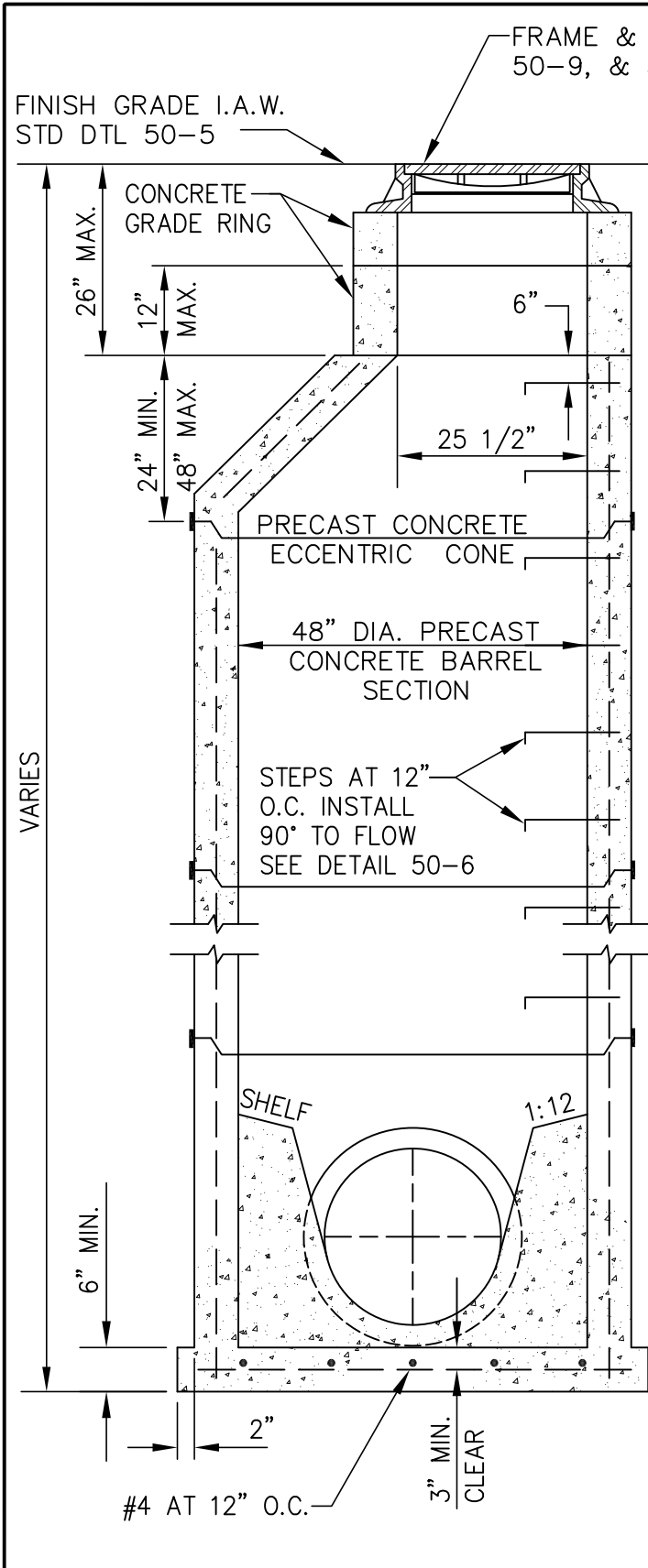


**STANDARD CONSTRUCTION SPECIFICATIONS  
MISCELLANEOUS  
DIVISION 50  
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**NOTES:**

1. STEEL REQ'D FOR BARREL SHALL CONFORM TO ASTM C-478. IMBED STEEL IN BASE SO THAT FIRST BARREL SECTION IS CONNECTED WITH BASE.
2. ALL MANHOLE SECTIONS SHALL CONFORM TO ASTM C-478.
3. PROVIDE Z-LOK BOOTS FOR 8" TO 18" PIPE PENETRATIONS. PROVIDE A-LOK BOOTS FOR 20" THROUGH 24" PIPE PENETRATIONS. GROUT PER MANUFACTURER'S RECOMMENDATIONS.
4. COAT ALL EXTERNAL CONCRETE SURFACES OF MANHOLE WITH WATERPROOF BITUMINOUS COATING.
5. "RAM-NEK" OR EQUAL AND PRIME BARREL JOINTS. HEAT "RAM-NEK" AND SEAL SURFACES BEFORE FINAL ASSEMBLY.
6. SEAL MANHOLE JOINTS WITH "MAC WRAP" EXTERIOR PIPE JOINT SEALER, MIRADRI OR APPROVED EQUAL, AFTER MANHOLE HAS BEEN WATERPROOFED (TYP ALL).
7. INSTALL INFI-SHIELD EXTERNAL UNI-BAND SEAL OVER FRAME, GRADE RINGS, AND TOP OF CONE.
8. WRAP EXTERIOR OF MANHOLE W/THREE LAYERS OF 8-MIL THICK POLYETHYLENE ENCASEMENT MATERIAL AFTER INSTALLING "MAC WRAP" AND INFI-SHIELD.
9. MANHOLE SHALL HAVE MINIMUM OF ONE (1) SIX-INCH (6") GRADE RING.
10. BACKFILL AROUND MANHOLE WITH NFS MATERIAL (3-FEET MINIMUM). BACKFILL SHALL BE INCIDENTAL TO COST OF MANHOLE INSTALLATION.
11. FOUNDATION MATERIAL AS DIRECTED BY ENGINEER



SCALE:  
NTS

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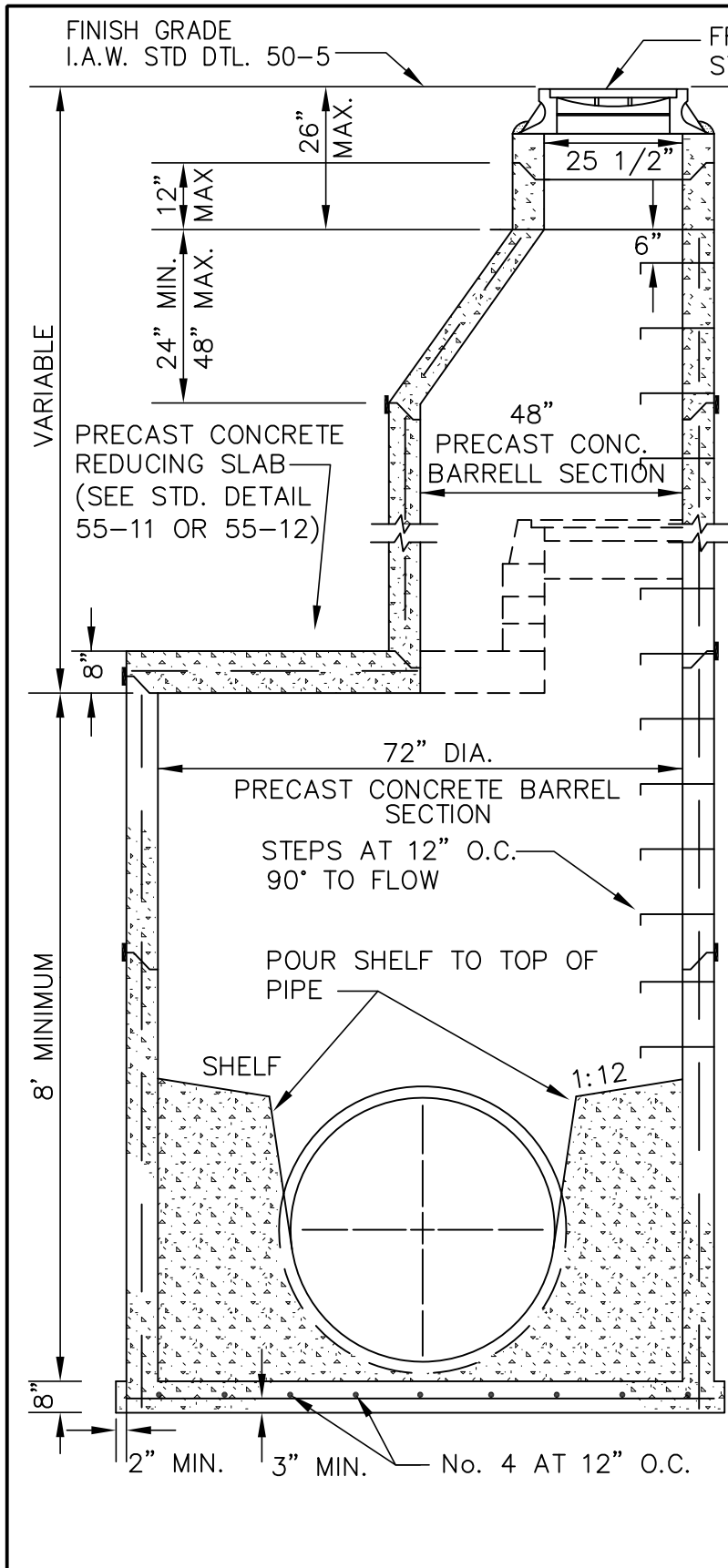
REVISED:  
4/12

**SANITARY MANHOLE  
TYPE A  
PIPE 8" TO 24"**

SECTION #  
50.03

DETAIL #  
50-1

FILE.DWG



**NOTES:**

1. STEEL REQ'D FOR BARREL SHALL CONFORM TO ASTM C-478. IMBED STEEL IN BASE SO THAT FIRST BARREL SECTION IS CONNECTED WITH BASE.
2. ALL MANHOLE SECTIONS SHALL CONFORM TO ASTM C-478.
3. PROVIDE A-LOK BOOTS FOR 30" THROUGH 36" PIPE PENETRATIONS. GROUT PER MANUFACTURER'S RECOMMENDATIONS.
4. COAT ALL EXTERNAL CONCRETE SURFACES OF MANHOLE WITH WATERPROOF BITUMINOUS COATING.
5. "RAM-NEK" OR EQUAL AND PRIME BARREL JOINTS. HEAT "RAM-NEK" AND SEAL SURFACES BEFORE FINAL ASSEMBLY.
6. SEAL MANHOLE JOINTS WITH "MAC WRAP" EXTERIOR PIPE JOINT SEALER, MIRADRI OR APPROVED EQUAL, AFTER MANHOLE HAS BEEN WATERPROOFED (TYP ALL).
7. INSTALL INFI-SHIELD EXTERNAL UNI-BAND SEAL OVER FRAME, GRADE RINGS, AND TOP OF CONE.
8. WRAP EXTERIOR OF MANHOLE W/THREE LAYERS OF 8-MIL THICK POLYETHYLENE ENCASEMENT MATERIAL AFTER INSTALLING "MAC WRAP" AND INFI-SHIELD.
9. MANHOLE SHALL HAVE MINIMUM OF ONE (1) SIX-INCH (6") GRADE RING.
10. BACKFILL AROUND MANHOLE WITH NFS MATERIAL (3-FEET MINIMUM). BACKFILL SHALL BE INCIDENTAL TO COST OF MANHOLE INSTALLATION.
11. FOUNDATION MATERIAL AS DIRECTED BY ENGINEER

FILE.DWG



SCALE:  
**NTS**

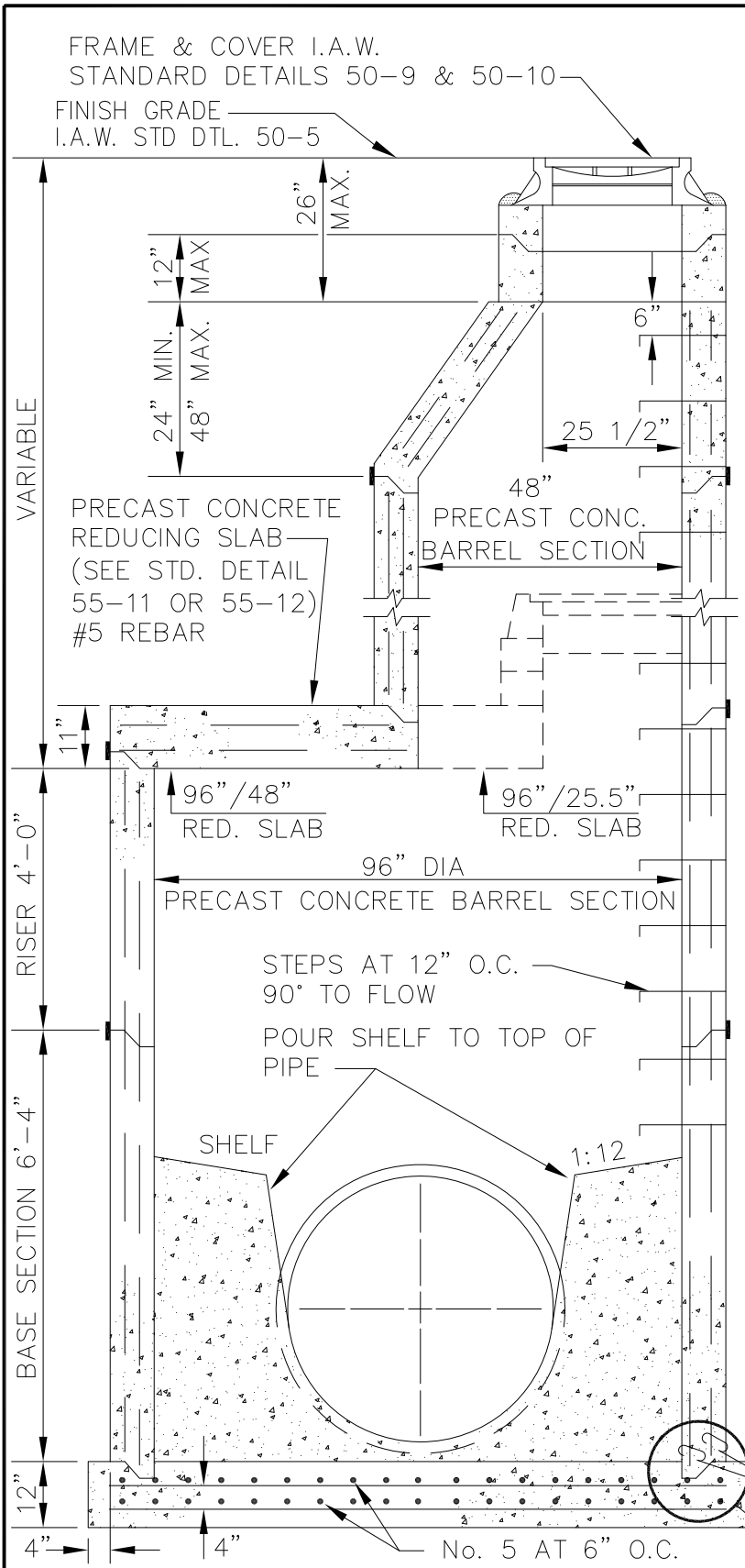
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**4/12**

**SANITARY MANHOLE  
TYPE B  
PIPE 30" TO 36"**

SECTION #  
**50.03**

DETAIL #  
**50-2**



NOTES:

1. STEEL REQ'D FOR BARREL SHALL CONFORM TO ASTM C-478.
2. ALL MANHOLE SECTIONS SHALL CONFORM TO ASTM C-478.
3. PROVIDE A-LOK BOOTS FOR 40" THROUGH 48" PIPE PENETRATIONS. GROUT PER MANUFACTURER'S RECOMMENDATIONS.
4. COAT ALL EXTERNAL CONCRETE SURFACES OF MANHOLE WITH WATERPROOF BITUMINOUS COATING.
5. "RAM-NEK" OR EQUAL AND PRIME BARREL JOINTS. HEAT "RAM-NEK" AND SEAL SURFACES BEFORE FINAL ASSEMBLY.
6. SEAL MANHOLE JOINTS WITH "MAC WRAP" EXTERIOR PIPE JOINT SEALER OR APPROVED EQUAL, AFTER MANHOLE HAS BEEN WATERPROOFED (TYP ALL).
7. INSTALL INFI-SHIELD EXTERNAL UNI-BAND SEAL OVER FRAME, GRADE RINGS, AND TOP OF CONE.
8. WRAP EXTERIOR OF MANHOLE W/THREE LAYERS OF 8-MIL THICK POLYETHYLENE ENCASEMENT MATERIAL AFTER INSTALLING "MAC WRAP" AND INFI-SHIELD.
9. MANHOLE SHALL HAVE MINIMUM OF ONE (1) SIX-INCH (6") GRADE RING.
10. BACKFILL AROUND MANHOLE WITH NFS MATERIAL (3- FEET MINIMUM). BACKFILL SHALL BE INCIDENTAL TO COST OF MANHOLE INSTALLATION.
11. FOUNDATION MATERIAL AS DIRECTED BY ENGINEER.

FILE.DWG



SCALE:  
NTS

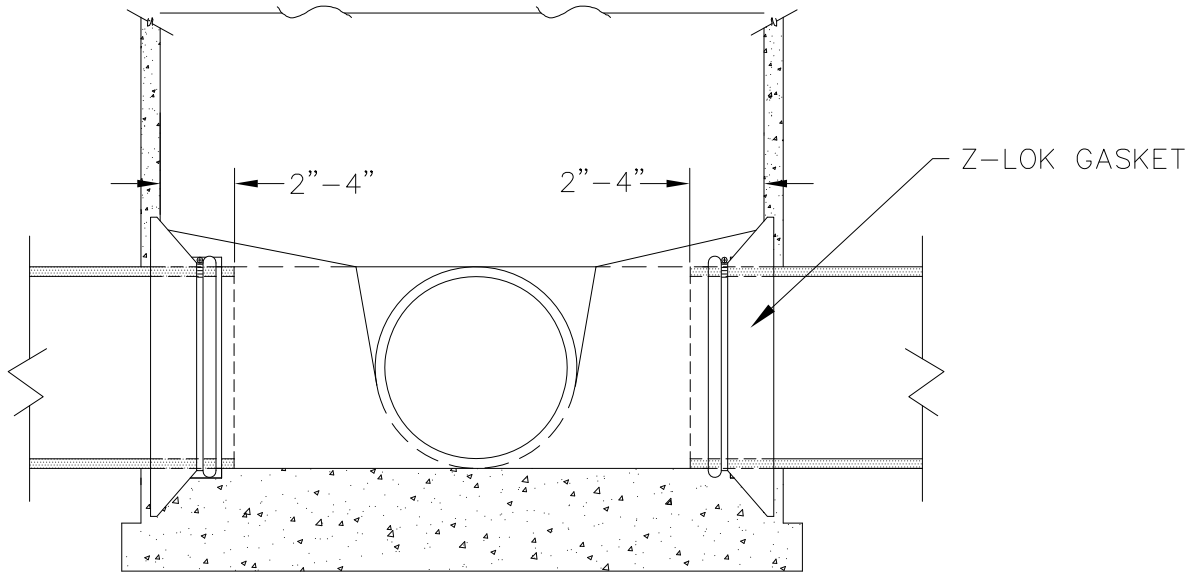
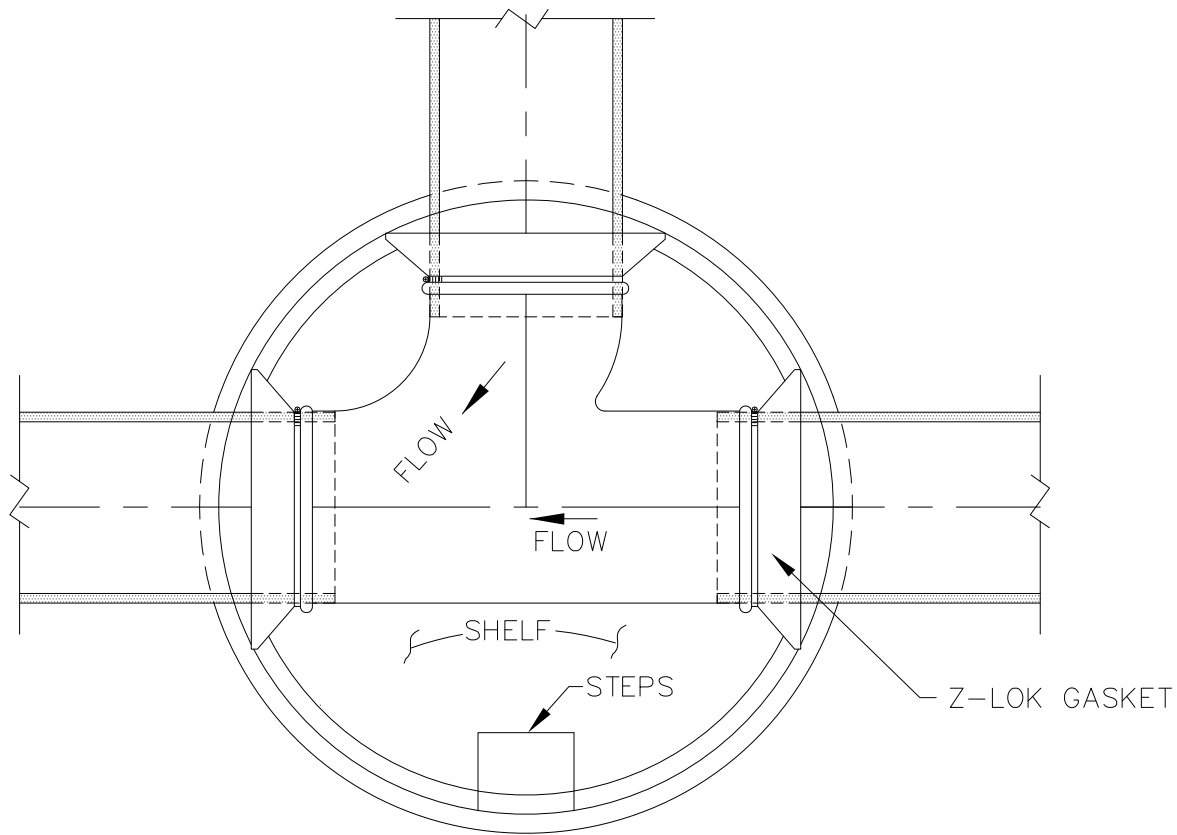
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4/12

**SANITARY MANHOLE  
TYPE C  
PIPE 40" TO 48"**

SECTION #  
50.03

DETAIL #  
50-3



FILE.DWG

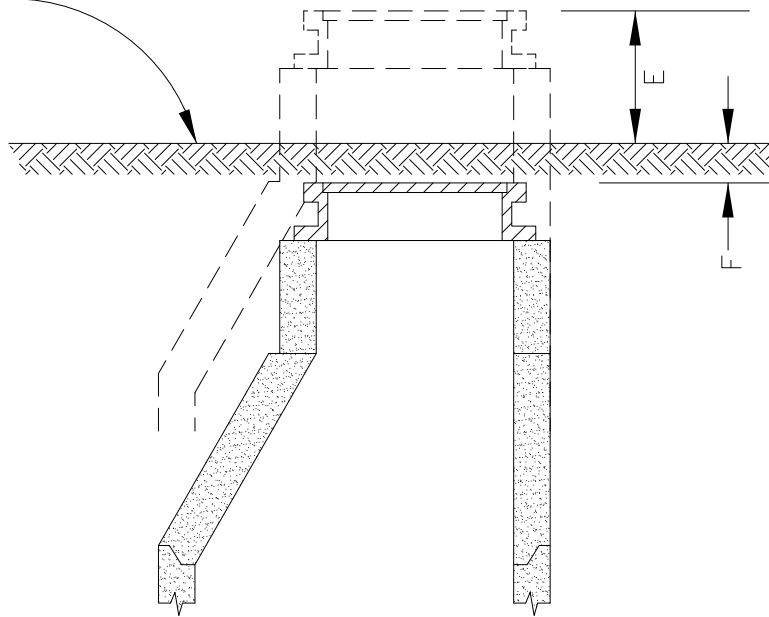


SCALE:  
NTS  
APPROVED:  
REVISED:  
4/12

**TYPE A AND B  
MANHOLE BASE  
PLAN**

SECTION #  
50.03  
DETAIL #  
50-4

GROUND LINE



LOCATION	E	F
BACKYARDS, GRAVEL STREETS, AND ALLEY AREAS WHERE TRAVELED.		4"–8"
UNDEVELOPED AND SWAMPY AREAS.	24" MIN	
HIGHWAY R.O.W.S OUTSIDE TRAFFIC AREAS.	6"	
PAVED STREETS.		1/2"

FILE.DWG



SCALE:  
NTS

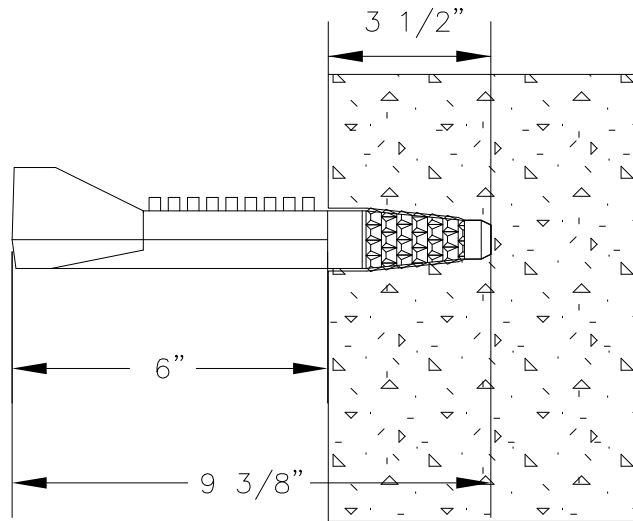
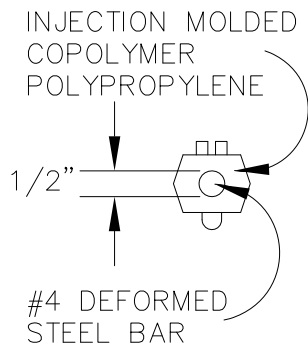
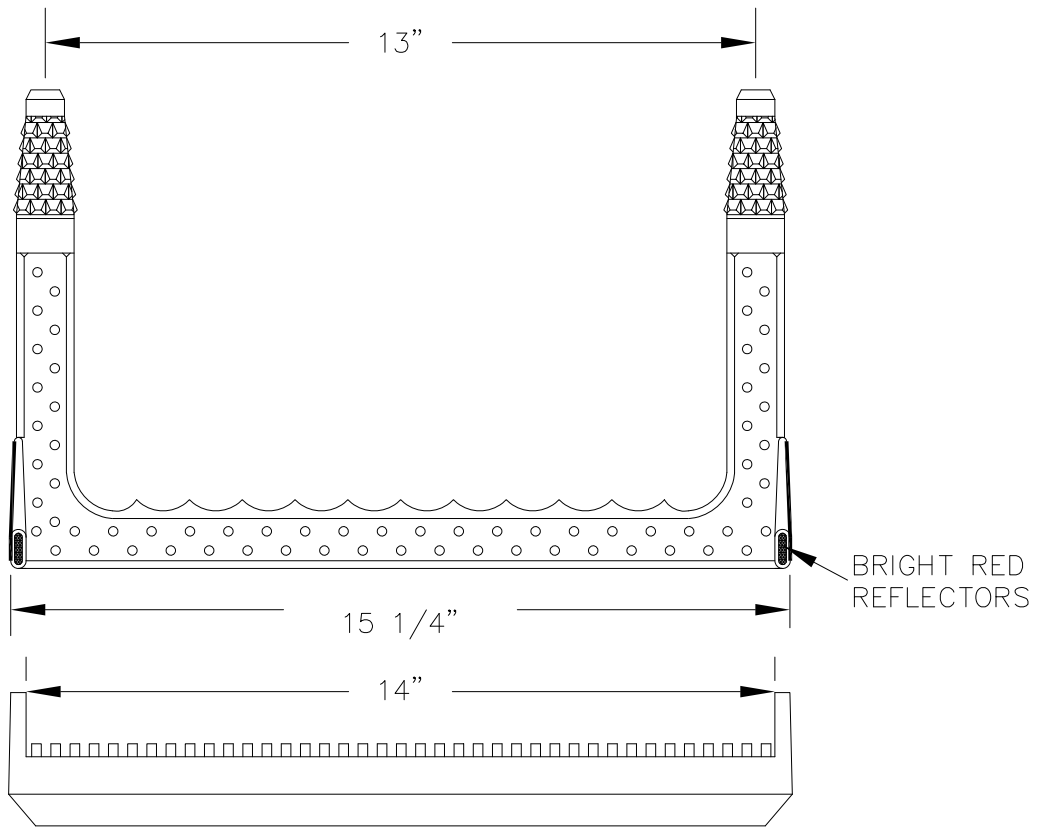
APPROVED:

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4/12

# MANHOLE HEIGHTS

SECTION #  
50.03

DETAIL #  
50-5



NOTE:

1. DRIVE RING INTO PREFORMED OR DRILLED HOLES WITH A 6 TO 10 LB. SLEDGE HAMMER, AFTER CONCRETE IS CURED TO 3000 PSI MIN.
2. THE INSTALLED STEP SHALL RESIST A PULLOUT FORCE OF 1500 LBS.

FILE.DWG



SCALE:  
NTS

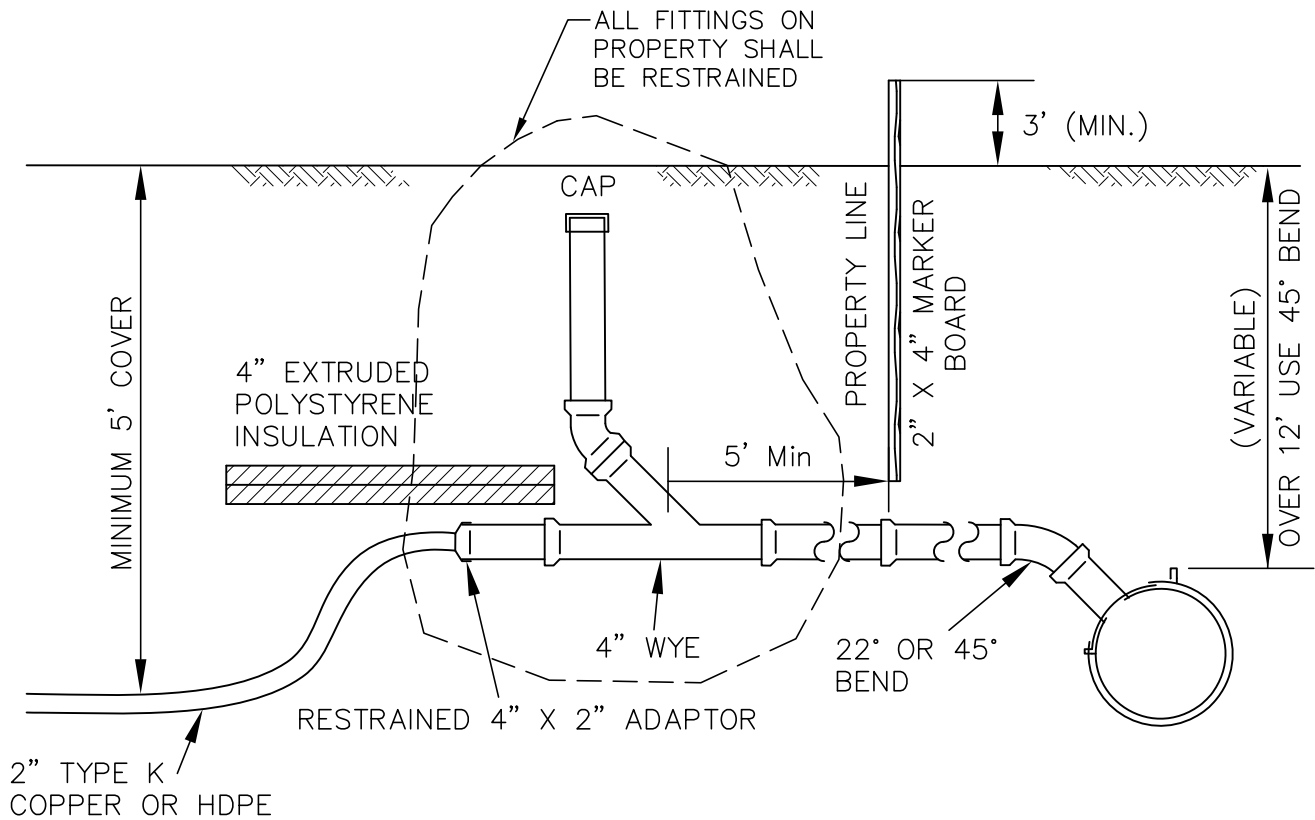
APPROVED:

REVISED:  
4/12

# MANHOLE STEP

SECTION #  
50.03

DETAIL #  
50-6



NOTES:

1. ROMAC STYLE CB SEWER SADDLE SHALL BE USED ON ALL PIPE.
2. TYPE "K" COPPER PIPE SHALL BE USED FOR ALL FORCE MAIN PIPE INSTALLATIONS OF 5-FOOT DEPTH OR MORE. HDPE ARCTIC PIPE SHALL BE USED FOR ALL FORCE MAIN PIPE INSTALLATIONS OF DEPTH LESS THAN 5-FOOT.
3. THE USE OF HDPE ARCTIC PIPE WITH ELECTRIC HEAT TRACE SHALL ONLY BE USED WITH PRIOR WRITTEN APPROVAL BY AWWU ENGINEERING. ENDS OF HEAT TRACE CHANNEL SHALL BE SEALED WATER TIGHT.
4. RIGID BOARD INSULATION SHALL BE HIGH DENSITY EXSTRUDED POLYSTYRENE, MIN. 60 P.S.I., EQUIVALENT TO R-18 PER 4-INCH THICKNESS.



SCALE:  
NTS

APPROVED:

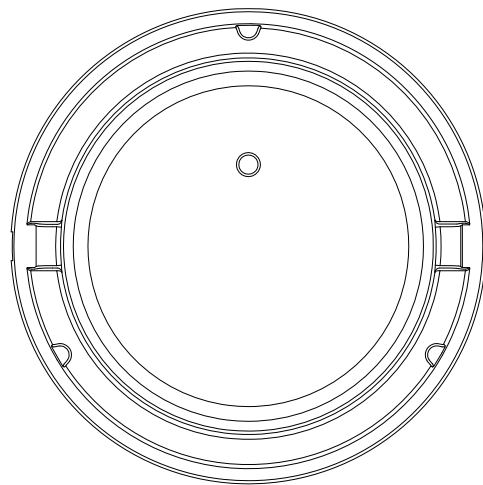
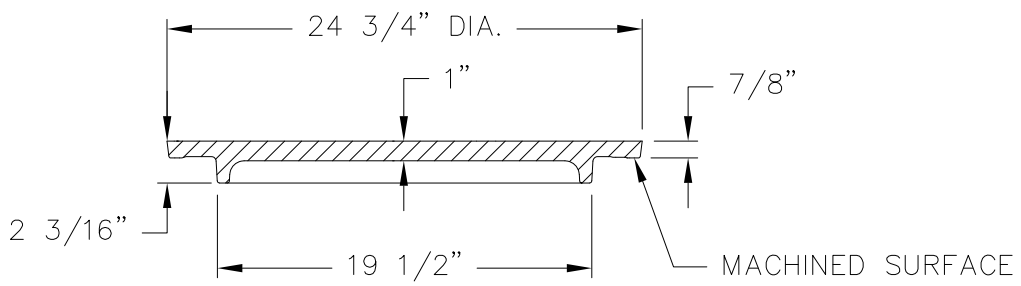
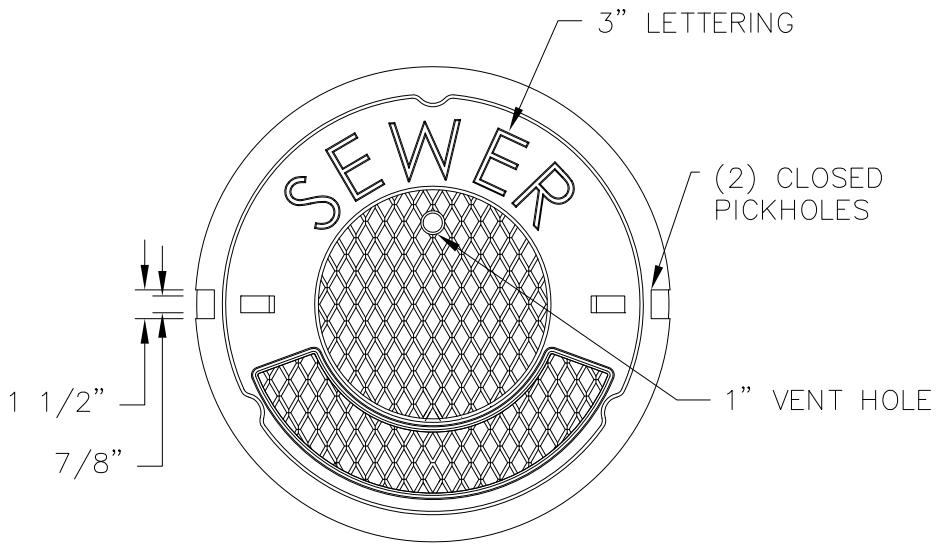
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4/12

**SEWER SERVICE CONNECT  
FOR ON-SITE STATION  
1-1/2" AND 2"**

SECTION #  
50.10

DETAIL #  
50-7





FILE.DWG



SCALE:  
NTS

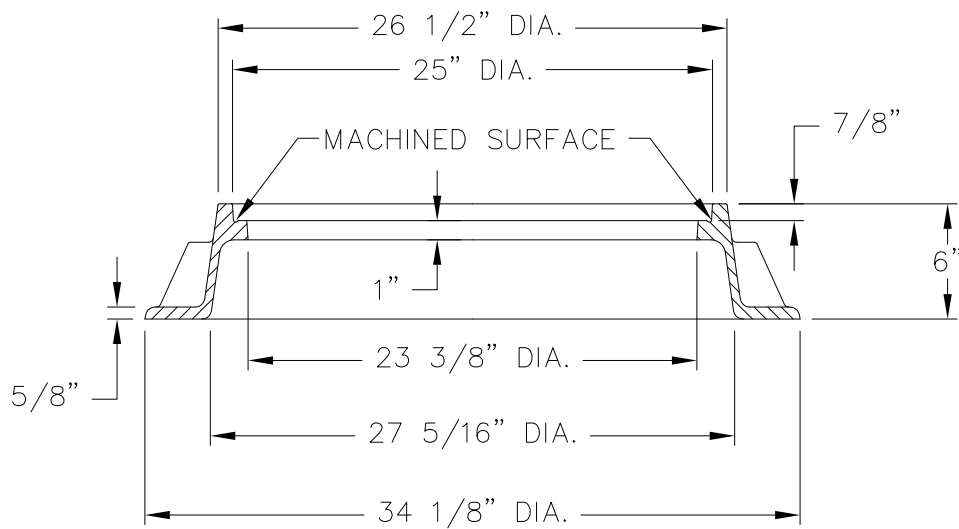
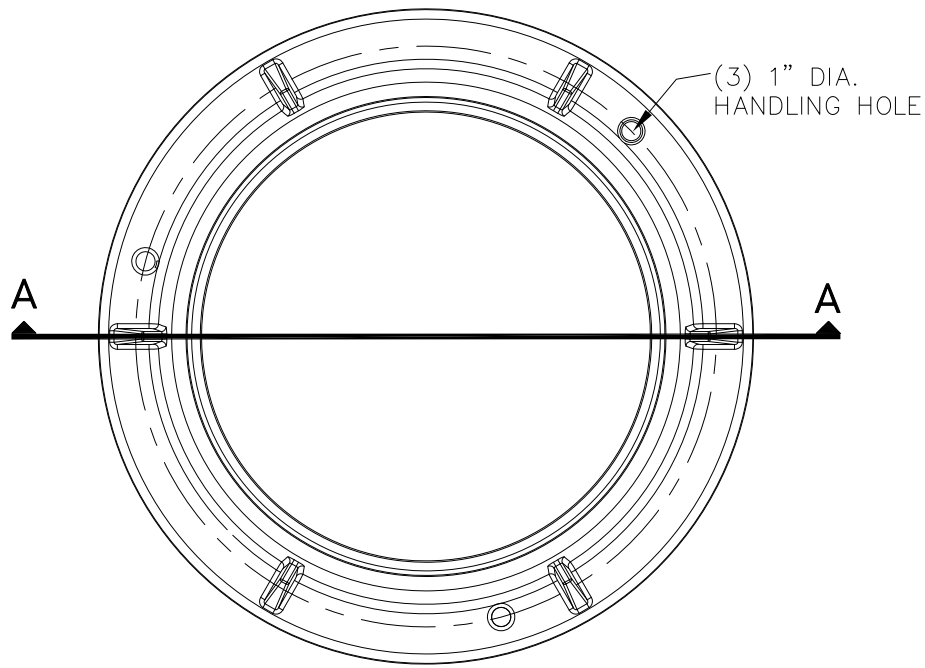
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4/12

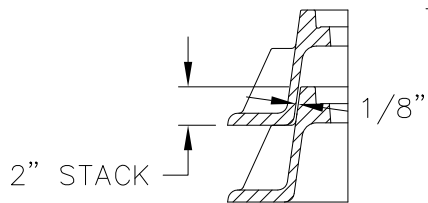
# MANHOLE COVER

SECTION #  
50.03

DETAIL #  
50-8



**SECTION AA**



**STACKING DETAIL**



SCALE:  
NTS

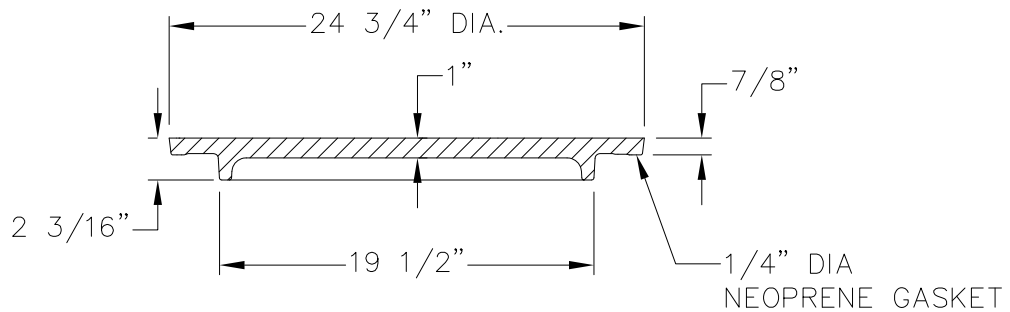
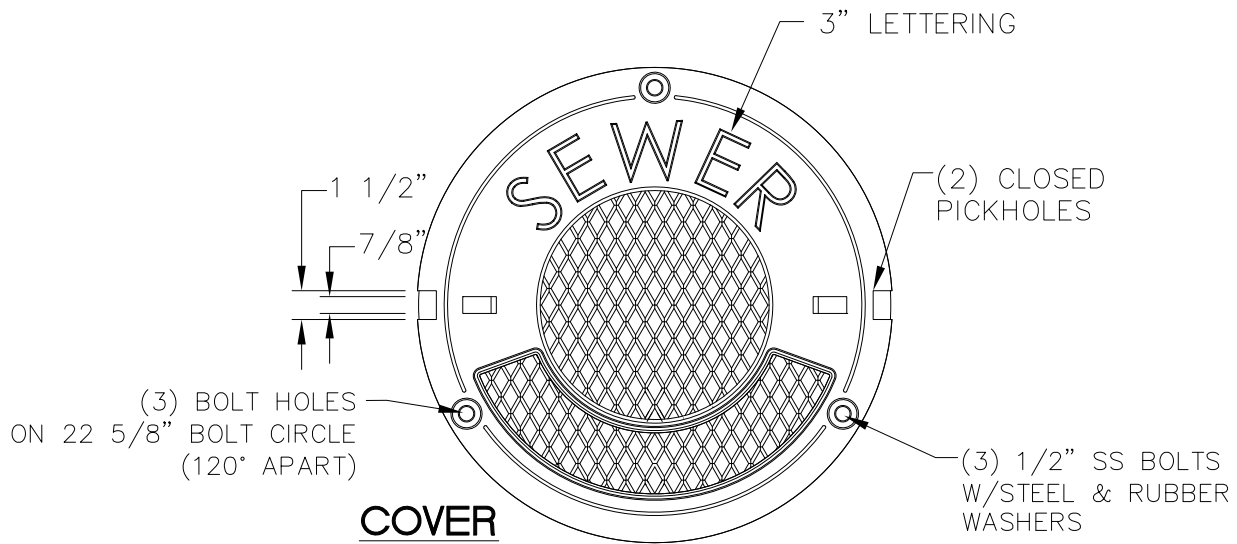
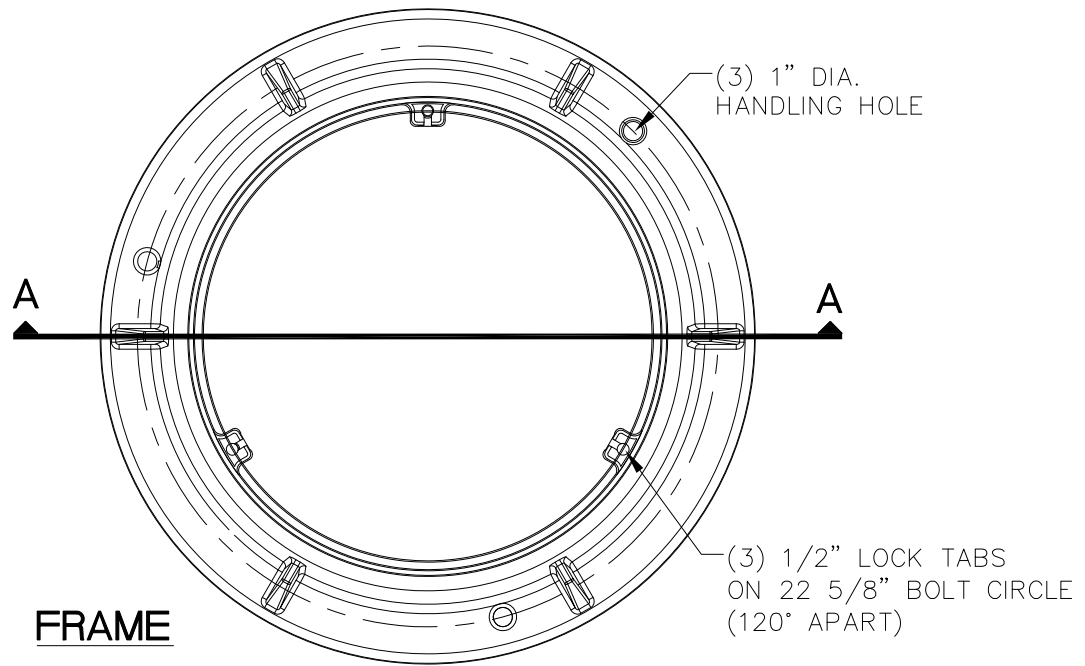
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4/12

**MANHOLE FRAME**

SECTION #  
50.03

DETAIL #  
50-9



**SECTION AA**

FILE.DWG



SCALE:  
NTS

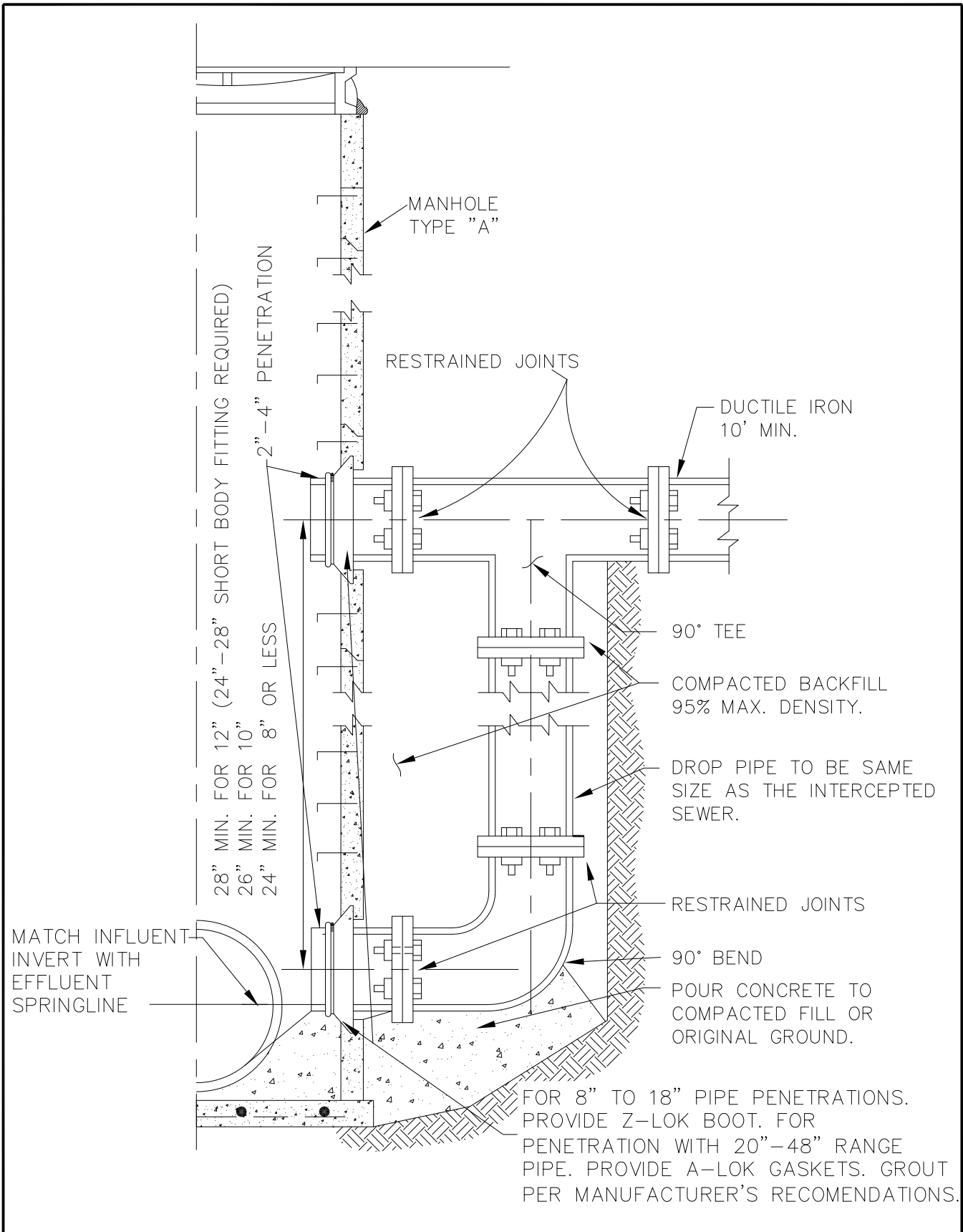
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4/12

**WATERTIGHT MANHOLE RING**

SECTION #  
50.04

DETAIL #  
50-10



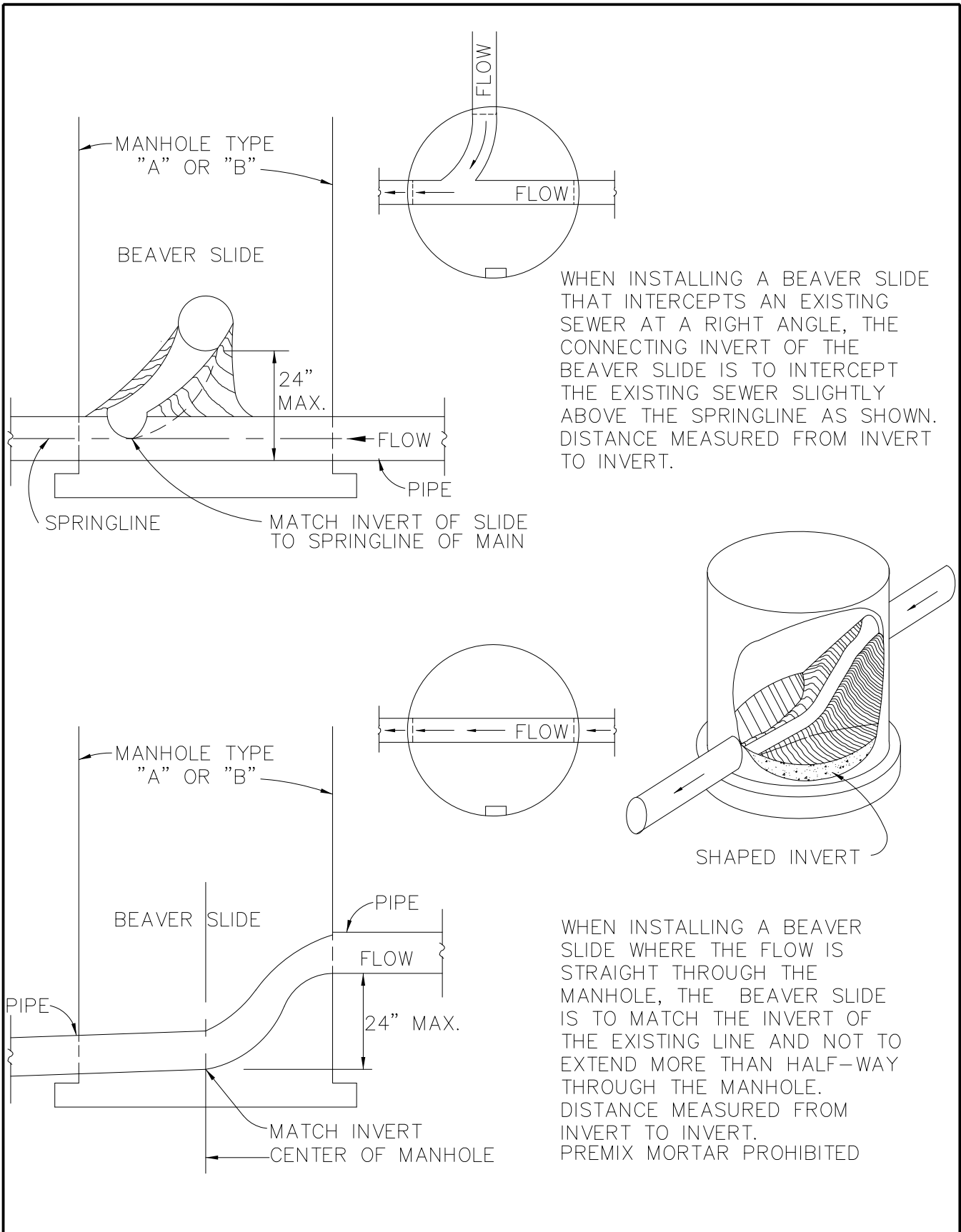
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SCALE:  
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APPROVED:  
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# MANHOLE DROP CONNECTION

SECTION #  
50.06  
DETAIL #  
50-11



FILE.DWG



SCALE:  
NTS

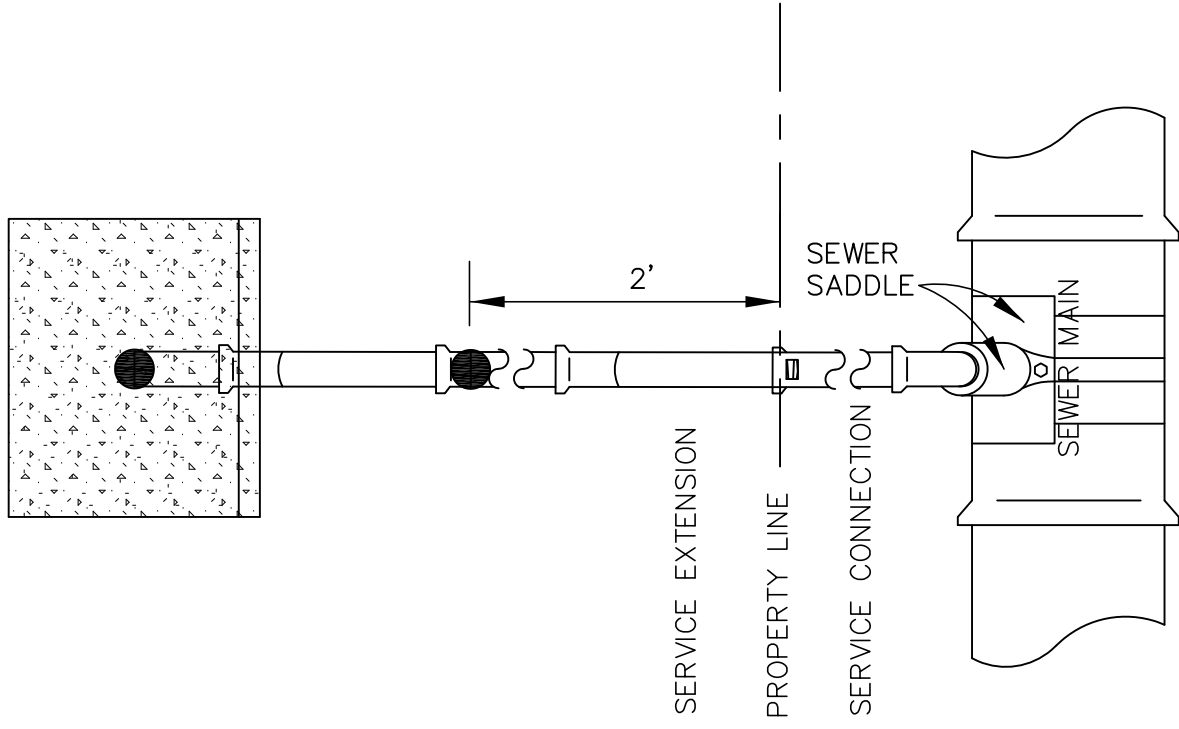
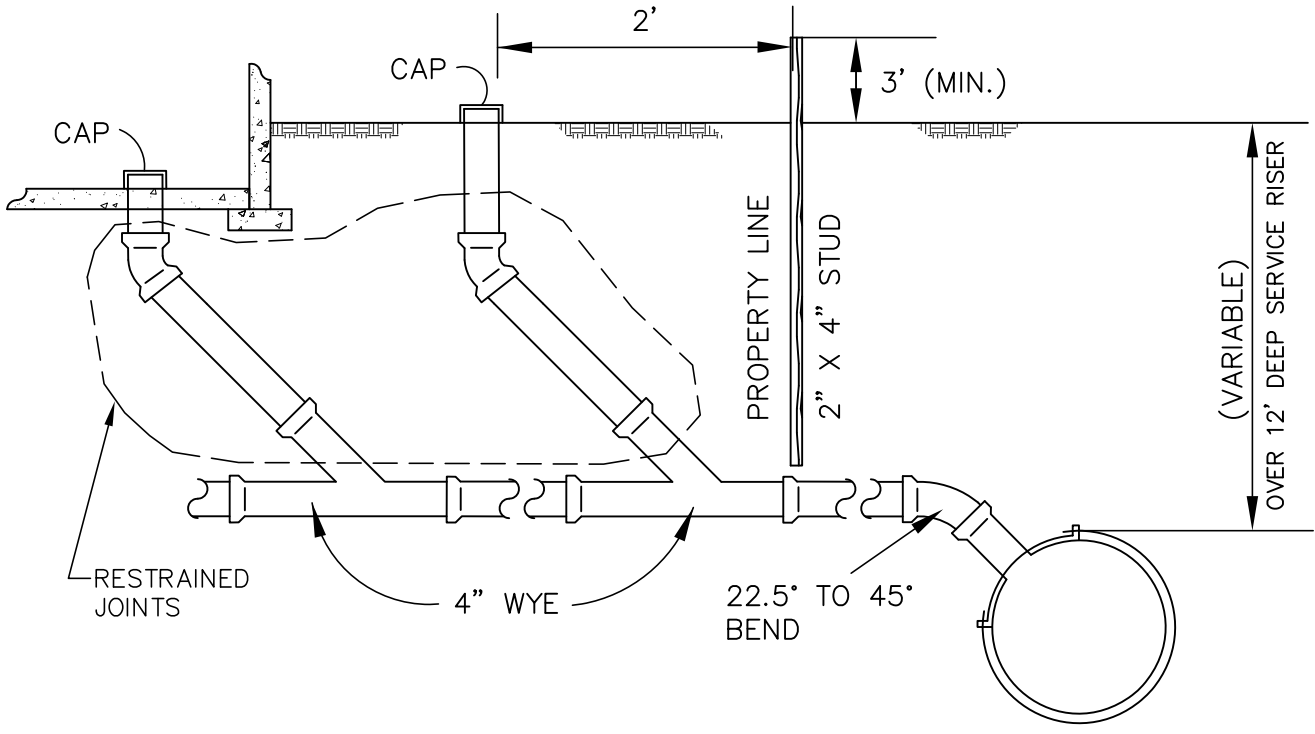
APPROVED:

REVISED:  
4/12

# TYPICAL BEAVER SLIDE MANHOLE

SECTION #  
50.07

DETAIL #  
50-12



FILE.DWG

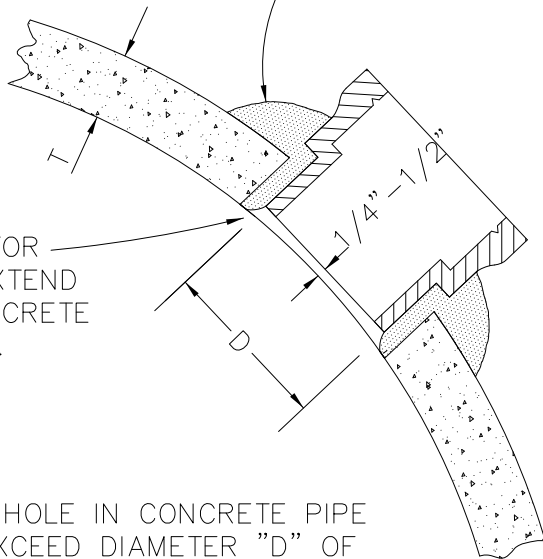


SCALE:  
**NTS**  
 APPROVED:  
 REVISED:  
**4/12**

# SANITARY SEWER SERVICE (COMPLETE)

SECTION #  
**50.09**  
 DETAIL #  
**50-13**

USE MORTAR TO FORM  
A WATERTIGHT SEAL.

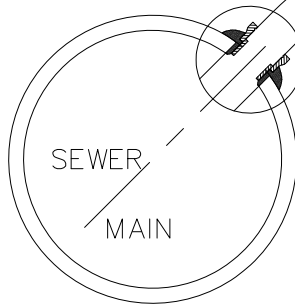


C. I. CONNECTOR  
SHALL NOT EXTEND  
INTO THE CONCRETE  
PIPE INTERIOR.

DIAMETER OF HOLE IN CONCRETE PIPE  
SHALL NOT EXCEED DIAMETER "D"  
OF THE C.I. CONNECTION PLUS 2".

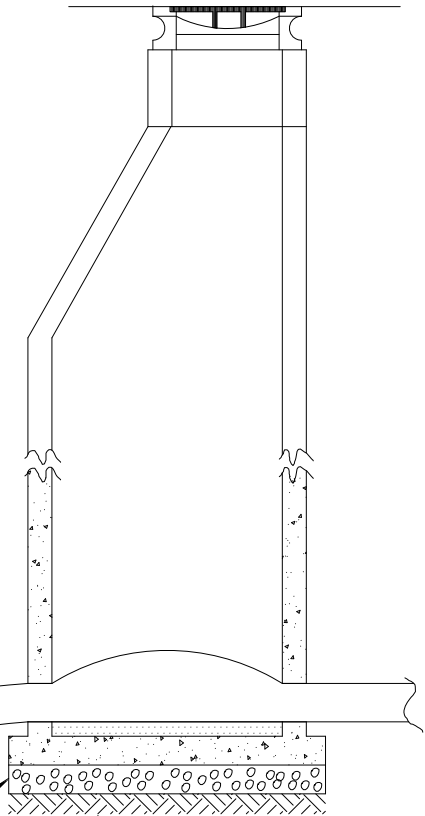
D.I.P. PIPE SHALL BE USED  
BETWEEN M.H. & TRUNKLINE.  
USE 22 1/2° OR 11 1/2° BENDS.

THE EXISTING GROUND AROUND  
THE CONC. TRUNK SHALL BE  
DISTURBED AS LITTLE AS  
POSSIBLE.



8" TYPE II-A  
COMPACTED TO MIN.  
95% MAX. DENSITY.

COMPACT EXISTING  
GROUND TO MIN. OF  
95% MAX. DENSITY



FILE.DWG



SCALE:  
NTS

APPROVED:

REVISED:  
4/12

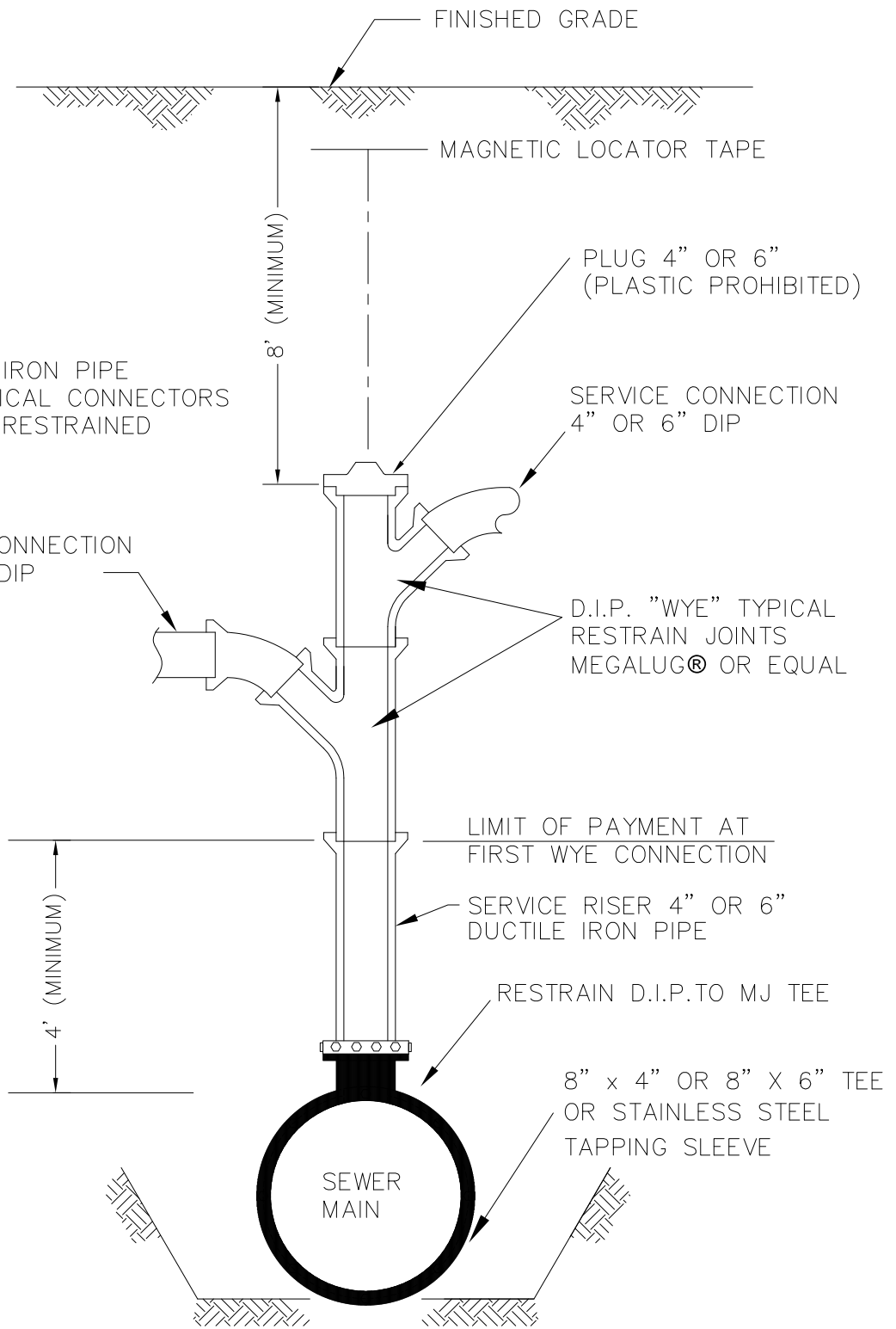
## LATERAL CONNECTION TO CONCRETE PIPE

SECTION #  
50.08

DETAIL #  
50-14

NOTE:

ALL DUCTILE IRON PIPE AND MECHANICAL CONNECTORS SHALL HAVE RESTRAINED JOINTS.



SCALE:  
NTS

APPROVED:

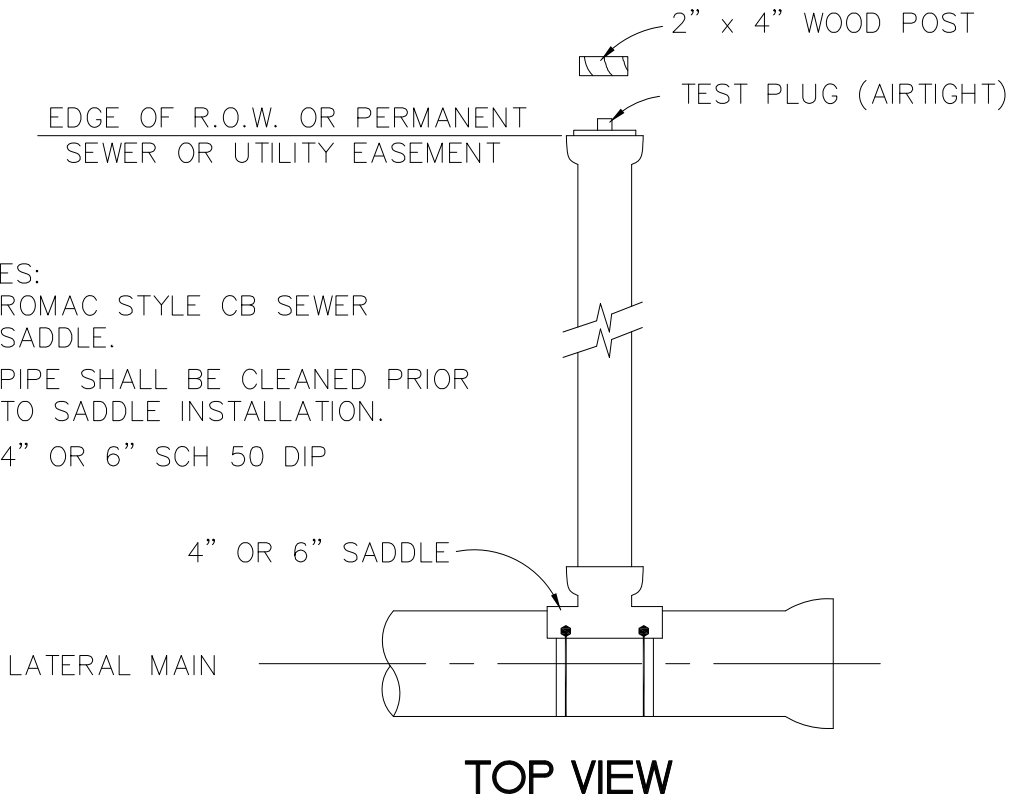
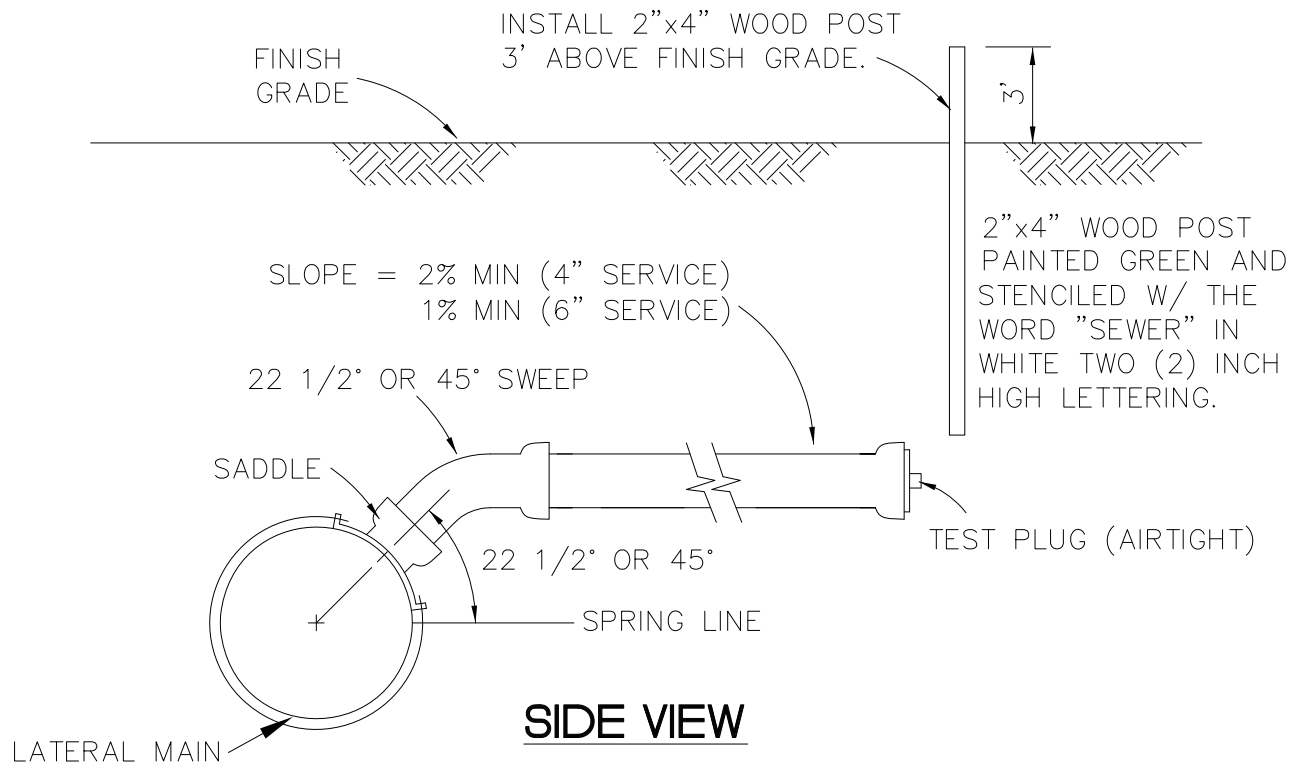
REVISED:  
4/12

# SERVICE RISER/TOP ENTRY (FOR CONSTRUCTION OF NEW DEEP SEWER-DUCTILE IRON)

SECTION #  
50.09

DETAIL #  
50-15





NOTES:

1. ROMAC STYLE CB SEWER SADDLE.
2. PIPE SHALL BE CLEANED PRIOR TO SADDLE INSTALLATION.
3. 4" OR 6" SCH 50 DIP

FILE.DWG



SCALE:  
NTS

APPROVED:

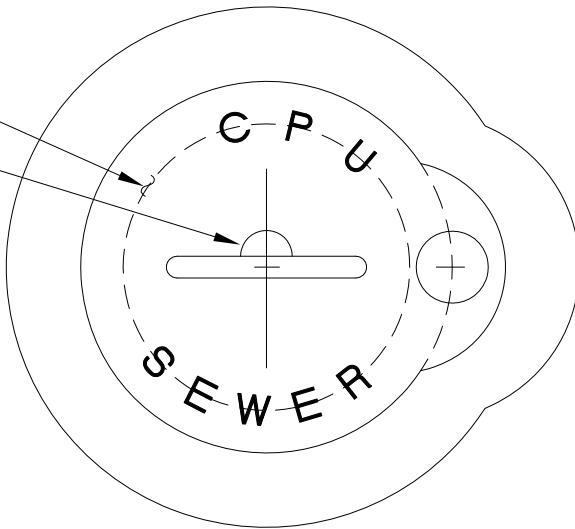
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**SANITARY SEWER SERVICE  
CONNECTION (R.O.W. ONLY)**

SECTION #  
50.10

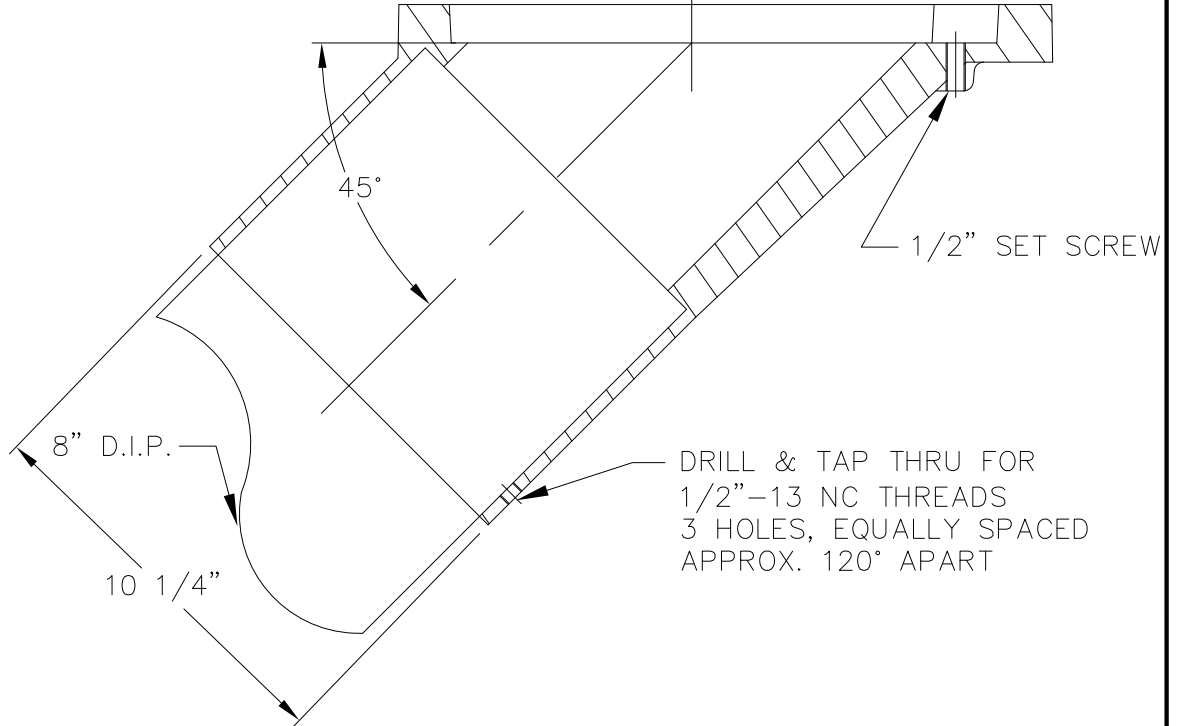
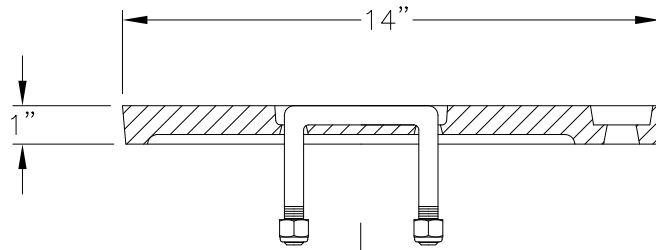
DETAIL #  
50-16

COVER  
 1" RECESS  
 1/2" DEEP  
 TAPERED TO  
 TOP OF LID.



NOTES:

1. CAST CLEANOUT FRAME AND COVER, EJIW 3668 (OR EQUAL)
2. CASTING THICKNESS SUBJECT TO FOUNDRY REQUIREMENTS.
3. CASTING MUST BE SIZED TO FIT 8-INCH, D.I.P. CLASS 50 ONLY.
4. COVER SHALL BE 1/2" BELOW TOP OF PAVEMENT OR 6" BURY BELOW GRAVEL, DIRT OR R.A.P ROAD.

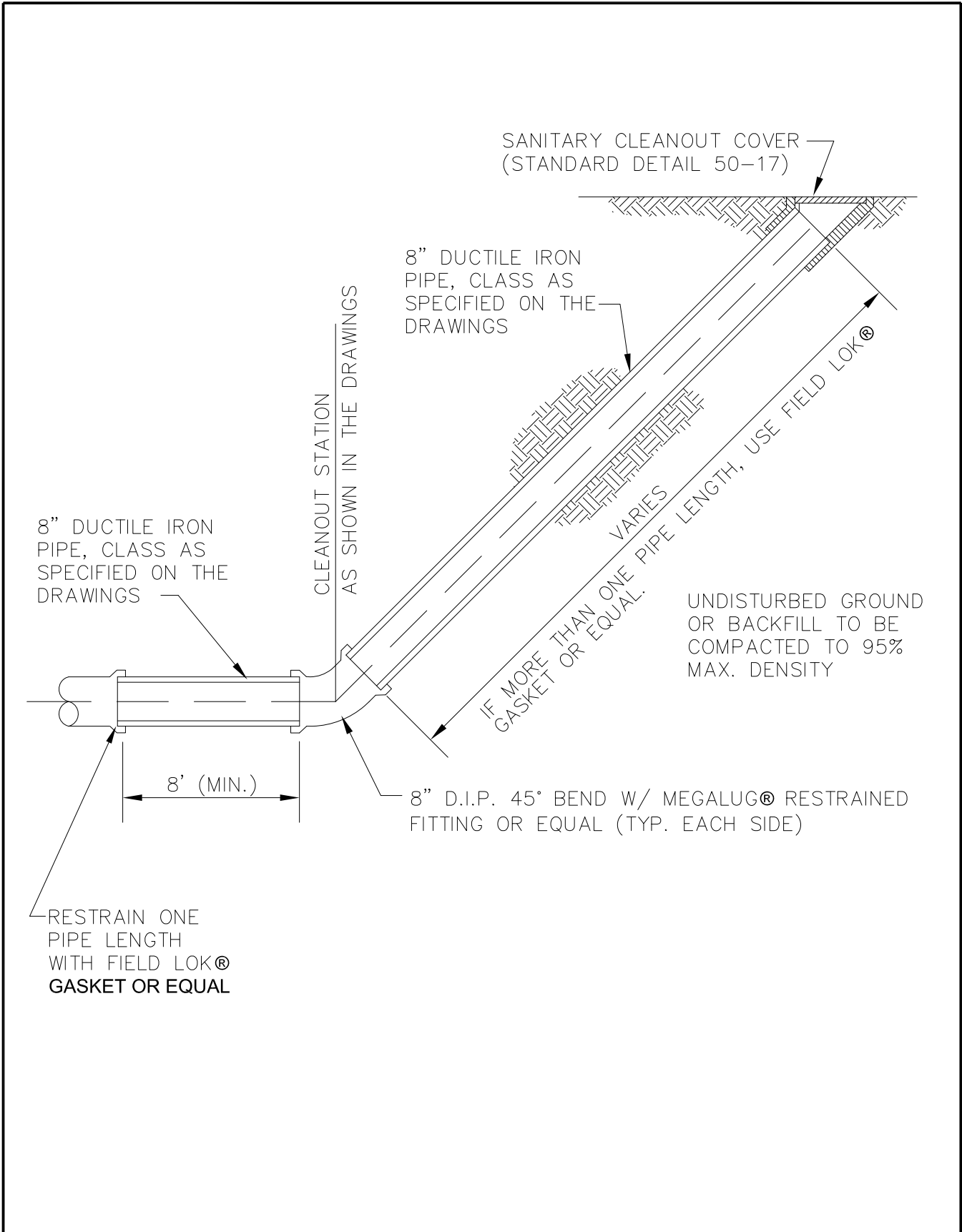


SCALE:  
 NTS  
 APPROVED:  
 REVISED:  
 4/12

**SANITARY SEWER  
 CLEANOUT COVER**

SECTION #  
 50.12

DETAIL #  
 50-17



FILE.DWG



SCALE:  
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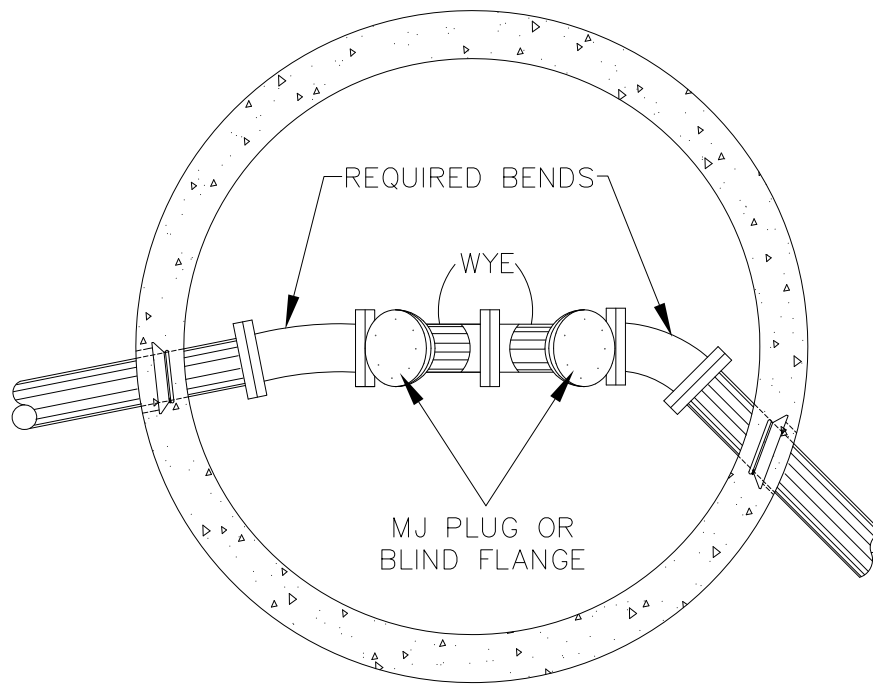
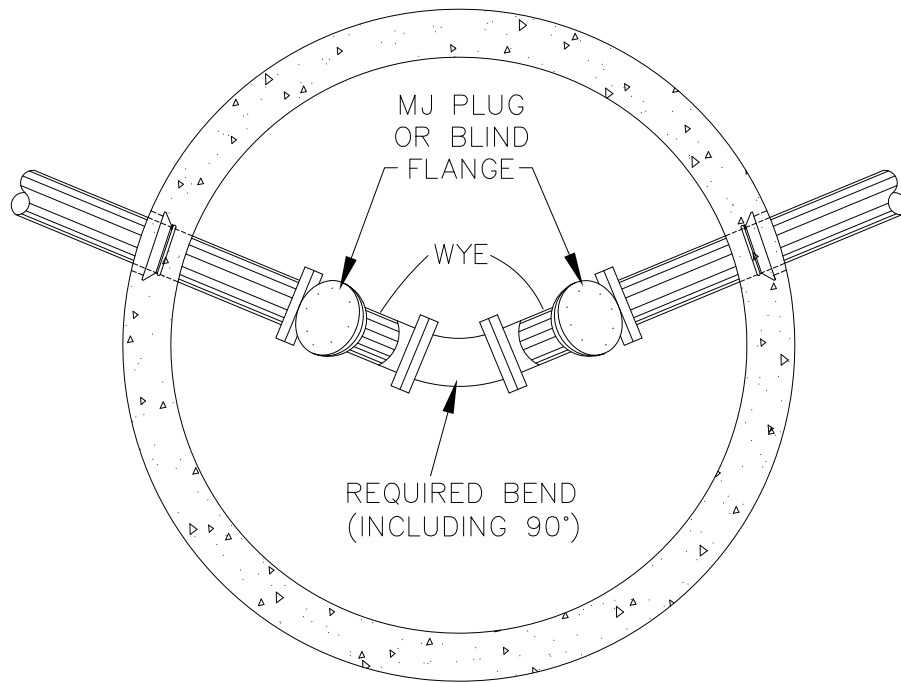
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4/12

# SANITARY CLEANOUT

SECTION #  
50.12

DETAIL #  
50-18



NOTES:

1. TYPE "B" MANHOLE (MINIMUM)
2. FITTINGS SHALL BE "SHORT BODY" AND RESTRAINED W/ MEGALUG® OR EQUAL.
3. INSTALL MASON SAND TO SPRING LINE (SEE DETAIL 50-21 OR 50-22).
4. MANHOLE LID & FRAME SHALL BE WATERTIGHT IN ACCORDANCE WITH DETAIL 50-10.



SCALE:  
NTS

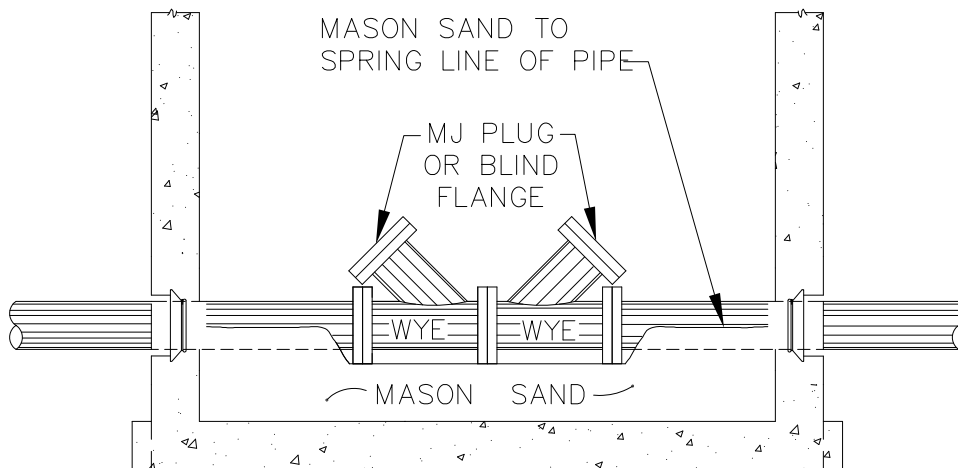
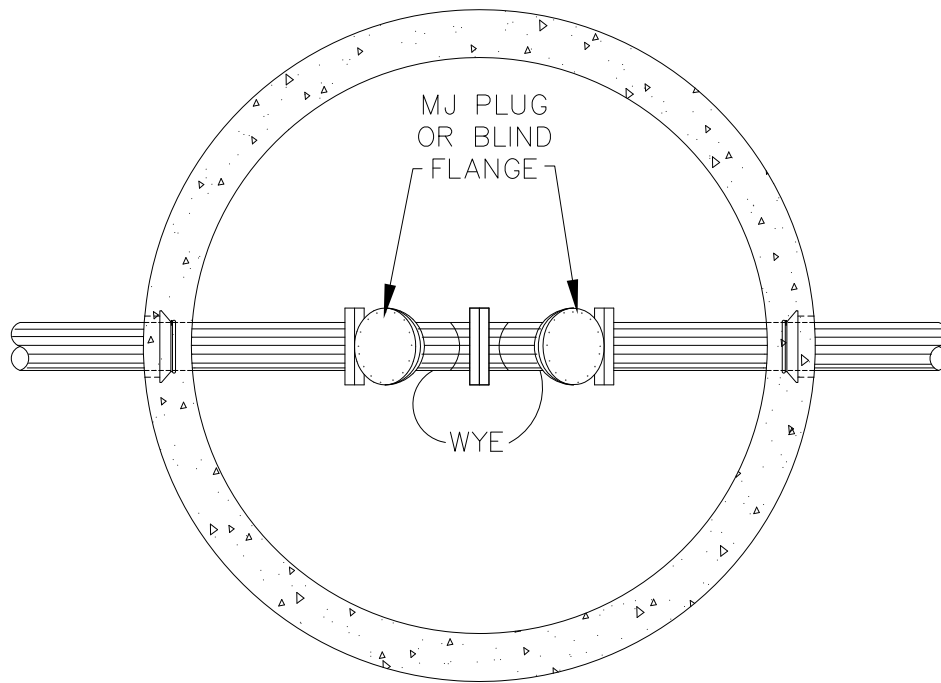
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REVISED:  
4/12

**SPECIAL MANHOLE AND  
CLEANOUT DETAIL (INSIDE  
PROTECTIVE WELL RADIUS)**

SECTION #  
DIV 50

DETAIL #  
50-19



NOTES:

1. TYPE "B" MANHOLE (MINIMUM).
2. FITTINGS SHALL BE "SHORT BODY" AND RESTRAINED W/ MEGALUG® OR EQUAL.
3. INSTALL MASON SAND TO SPRING LINE OF PIPE.
4. MANHOLE LID & FRAME SHALL BE WATERTIGHT IN ACCORDANCE WITH DETAIL 50-10.



SCALE:  
NTS

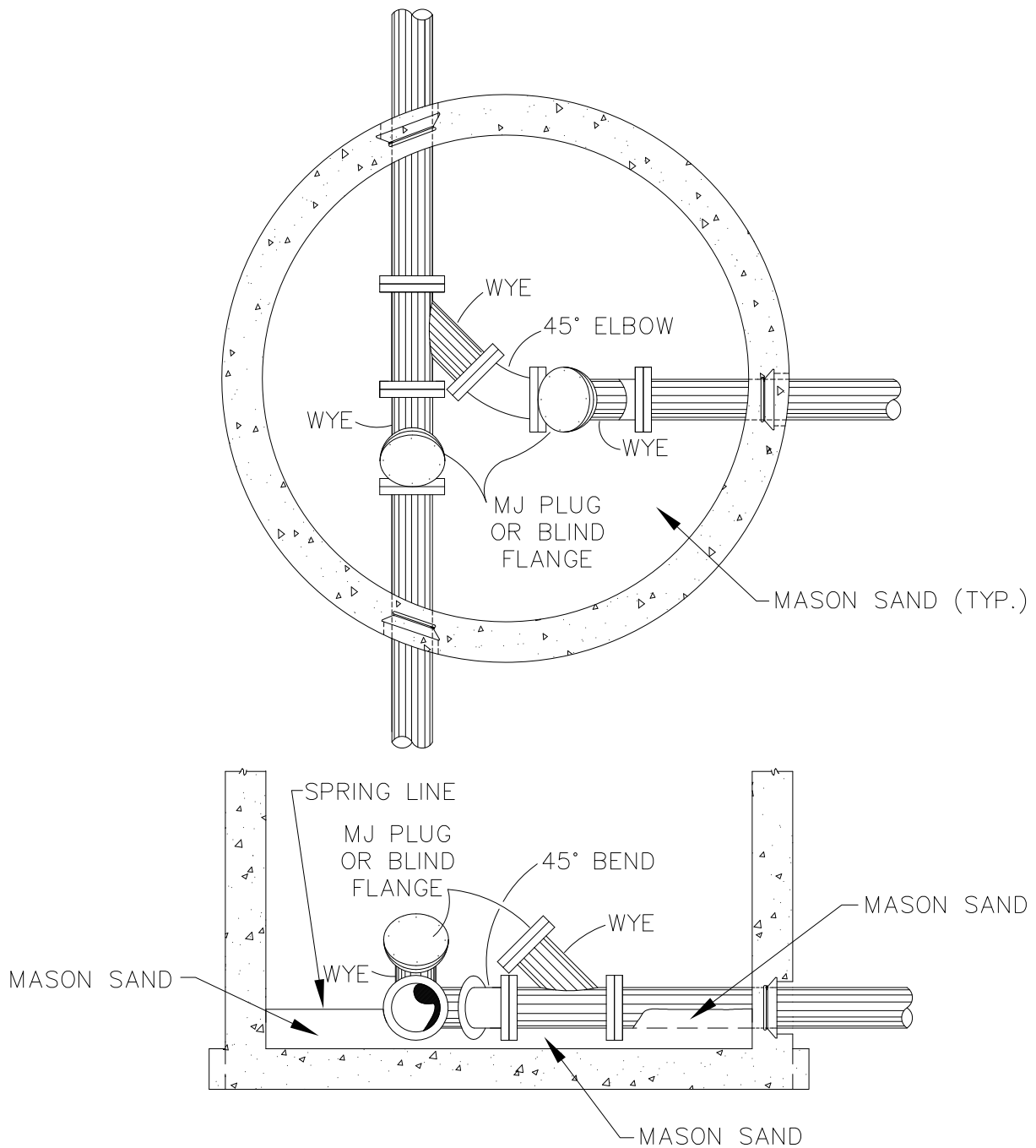
APPROVED:

REVISED:  
4/12

## SPECIAL MANHOLE AND CLEANOUT DETAIL (INSIDE PROTECTIVE WELL RADIUS)

SECTION #  
DIV 50

DETAIL #  
50-20



NOTES:

1. TYPE "B" MANHOLE (MINIMUM).
2. FITTINGS SHALL BE "SHORT BODY" AND RESTRAINED W/ MEGALUG® OR EQUAL.
3. INSTALL MASON SAND TO SPRING LINE OF PIPE.
4. MANHOLE LID AND FRAME SHALL BE WATERTIGHT IN ACCORDANCE WITH DETAIL 50-10.

FILE.DWG



SCALE:  
NTS  
APPROVED:  
REVISED:  
4/12

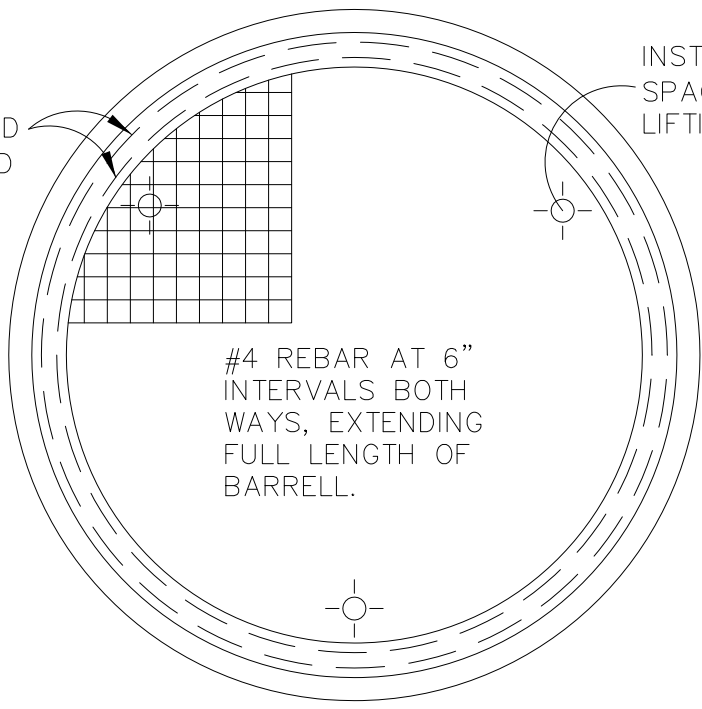
**SPECIAL MANHOLE AND  
CLEANOUT DETAIL (INSIDE  
PROTECTIVE WELL RADIUS)**

SECTION #  
DIV 50  
DETAIL #  
50-21

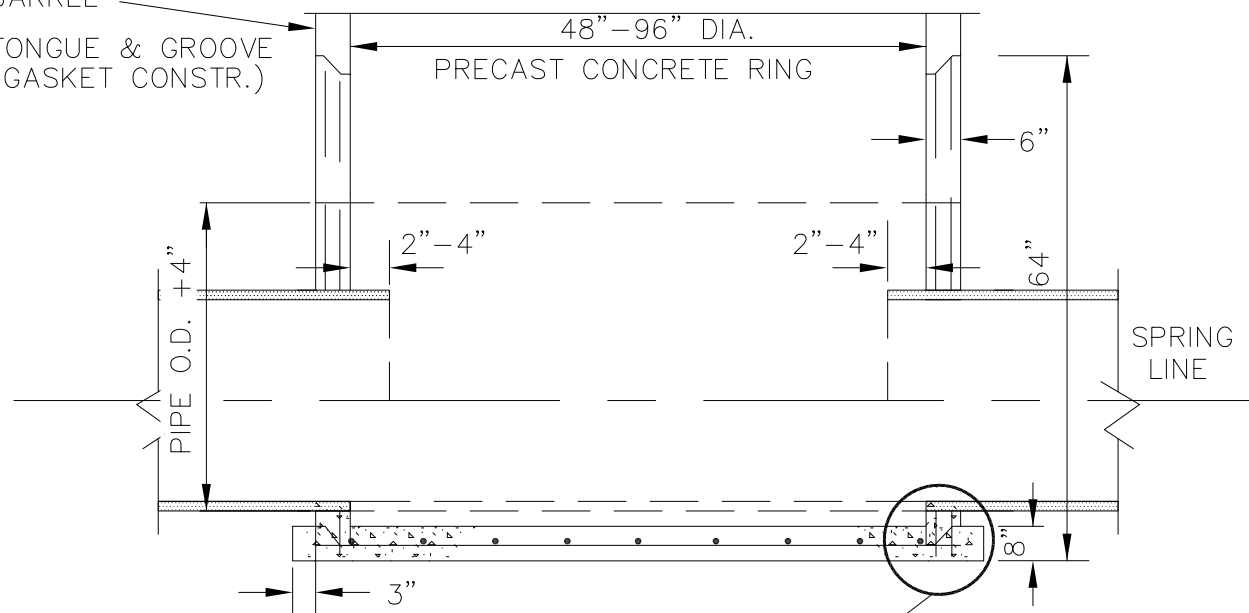
2 - #4 REBAR SPACED  
2" APART ALL AROUND  
2" & 4" FROM TOP.

INSTALL 3 EQUALLY  
SPACED (120° APART)  
LIFTING RINGS.

#4 REBAR AT 6"  
INTERVALS BOTH  
WAYS, EXTENDING  
FULL LENGTH OF  
BARRELL.



BARREL  
TONGUE & GROOVE  
(GASKET CONSTR.)



STD. TONGUE &  
GROOVE. DETAIL A  
W/RAM-NEK GASKET

NOTE: 1. NO REBAR TO EXTEND INTO PIPE OPENING.  
2. MORTAR PENETRATIONS WITH JET SET OR EQUAL



SCALE:  
NTS  
APPROVED:  
REVISED:  
4/12

# HORSE SHOE SANITARY SEWER MANHOLE DETAIL

SECTION #  
50.03  
DETAIL #  
50-22

FILE.DWG

(DIRECTION ON STREET) S. ON ARCTIC PROJECT NAME SIZE "DI CL-50 SEWER"					
STA	+	H.I.	-	T.B.M. EL.	INV. EL.
(23+36.98)	5.64	74.70		69.06	
24+52.18	SSMH C #4				
24+53.88	N. INV.=	65.20			65.17
24+71.99	RT (24+58.2)	4" S/S L-9, B-2	8.80 65.90		65.24
24+90.13	LT (24+84)	4" S/S L-4, B-1	8.70 66.00		65.32
25+08.19	RT (24+87)	4" S/S L-8, B-2	8.70 66.00		65.39
25+25.90	RT (25+16.2)	4" S/S L-7, B-2	8.60 66.10		65.46
25+44.00	RT (25+40.2)	4" S/S L-6, B-2	8.50 66.20		65.53
25+62.10	RT (25+66.1)	4" S/S L-5, B-2	8.40 66.30		65.60
25+70.75	S. INV.=	65.67			65.64
24+72.45	SSMH C #5				
(23+36.98)	5.38	74.44		69.06	
24+72.45	SSMH C #5				
25+74.15	NW. INV.=	65.77			65.74
25+92.28	RT (25+78.4)	4" S/S L-4, B-2	7.99 66.45		65.81
26+10.38	RT (26+07)	4" S/S L-3, B-2	7.89 66.55		65.89
26+28.48	LT (26+14)	4" S/S L-3, B-1	7.84 66.60		65.96
26+46.58	RT (26+43.5)	4" S/S L-2, B-2	7.74 66.70		66.03
26+64.71	LT (26+49.6)	4" S/S L-2, B-1	7.69 66.75		66.10
26+77.85	8" 45 C C.O.	INV.= 66.18			66.16
	RT (26+71.5)	4" S/S L-1, B-2	7.64 66.80		

CONTRACTOR NAME				PAGE#	①
LINE & GRADE PERSON NAME				DAY & DATE	
ROD INV.	ROD T.O.P.	FOOTAGE	TIME/SET	SLOPE/DESCR.	
(15)	SSMH#3				
		0.00			
9.53	8.78	1.70		S = +0.004/FT.	
9.46	8.71	18.11 19.81	8:00	+0.07/JNT	
9.38	8.63	18.14 37.95	8:20		
9.31	8.56	18.06 56.01	8:35	SERVICE TAP STA & DIR.	
9.24	8.49	17.71 73.72	8:55	SIZE, LOT, BLOCK MAY GO HERE OR AT THE LEFT	
9.17	8.42	18.10 91.82	9:10		
9.10	8.35	18.10 109.92	9:20		
9.06	8.31	8.65 118.57	9:30		
		1.70 120.27	10:00		
(15)	SSMH#3				
		0.00			
8.70	7.95	1.70		S = +0.004/FT.	
8.63	7.88	18.13 19.83	10:30	0.07/JNT	
8.55	7.80	18.10 37.93	10:45		
8.48	7.73	18.10 56.03	11:00		
8.41	7.66	18.10 74.13	11:15		
8.34	7.59	18.13 92.26	11:30		
8.28	7.53	13.14 105.40	12:00		
		105.40			

USE INVERT ELEVATIONS (INV) FOR SEWER  
USE BOTTOM OF PIPE ELEVATIONS (BOP) FOR WATER

FILE.DWG

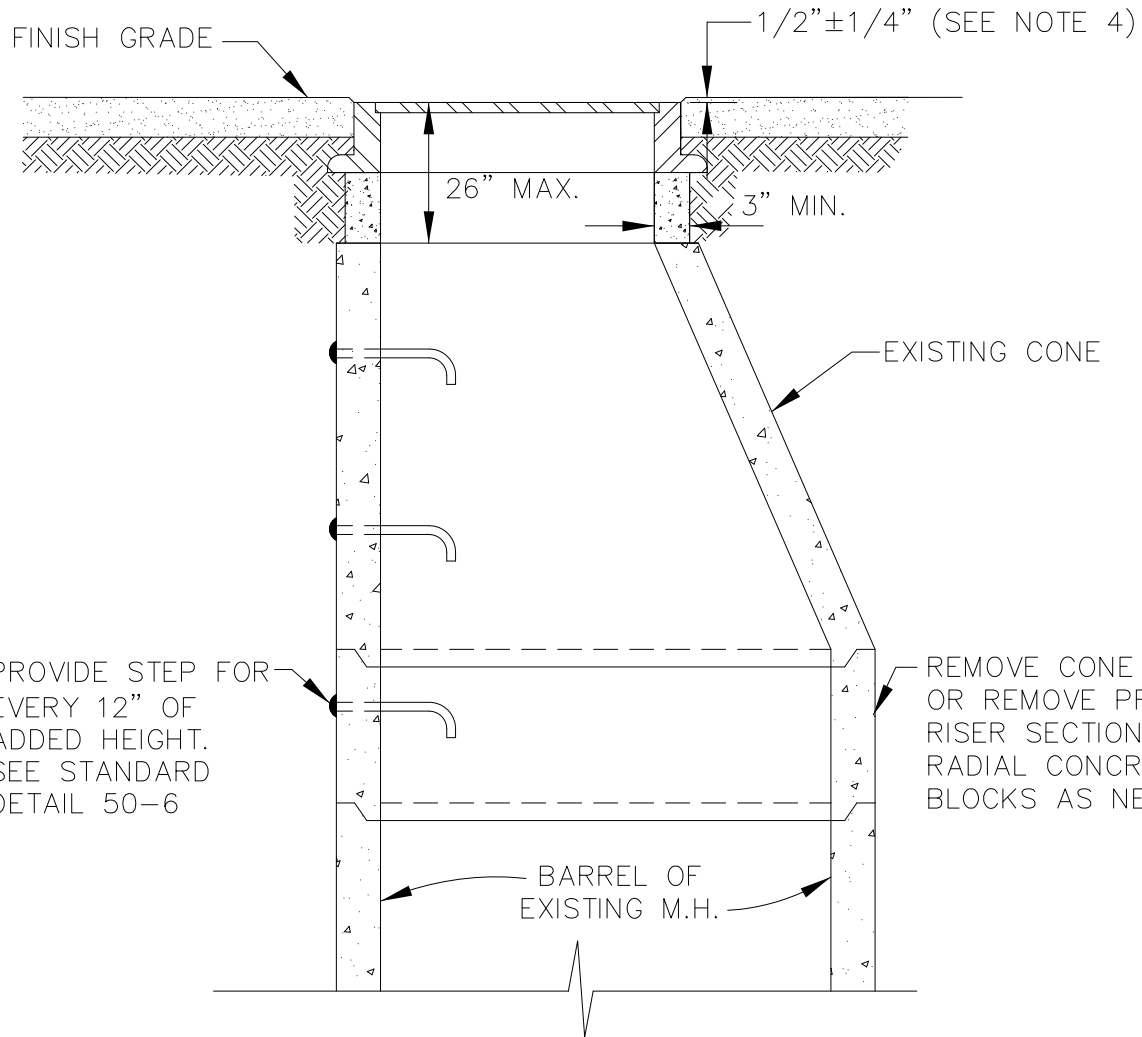


SCALE:  
NTS  
APPROVED:  
REVISED:  
4/12

# CONTRACTOR FIELD INSTALLATION NOTES SANITARY EXAMPLE

SECTION #  
DIV 50  
DETAIL #  
50-23





PROVIDE STEP FOR EVERY 12" OF ADDED HEIGHT. SEE STANDARD DETAIL 50-6

REMOVE CONE & ADD OR REMOVE PRECAST RISER SECTIONS OR RADIAL CONCRETE M.H. BLOCKS AS NEEDED.

BARREL OF EXISTING M.H.

NOTES:

1. RESET CONCRETE GRADE RING IN FULL BED OF MORTAR.
2. REFER TO ASTM DESIGNATION C-478 FOR DESIGN AND STRENGTH REQUIREMENTS.
3. RESET CONE IN RAM-NEK OR EQUAL.
4. ADJUST FRAME TO A DEPTH OF 1/2" BELOW SURFACE OF PAVEMENT. FEATHER EDGE OF PAVEMENT TO SMOOTH TRANSITION.

FILE.DWG



SCALE:  
NTS

APPROVED:

REVISED:  
4/12

## MANHOLE CONE ADJUSTMENT

SECTION #  
50.19

DETAIL #  
50-24

SET MANHOLE GRADE RING IN FULL BED OF MORTAR

FINISH GRADE

$1/2" \pm 1/4"$   
(SEE NOTE 3)

REMOVE M.H. FRAME & ADD OR REMOVE GRADE RINGS AS REQUIRED TO MEET FINISH GRADE

26" MAX.

30" MAX.

24"

12" MAX. HEIGHT OF TALLEST GRADE RING

EXISTING M.H. CONE

NOTES:

1. REFER TO ASTM DESIGNATION C-478 FOR DESIGN AND STRENGTH REQUIREMENTS.
2. WHEN AN ADJUSTMENT OF GREATER THAN 18" IN GRADE RINGS IS REQUIRED, ADJUST CONE I.A.W. STANDARD DETAIL 50-24 RATHER THAN GRADE RINGS.
3. IF NECESSARY, SHIM MANHOLE FRAME WITH STUD WASHERS, TO ADJUST FRAME TO A DEPTH OF  $1/2"$  BELOW SURFACE OF PAVEMENT. FEATHER EDGE OF PAVEMENT TO SMOOTH TRANSITION. WHEN SHIMS ARE USED, SET MANHOLE FRAME IN A FULL BED OF MORTAR WITH SHIMS.



SCALE:  
NTS

APPROVED:

REVISED:  
4/12

# MANHOLE RING ADJUSTMENT

SECTION #  
50.20

DETAIL #  
50-25

FILE.DWG