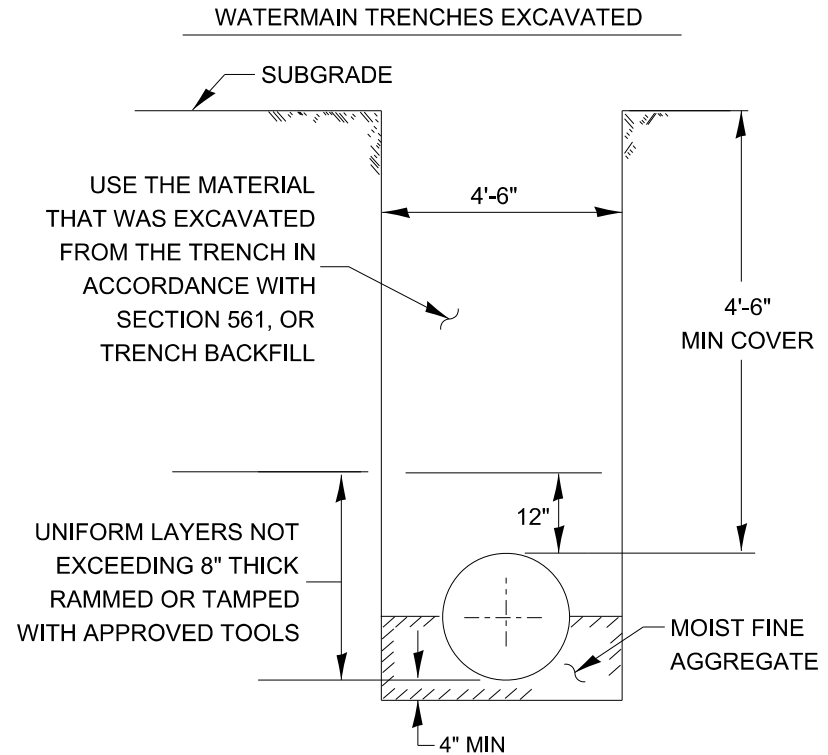
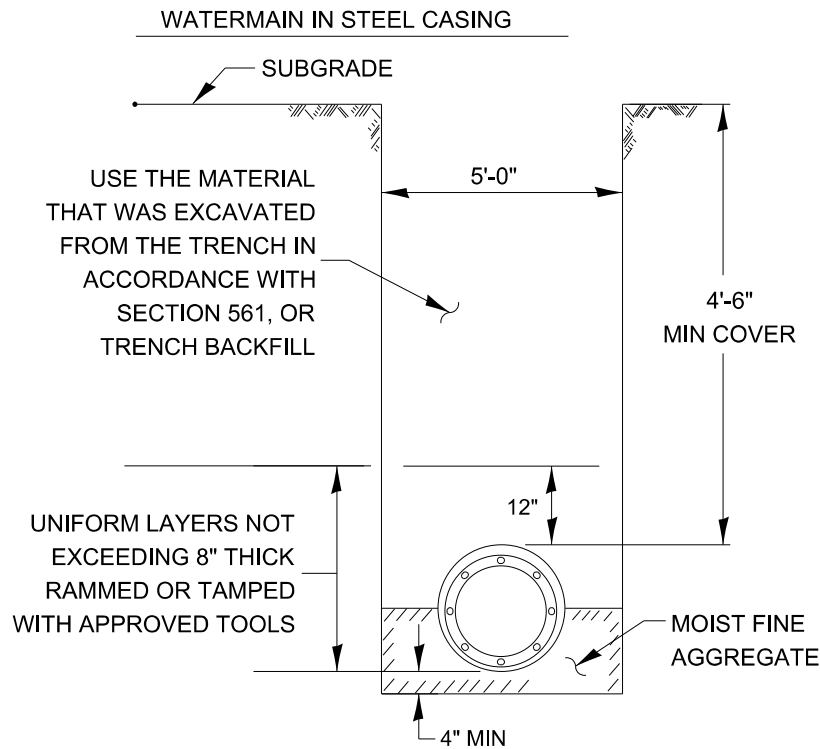
FRONT VIEW



SIDE VIEW

CONCRETE COLLAR FOR SEWER CONNECTION

550-1



GENERAL NOTES:

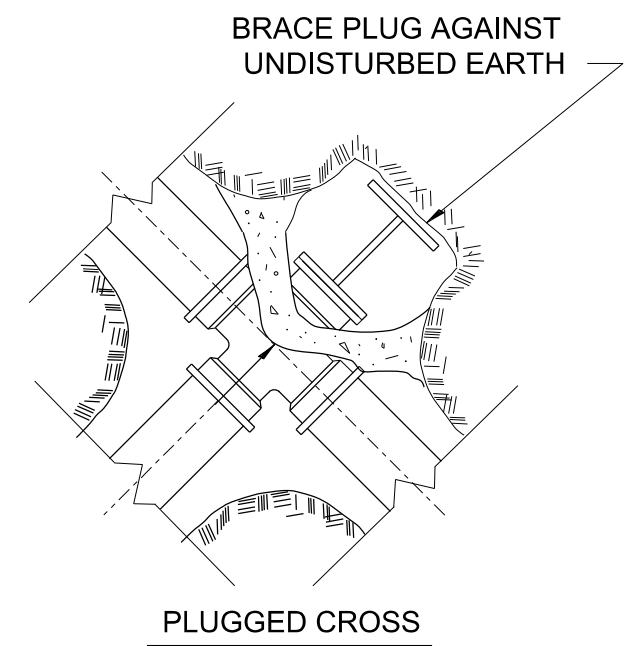
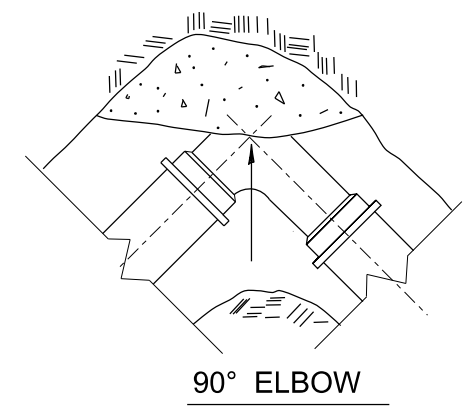
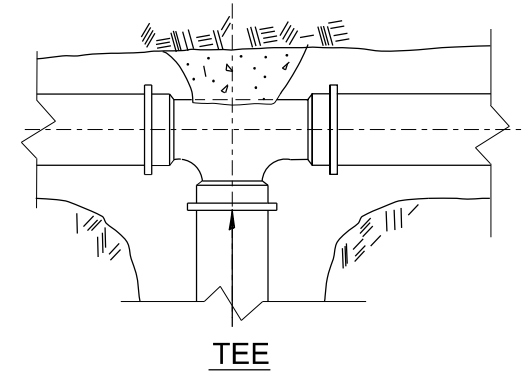
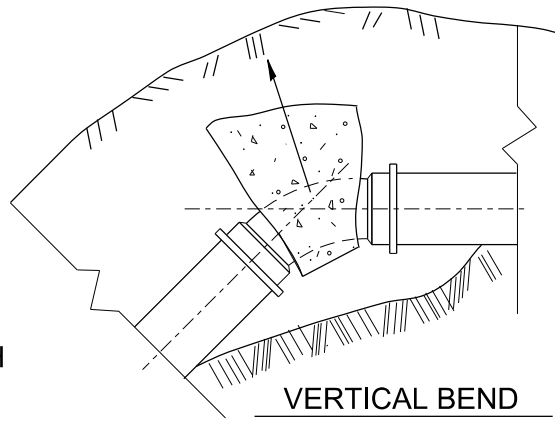
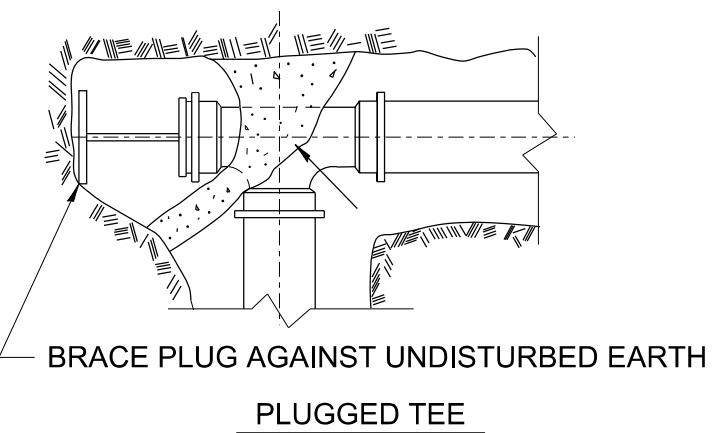
1. ANY SOFT OR SPONGY MATERIAL ENCOUNTERED BELOW THE ELEVATION OF THE PIPE SHALL BE REMOVED AND REPLACED WITH WELL COMPACTED MOIST FINE AGGREGATE.
2. ANY ROCK ENCOUNTERED IN THE TRENCH SHALL BE REMOVED TO A DEPTH OF AT LEAST 8 INCHES BELOW THE PIPE GRADE AND REPLACED WITH WELL COMPACTED MOIST FINE AGGREGATE.
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 COMPLETE 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 SPACING OF HOLES.

561-4

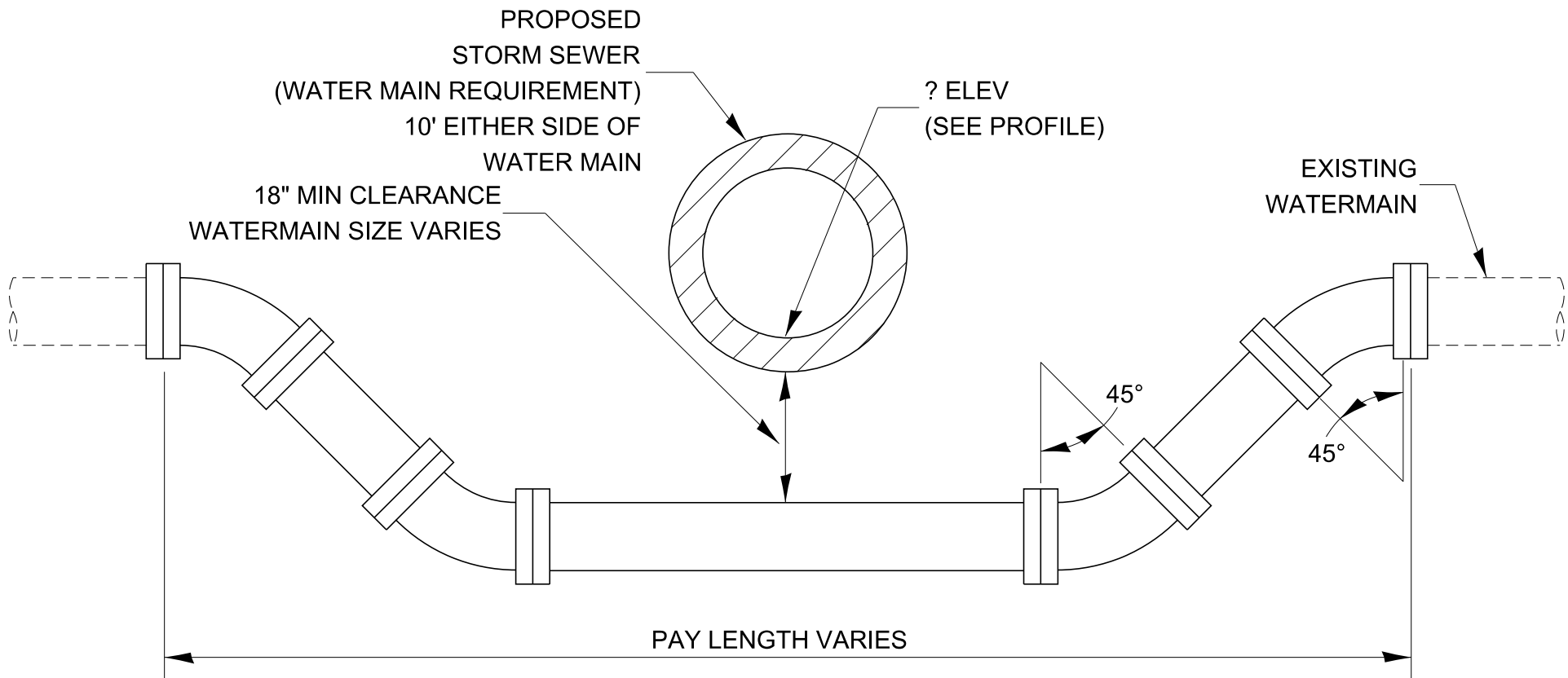
WATERMAIN INSTALLATION REQUIREMENTS



NOTES:

- ALL BLOCKS BEAR AGAINST UNDISTURBED EARTH.
- ALL BLOCKING SHALL BE 3,000 PSI POURED CONCRETE.
- ARROWS INDICATE DIRECTION OF THRUST.
- ALL FITTINGS SHOWN IN PLAN EXCEPT VERTICAL BEND.

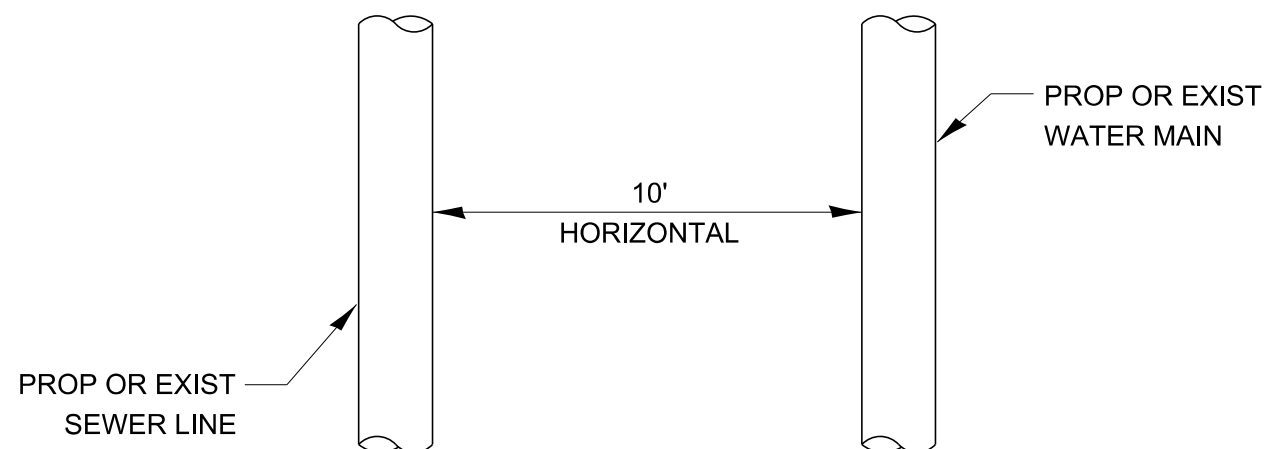
TYPICAL THRUST BLOCK INSTALLATIONS



ADJUSTING WATERMAIN DETAIL

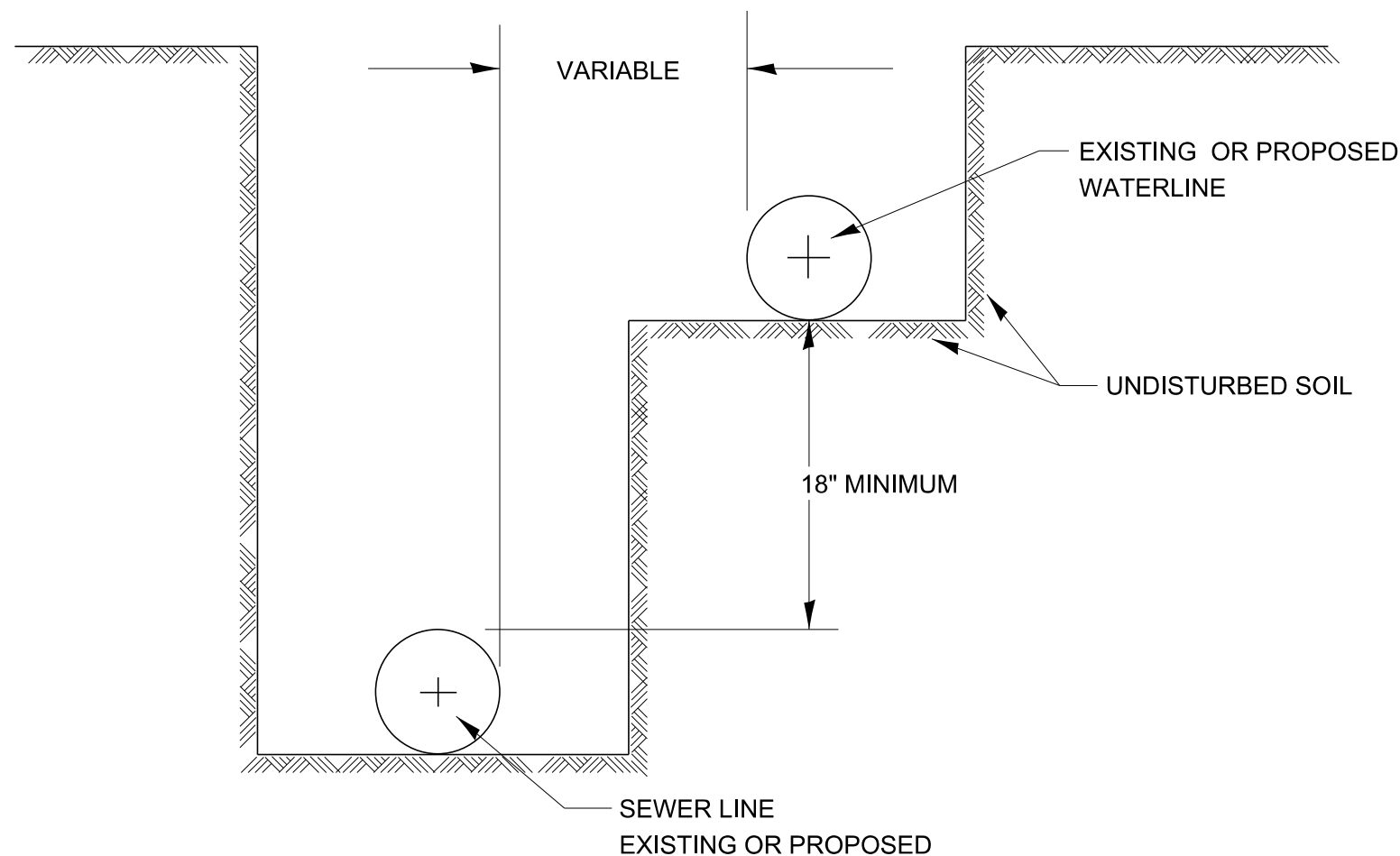
561-7

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

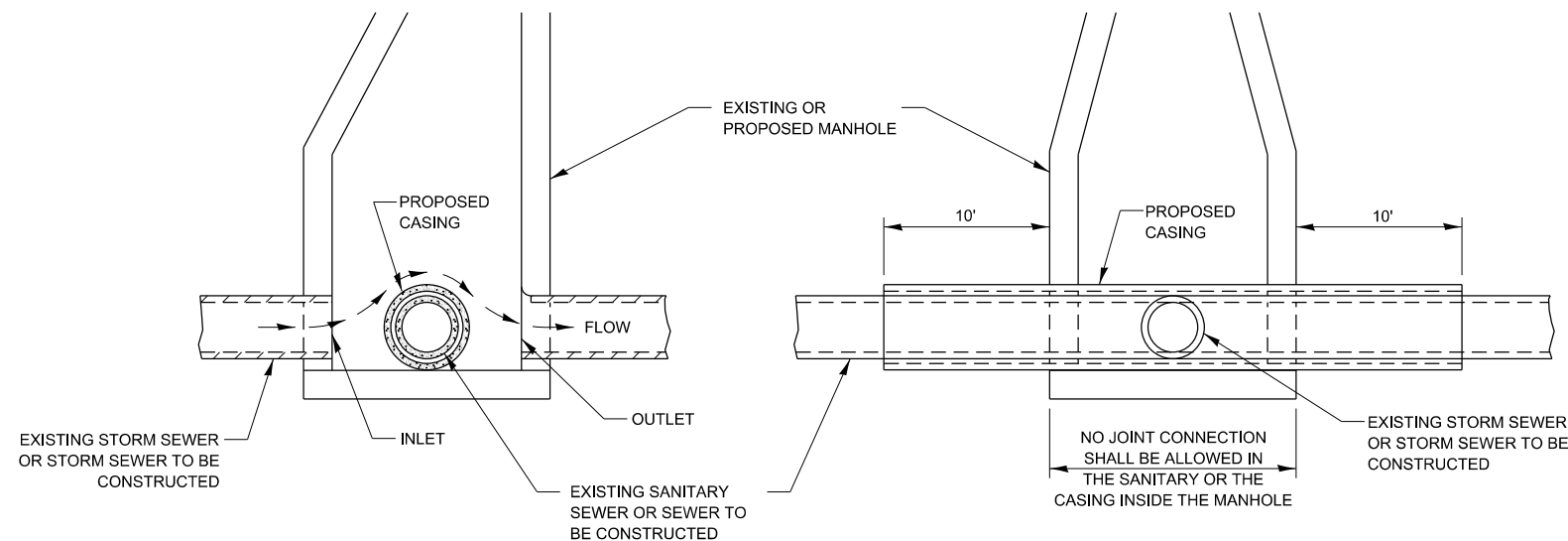


PLAN VIEW

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



WATER AND SEWER SEPARATION REQUIREMENTS - HORIZONTAL SEPARATION

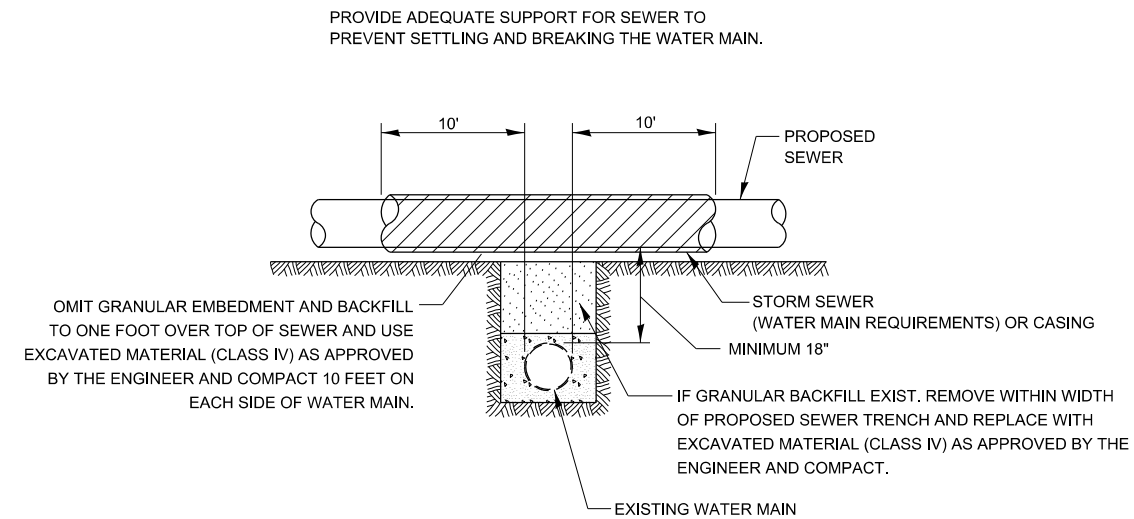


ELEVATION - ECCENTRIC

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

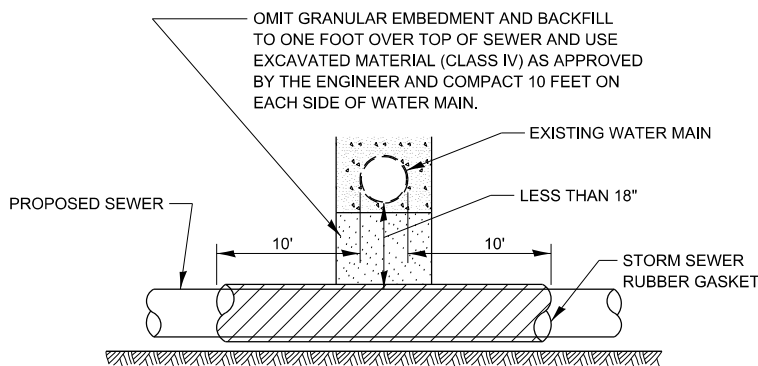
AT GRADE CROSSING OF SANITARY AND STORM SEWER



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

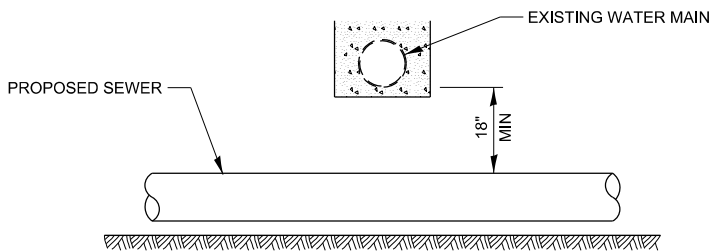
PROPOSED SEWER LINE WITH MINIMUM 18" VERTICAL SEPARATION ABOVE EXISTING WATERMAIN

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

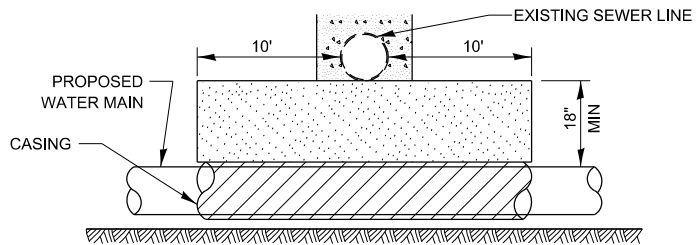


PROPOSED SEWER LINE BELOW EXISTING WATER MAIN

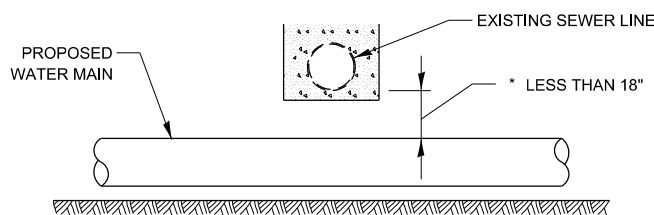
PROVIDE ADEQUATE SUPPORT FOR EXISTING SEWER LINE TO PREVENT DAMAGE DUE TO SETTLEMENT.

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' EITHER SIDE OF SEWER LINE.



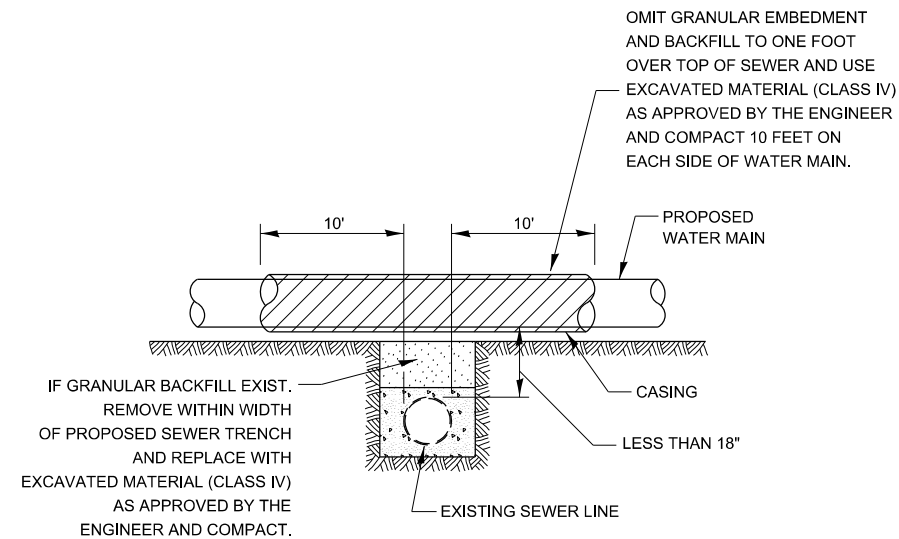
CASING SHALL BE OF WATER MAIN MATERIAL WITH AN INSIDE DIAMETER 2" LARGER IN DIAMETER THAN ENCASED PIPE OUTSIDE DIAMETER WITH BOTH ENDS OF CASING SEALED



* 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

MODEL: det 3 details
 FILE: \\msbpc-pw\share\paw\benefit\com\p\INDOT\Documents\INDOT_Offices\Director_Standards - District_3\DETAILS\DISTRICT_3_STANDARD_DETAILS.dgn\500-599_STRUCTURES.dgn

USER NAME = Ronald Pohar	DESIGNED -	REVISED -
PLOT SCALE = 100,000 * / in.	DRAWN -	REVISED -
PLOT DATE = 3/25/2024	CHECKED -	REVISED -
	DATE -	REVISED -

STATE OF ILLINOIS
 DEPARTMENT OF TRANSPORTATION

SEWER AND WATER MAIN CROSSING

SCALE: SHEET OF SHEETS STA. TO STA.

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