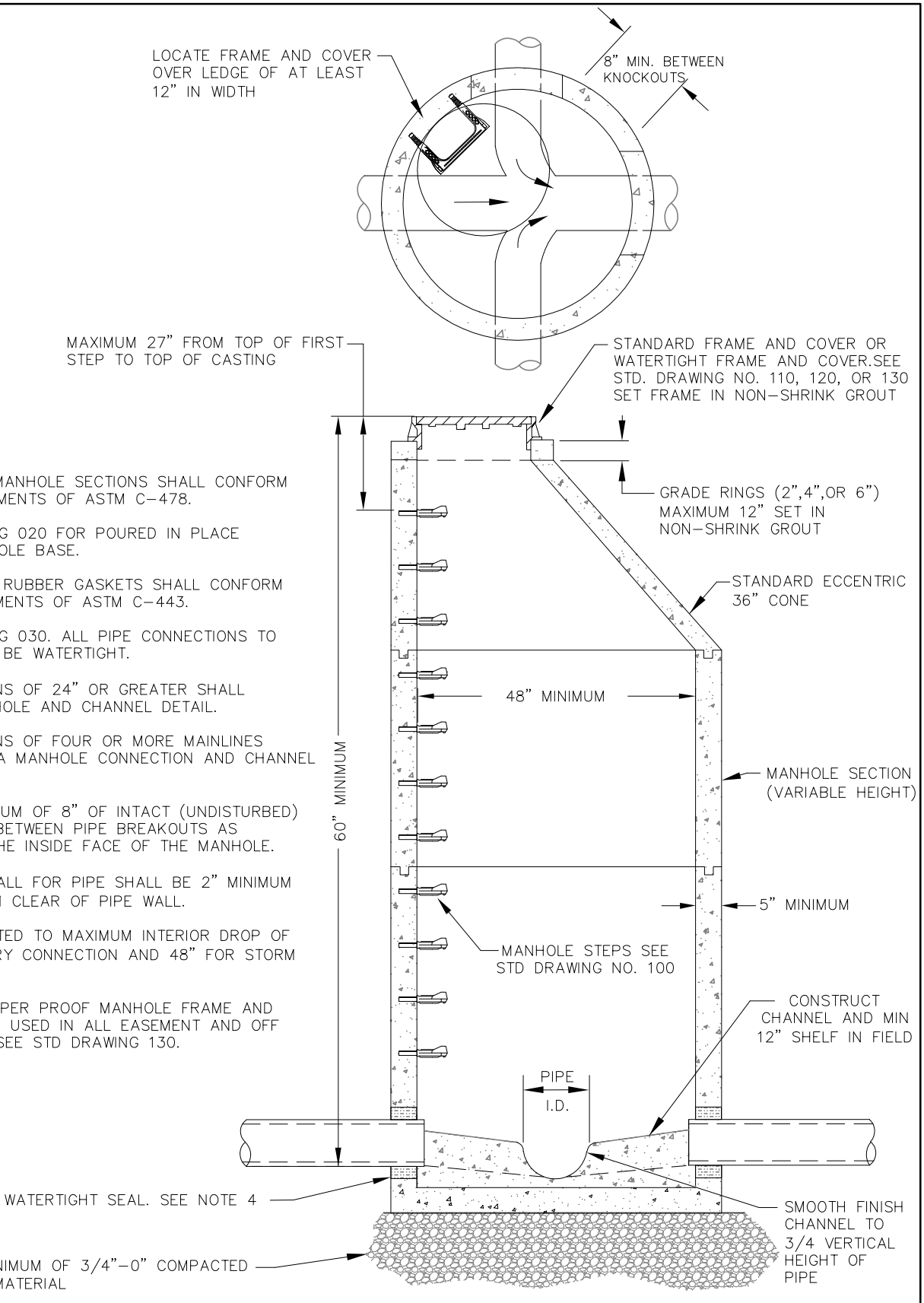


NOTES:

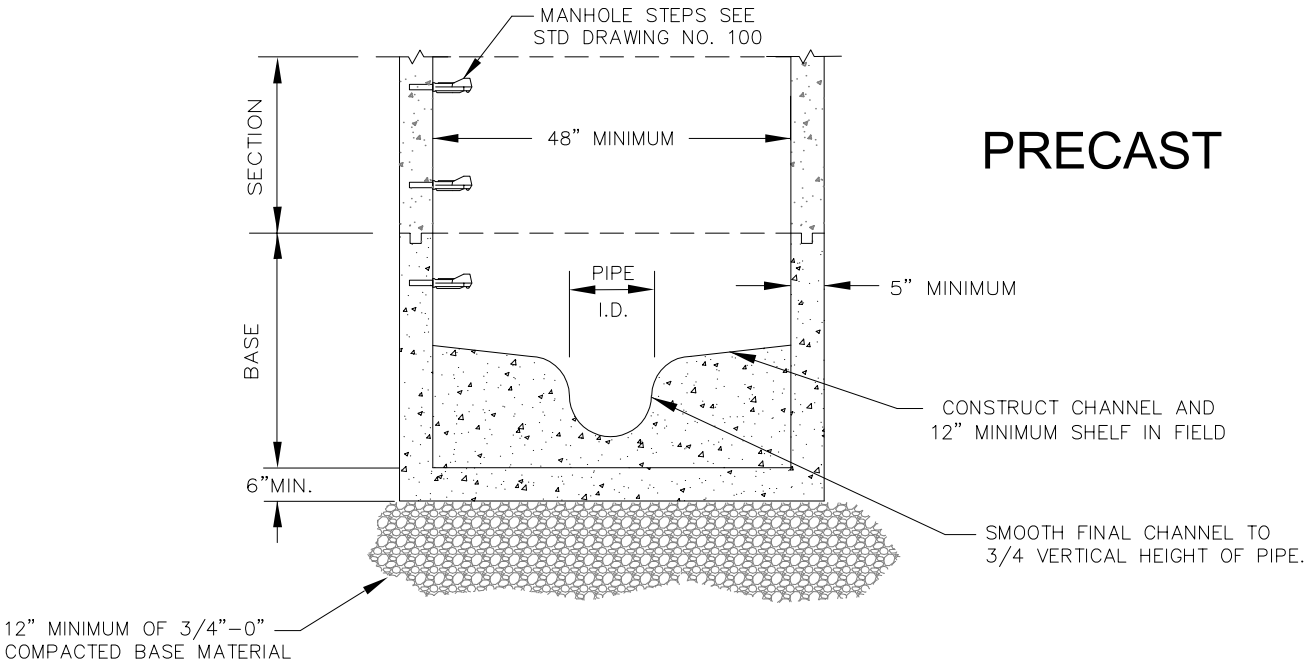
1. ALL PRE-CAST MANHOLE SECTIONS SHALL CONFORM TO THE REQUIREMENTS OF ASTM C-478.
2. SEE STD DRAWING 020 FOR POURED IN PLACE CONCRETE MANHOLE BASE.
3. ALL JOINTS AND RUBBER GASKETS SHALL CONFORM TO THE REQUIREMENTS OF ASTM C-443.
4. SEE STD DRAWING 030. ALL PIPE CONNECTIONS TO MANHOLE SHALL BE WATERTIGHT.
5. PIPE CONNECTIONS OF 24" OR GREATER SHALL REQUIRE A MANHOLE AND CHANNEL DETAIL.
6. PIPE CONNECTIONS OF FOUR OR MORE MAINLINES SHALL REQUIRE A MANHOLE CONNECTION AND CHANNEL DETAIL.
7. PROVIDE A MINIMUM OF 8" OF INTACT (UNDISTURBED) MANHOLE WALL BETWEEN PIPE BREAKOUTS AS MEASURED ON THE INSIDE FACE OF THE MANHOLE.
8. BREAKOUT OF WALL FOR PIPE SHALL BE 2" MINIMUM AND 4" MAXIMUM CLEAR OF PIPE WALL.
9. THIS DETAIL LIMITED TO MAXIMUM INTERIOR DROP OF 12" FOR SANITARY CONNECTION AND 48" FOR STORM CONNECTION.
10. WATERTIGHT/TAMPER PROOF MANHOLE FRAME AND COVER SHALL BE USED IN ALL EASEMENT AND OFF STREET AREAS. SEE STD DRAWING 130.

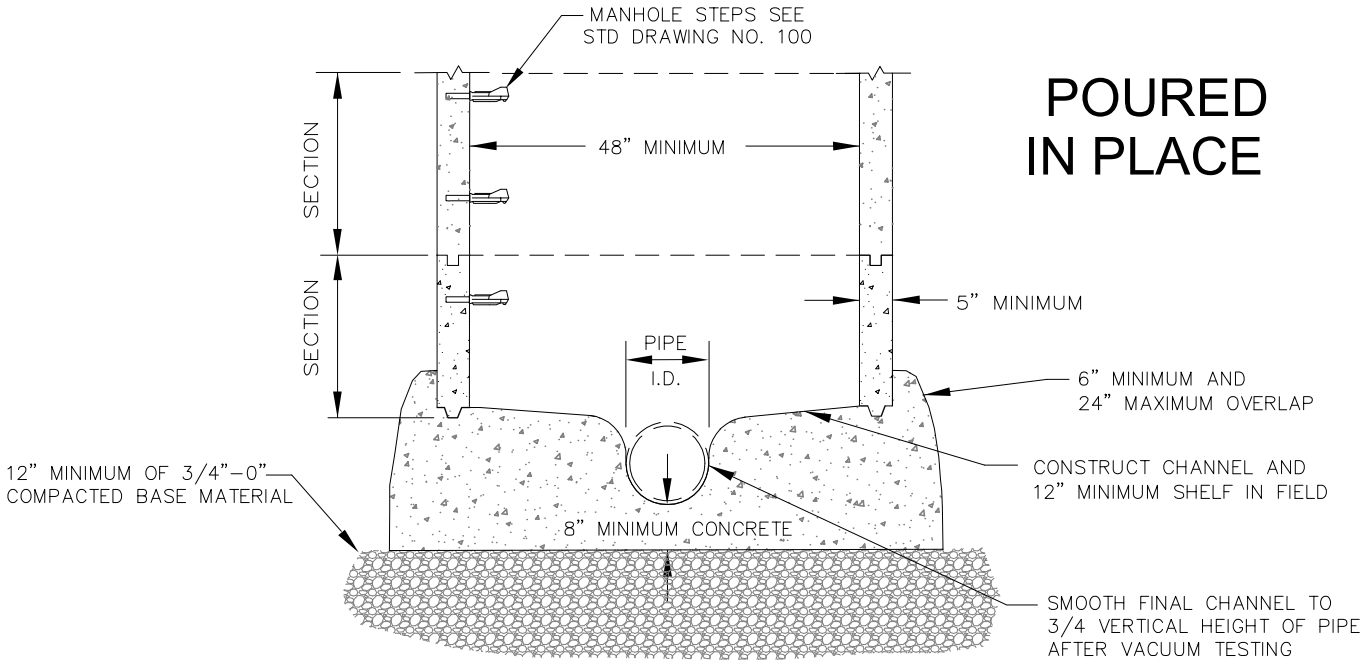
STANDARD MANHOLE

DRAWING NO. 010

REVISED 10-31-19

Clean Water Services





NOTES:

1. ALL MANHOLE SECTIONS SHALL CONFORM TO THE REQUIREMENTS OF ASTM C-478 AND APPLICABLE PROVISIONS OF STANDARD MANHOLE, DRAWING NO. 010.

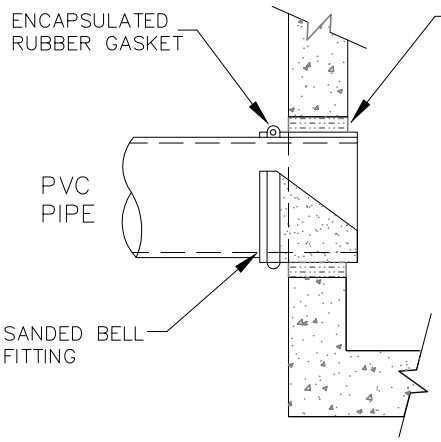
2. ALL POURED IN PLACE CONCRETE SHALL HAVE A 28 DAY STRENGTH OF 3000 PSI AND A SLUMP OF 2" TO 4".

PRE-CAST/POURED IN PLACE MANHOLE BASE

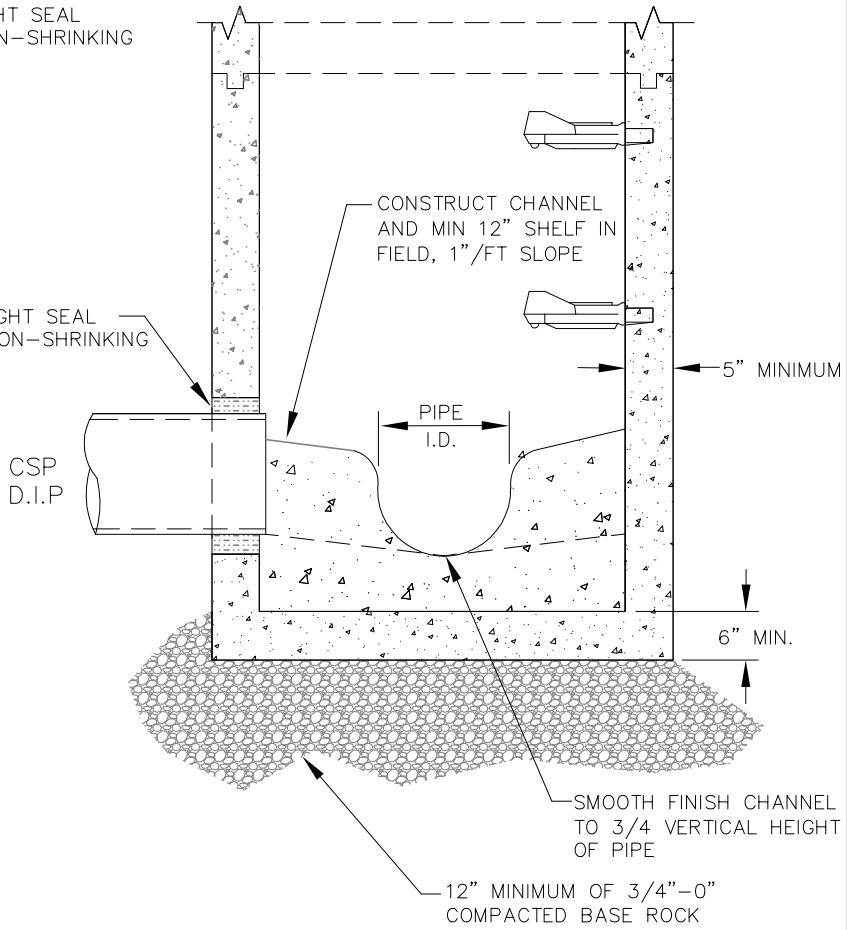
DRAWING NO. 020

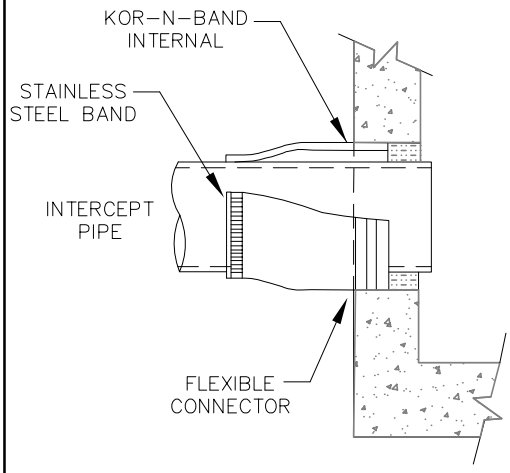
REVISED 10-31-19

Clean Water Services

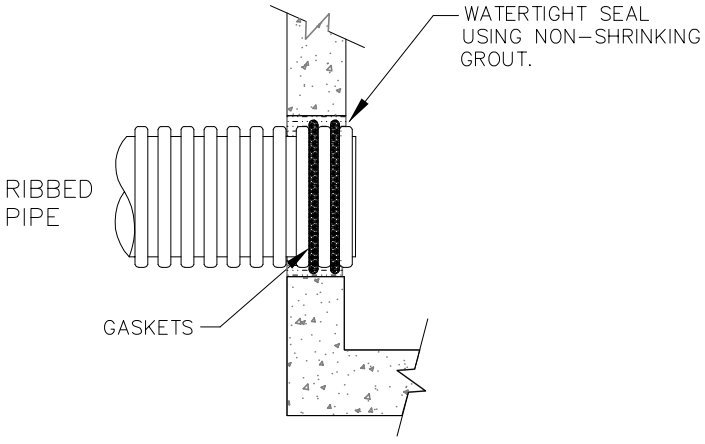


PVC SANDED BELL





KOR-N-SEAL BOOT



RIBBED PIPE WITH GASKETS

NOTES:

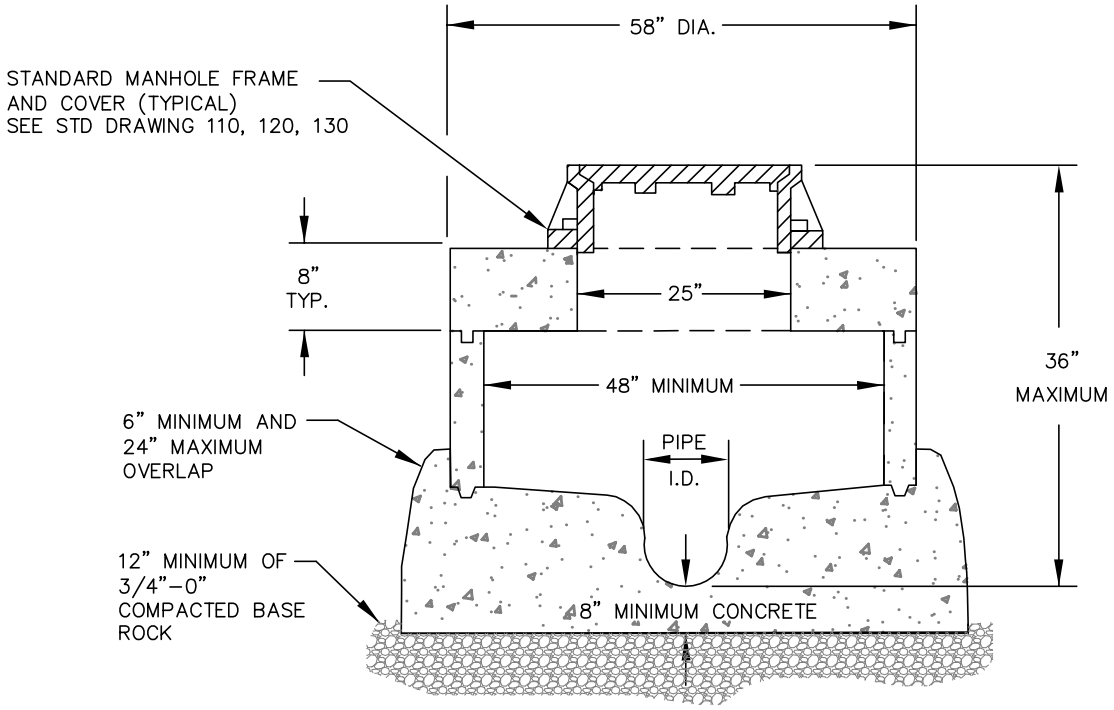
1. ALL PRE-CAST MANHOLE SECTIONS SHALL CONFORM TO THE REQUIREMENTS OF ASTM C-478 AND APPLICABLE PROVISIONS OF STANDARD DRAWING NO. 010.
2. ALTERNATE METHODS TO BE APPROVED BY CITY/DISTRICT.
3. BOOTS TO BE SIZED PER MANUFACTURER'S RECOMMENDATIONS/SPECIFICATIONS.

MANHOLE CONNECTIONS

DRAWING NO. 030

REVISED 10-31-19

Clean Water Services



NOTES:

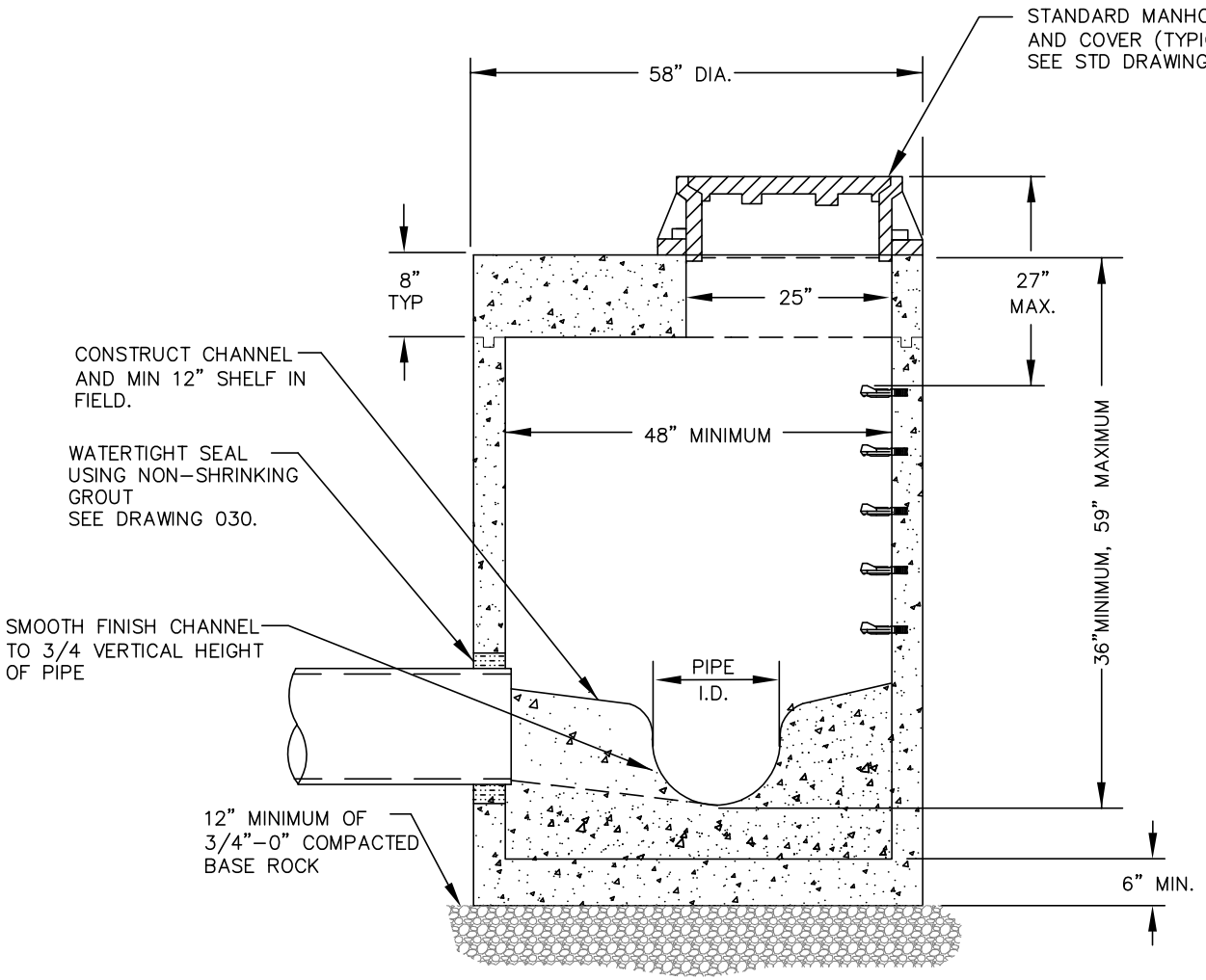
1. ALL JOINTS AND RUBBER GASKETS SHALL CONFORM TO THE REQUIREMENTS OF ASTM C-433.
2. ALL MANHOLE SECTIONS SHALL CONFORM TO THE REQUIREMENTS OF ASTM C-478 AND APPLICABLE PROVISIONS OF STANDARD MANHOLE, SEE STD DRAWING NO. 010.
3. CENTER OPENING FLATOP REQUIRED.
4. NO STEPS ALLOWED IN SHALLOW FLATTOP MANHOLE.
5. ALL POURED IN PLACE CONCRETE SHALL HAVE A 28 DAY STRENGTH OF 3000 PSI AND A SLUMP OF 2" TO 4".
6. SEE DRAWING 030 FOR WATERTIGHT MANHOLE CONNECTIONS.
7. ALL MANHOLE FLAT TOPS SHALL CONFORM TO ASTM C-478 AND ARE DESIGNED TO MEET H-20 TRAFFIC LOADING.

SHALLOW FLAT TOP MANHOLE

DRAWING NO. 040

REVISED 10-31-19

Clean Water Services



FLAT TOP

NOTES:

1. ALL JOINTS AND RUBBER GASKETS SHALL CONFORM TO THE REQUIREMENTS OF ASTM C-433.
2. ALL MANHOLE SECTIONS SHALL CONFORM TO THE REQUIREMENTS OF ASTM C-478 AND APPLICABLE PROVISIONS OF STANDARD MANHOLE, SEE STD DRAWING NO. 010.
3. STEPS REQUIRED ON FLAT TOP MANHOLES DEEPER THAN 48" FROM FINISHED GRADE TO I.E. OUT.
4. SEE DRAWING 030 FOR WATERTIGHT MANHOLE CONNECTIONS.
5. ALL MANHOLE FLAT TOPS SHALL CONFORM TO ASTM C-478 AND ARE DESIGNED TO MEET H-20 TRAFFIC LOADING.

FLAT TOP MANHOLE

DRAWING NO. 050

REVISED 10-31-19

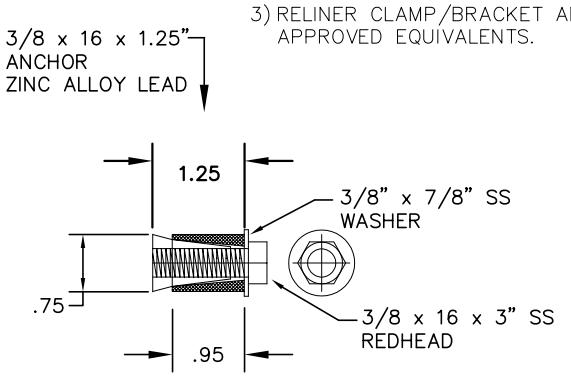
Clean Water Services

SPECIFICATIONS:

1) CLAMP AND BRACKETS ARE TYPE 304 STAINLESS STEEL, 11 GAUGE (.1196").

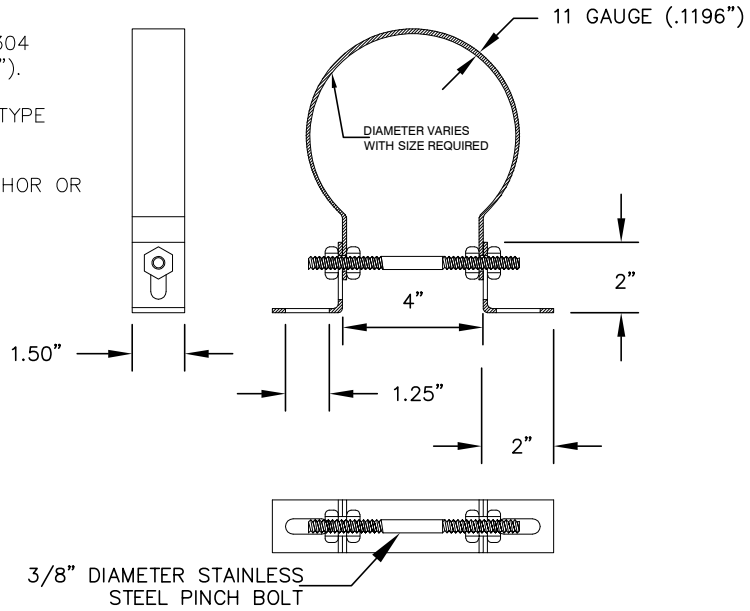
2) 3/8" ø PINCH BOLT AND NUTS IS TYPE 18–8 STAINLESS STEEL.

3) RELINER CLAMP/BRACKET AND ANCHOR OR APPROVED EQUIVALENTS.



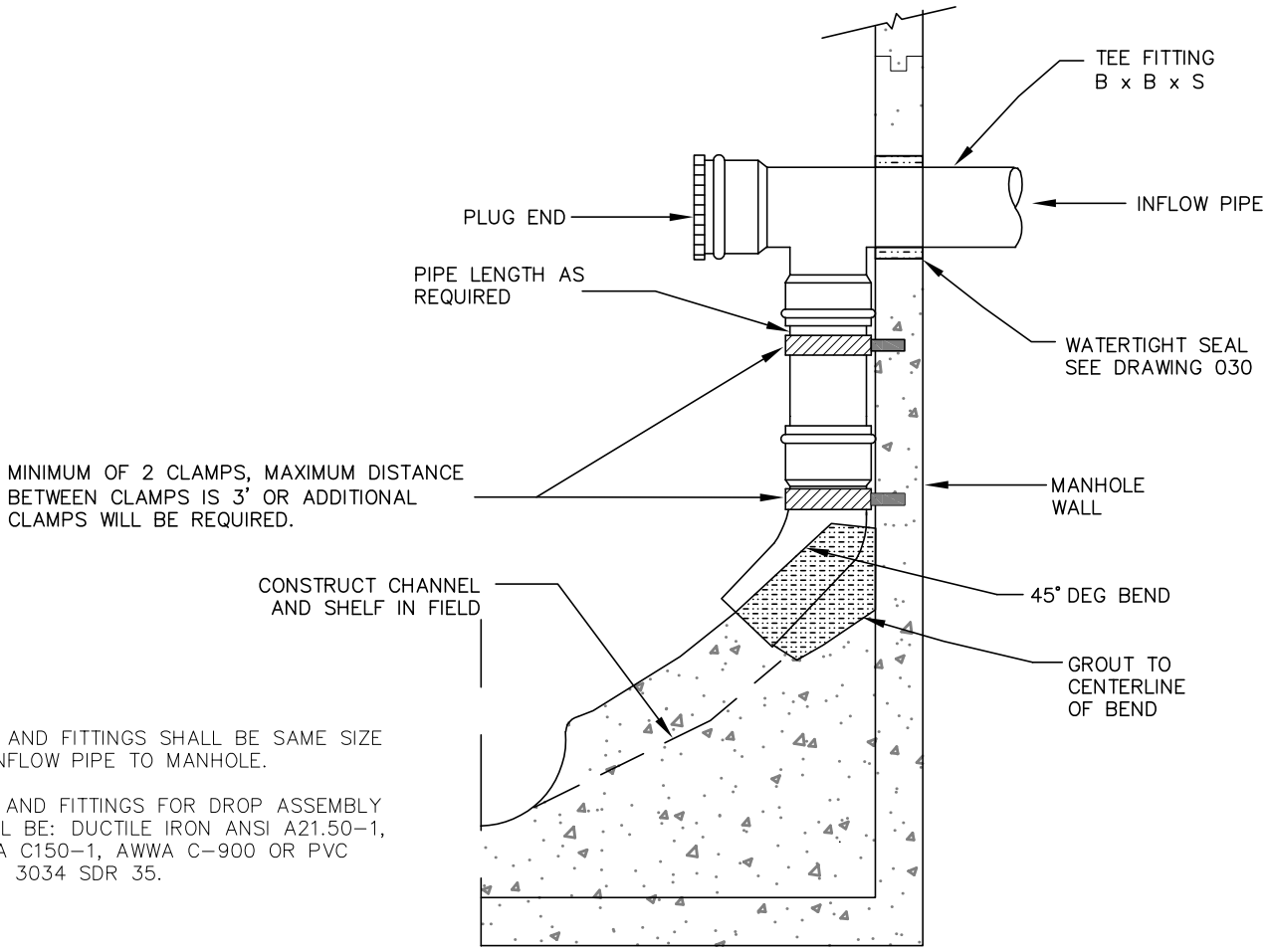
ANCHOR DETAIL

N.T.S.



CLAMP DETAIL

N.T.S.



NOTES:

1. PIPE AND FITTINGS SHALL BE SAME SIZE AS INFLOW PIPE TO MANHOLE.

2. PIPE AND FITTINGS FOR DROP ASSEMBLY SHALL BE: DUCTILE IRON ANSI A21.50–1, AWWA C150–1, AWWA C–900 OR PVC ASTM 3034 SDR 35.

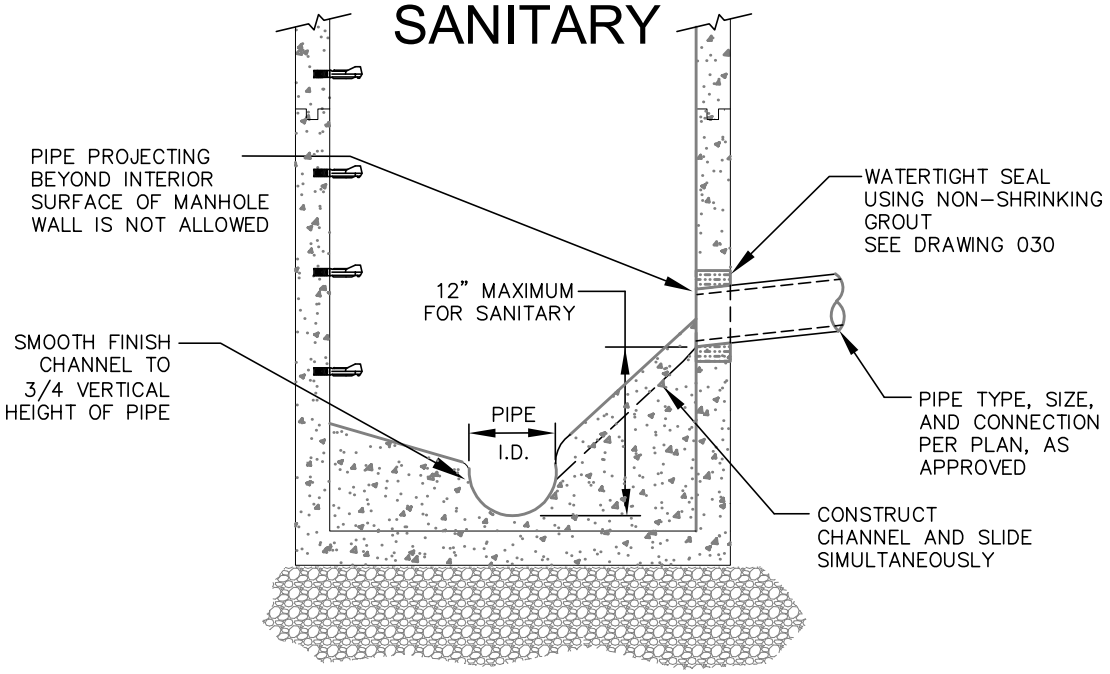
MECHANICAL INSIDE DROP MANHOLE

DRAWING NO. 060

REVISED 10–31–19

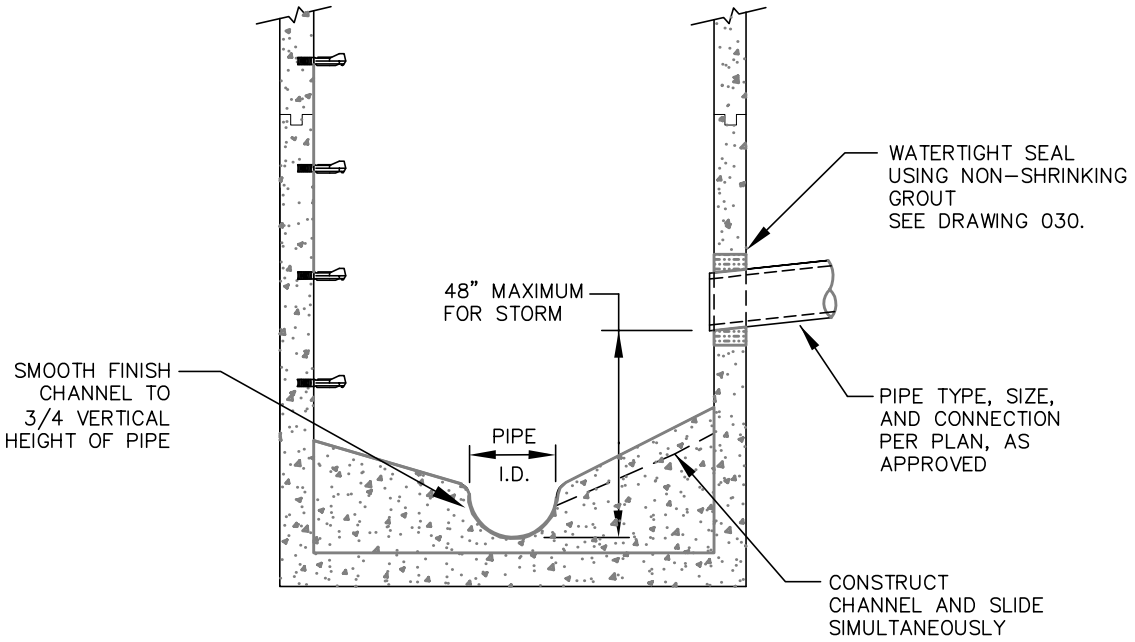
Clean Water Services

SANITARY



OPEN INSIDE DROP WITH BEAVER SLIDE

STORM



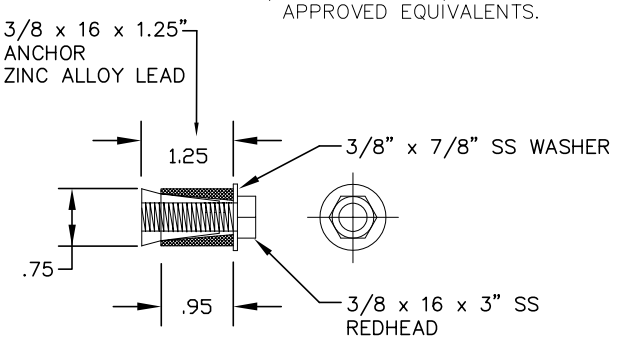
OPEN INSIDE DROP MANHOLE

DRAWING NO. 080

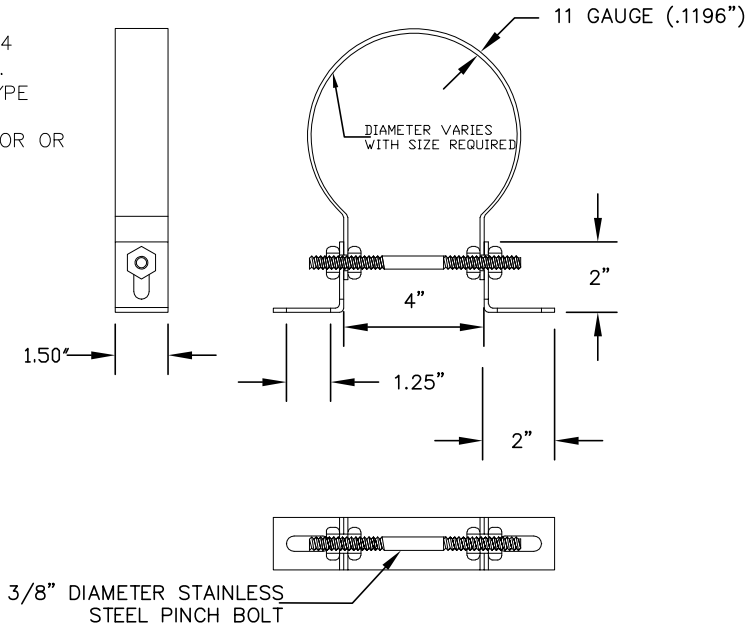
REVISED 10-31-19

Clean Water Services

SPECIFICATIONS:
1) CLAMP AND BRACKETS ARE TYPE 304 STAINLESS STEEL, 11 GAUGE (.1196").
2) 3/8" ø PINCH BOLT AND NUTS IS TYPE 18–8 STAINLESS STEEL.
3) RELINER CLAMP/BRACKET AND ANCHOR OR APPROVED EQUIVALENTS.



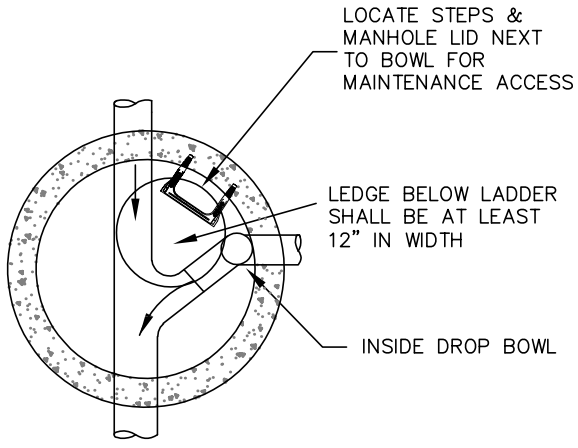
ANCHOR DETAIL
N.T.S.

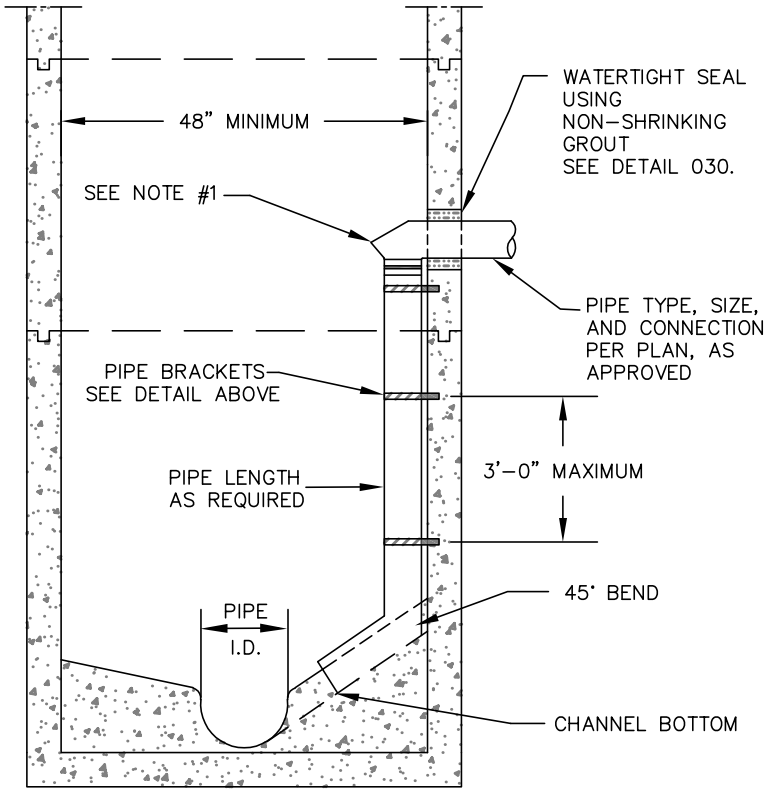


CLAMP DETAIL
N.T.S.

NOTES:

1. DROP BOWL AS MANUFACTURED BY RELINER–DURAN INC. OR APPROVED EQUAL.
2. DROP BOWL TO BE SIZED PER MANUFACTURER'S RECOMMENDATIONS (INFORMATION AVAILABLE @ RELINER.COM) OR AS REQUIRED BY DISTRICT OR CITY.
3. PIPE AND FITTING FOR DROP ASSEMBLY SHALL BE: AWWA CL50–1, AWWA C–900 OR PVC ASTM 3034 SDR 35.
4. NO MORE THAN ONE DROP BOWL PER MANHOLE WITHOUT WRITTEN APPROVAL BY DISTRICT OR CITY.
5. WRITTEN APPROVAL BY DISTRICT OR CITY IS REQUIRED FOR DROP BOWL INSTALLATION ON PIPELINES WITH A SLOPE OF 5% OR GREATER.



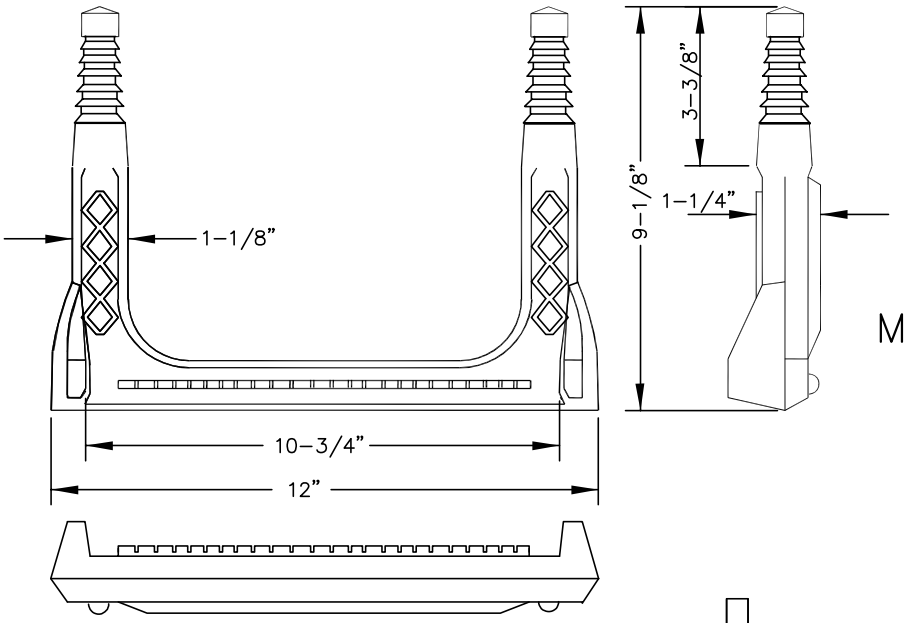


INSIDE DROP MANHOLE W/BOWL

DRAWING NO. 090

REVISED 10–31–19

Clean Water Services

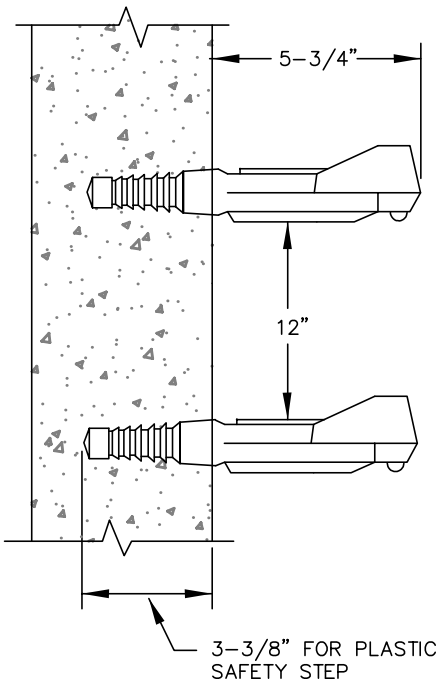


COPOLYMER POLYPROPYLENE PLASTIC

MATERIALS:

PLASTIC:

MUST CONFORM WITH ASTM C-478. STEEL REINFORCING BAR MINIMUM 1/2" GRADE 60. MEETING REQUIREMENTS OF ASTM A-615 ENCAPSULATED WITH INJECTION MOLDED COPOLYMER POLYPROPYLENE WITH SERRATED SURFACES.



NOTES:

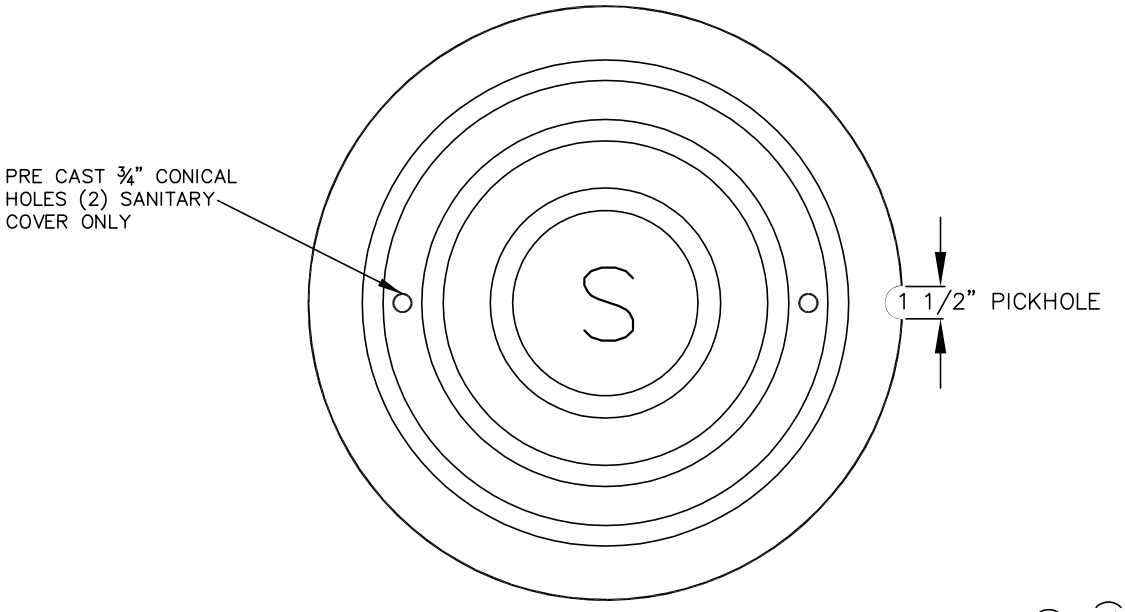
1. ALL STEPS SHALL CONFORM TO THE REQUIREMENTS OF ASTM C-478.
2. MANHOLE STEPS MUST BE TIGHT AND FIRMLY EMBEDDED.
3. ALL STEPS WITHIN A MANHOLE SHALL BE OF THE SAME DESIGN, TYPE, AND SIZE. (MIXING OF UNMATCHED STEPS IS NOT PERMITTED).
4. STEPS ADJUSTED OR ADDED SHALL BE EPOXIED IN HOLES THAT ARE FREE OF MOISTURE AND DEBRIS. (EPOXY TO MEET ASTM C881).

MANHOLE STEP

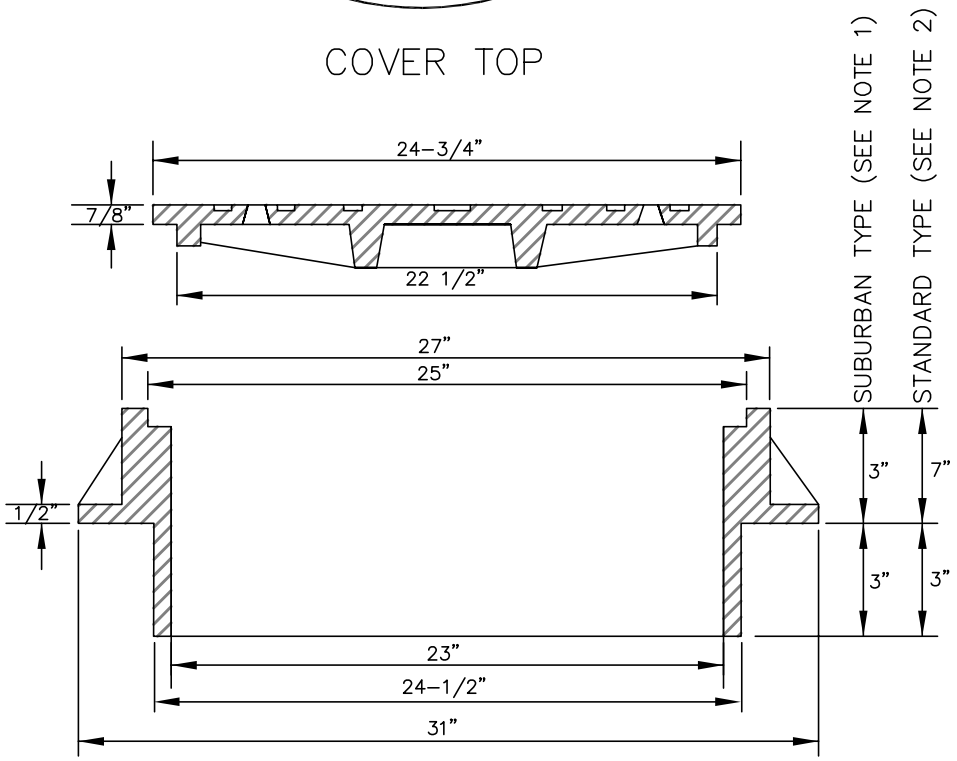
DRAWING NO. 100

REVISED 10-31-19

Clean Water Services



COVER TOP



SECTION VIEW

NOTES:

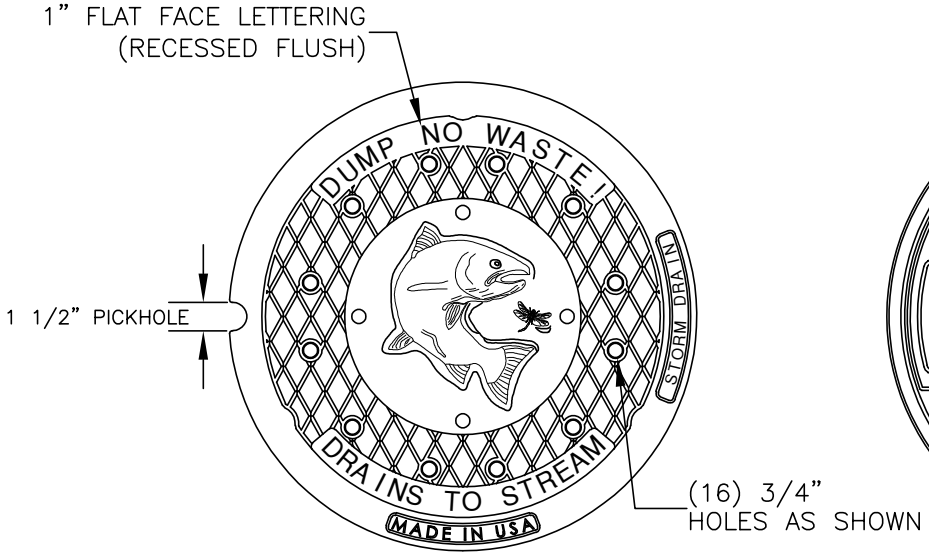
1. SUBURBAN TYPE FOR USE IN TRAFFIC AREAS OF LOCAL AND NEIGHBORHOOD STREETS.
2. STANDARD TYPE FOR USE IN TRAFFIC AREAS OF COLLECTOR AND ARTERIAL STREETS.
3. COVER AND FRAME SHALL BE GRAY CAST IRON ASTM A–48 CLASS 30.
4. COVER AND FRAME TO BE MACHINED TO A TRUE BEARING ALL AROUND.
5. 1 1/2" PICKHOLE IN LID FOR LIFTING HOOK.

SUBURBAN AND STANDARD MANHOLE FRAME AND COVER SANITARY

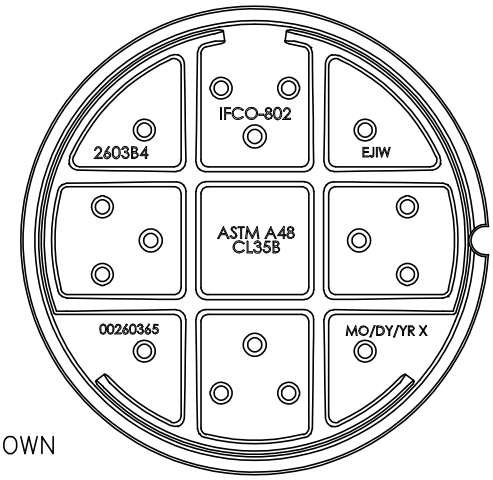
DRAWING NO. 110

REVISED 10–31–19

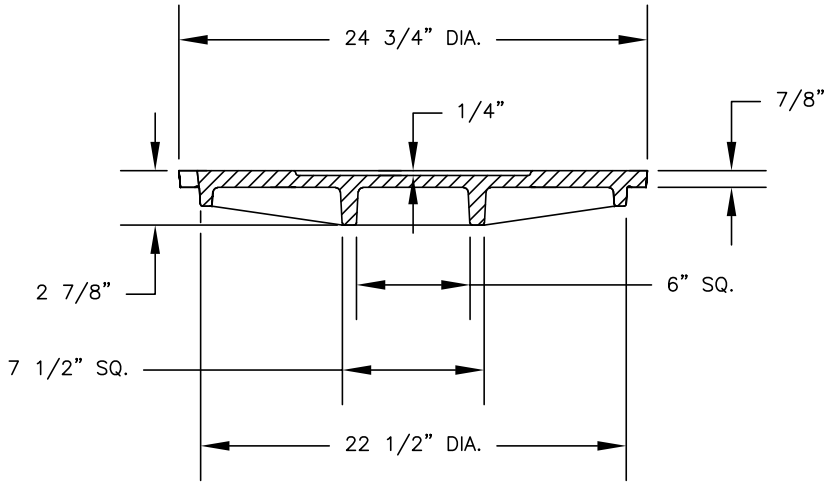
Clean Water Services



COVER TOP



COVER BACK



SECTION VIEW

SEE DETAIL #110 FOR MANHOLE FRAME SPECIFICATIONS.

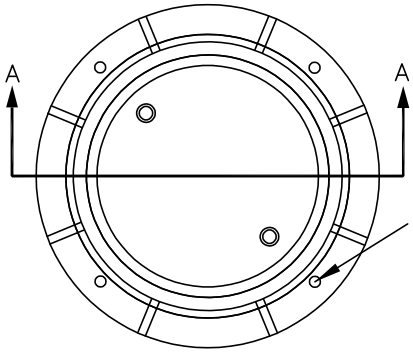
STORM WATER MANHOLE LID

DRAWING NO. 120

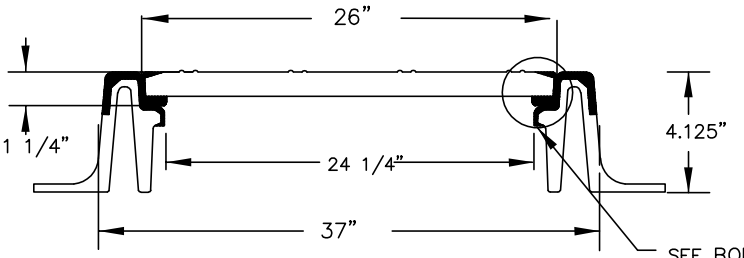
REVISED 10-31-19

Clean Water Services

WATERTIGHT MANHOLE RING

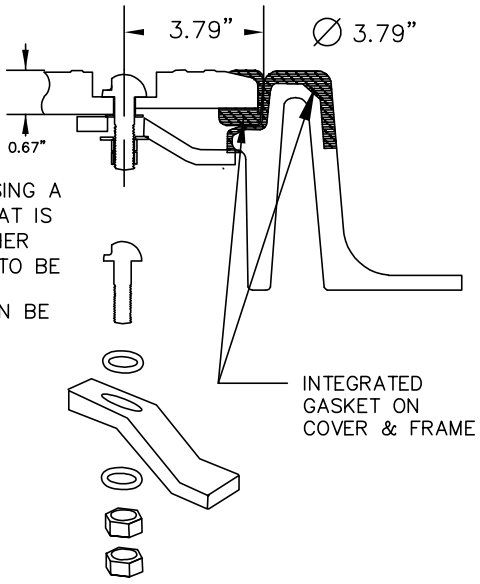


FRAME WILL BE ATTACHED TO THE MANHOLE TOP/ CONE SECTION BY USING A "RED HEAD" ANCHOR (OR EQUAL) THAT IS A MIN 1–1/4" O.D. W/S. STEEL WASHER 3/32" THICK. IF GRADE RINGS NEED TO BE INSTALLED, A HOLE WILL BE CORED THROUGH THE RING SO THE BOLT CAN BE ATTACHED TO TOP SECTION.



SECTION A–A

SEE BOLT DOWN DETAIL



BOLT–DOWN DETAIL

NOTES:

1. COMPOSITE WATERTIGHT/TAMPER PROOF MANHOLE FRAME AND COVER SHALL BE USED IN ALL EASEMENT AND OFF STREET AREAS.
2. THE WATERTIGHT MANHOLE COVER FRAME SHALL BE GMI 2600 SERIES COMPOSITE FRAME AND COVER MANUFACTURED BY TITUS INDUSTRIAL GROUP, INC. OR ITS EQUAL.
3. THE LOCKING MECHANISM SHALL BE A TWISTLIFT® MANUFACTURED BY TITUS INDUSTRIAL GROUP, INC.OR ITS EQUAL.
4. THE TWISTLIFT® COMPOSITE ACCESS COVER LOCK IS DESIGNED AS A SECURITY BOLT REQUIRING A SPECIAL TOOL TO OPERATE THE QUARTER TURN BOLT AND LIFT THE COVER FROM THE FRAME. IT FUNCTIONS WITH EITHER THE STANDARD CAM LOCK QUARTER TURN PADDLE, OR THE EXTENDED 'SURCHARGE' PADDLE.
5. THE BOLT SHALL BE MACHINED FROM 316 STAINLESS STEEL.
6. THE BOLT FEATURES A DOMED HEAD WITH 3 EQUALLY SPACED 'J' SLOTS RUNNING HORIZONTALLY AROUND THE BOLT HEAD.
7. STANDARD BOLT SIZES ARE 14 MM COARSE THREAD WITH A FLAT MACHINED ON TWO SIDES TO ENGAGE PADDLE.
8. THE PADDLE IS DIE CAST FROM 304 STAINLESS STEEL AND ALSO AVAILABLE IN BOTH STANDARD CAM LOCK DESIGN, OR EXTENDED SURCHARGE CONFIGURATION.
9. THE BOLT AND PADDLE WILL BE ASSEMBLED USING TWO STAINLESS STEEL 14 MM NUT'S, THE BOTTOM NUT IS A STANDARD NUT THAT WILL BE TORQUE TO 35 FT. LBS. TO GIVE THE DESIRED TENSION ON THE BOLT. A SECOND NYLOCK™ LOCK NUT IS USED AS A JAM NUT, AND TORQUE TO 90 FT. LBS. STAINLESS STEEL WASHERS ARE USED TO PROVIDE CONSISTENT TURNING RESISTANCE.
10. A 5/16 STAINLESS STEEL SET SCREW, SET IN A THREADED HOLE IN THE COVER PROVIDES FOR A STOP AT ¼ TURN OF OPERATION.
11. THE BOLT WILL BE OPERATED BY MEANS OF A SPECIALLY MADE OPENING KEY CONSISTING OF A SPECIAL SOCKET ATTACHED TO A 'T' HANDLE USED TO BOTH TURN THE BOLT, AND LIFT OUT THE COVER.
12. ONE SET OF REPLACEMENT OPENING KEYS WILL BE PROVIDED TO CLEAN WATER SERVICES AT TIME OF INSTALLATION.
13. THE BOLT HEAD IS PROTECTED BY A WEATHER RESISTANT PLASTIC DEBRIS CAP. THE CAP IS INCLUDED WITH EACH LOCK.
14. SEE LOCAL JURISDICTION REQUIREMENTS FOR USE IN TRAFFIC AREAS.

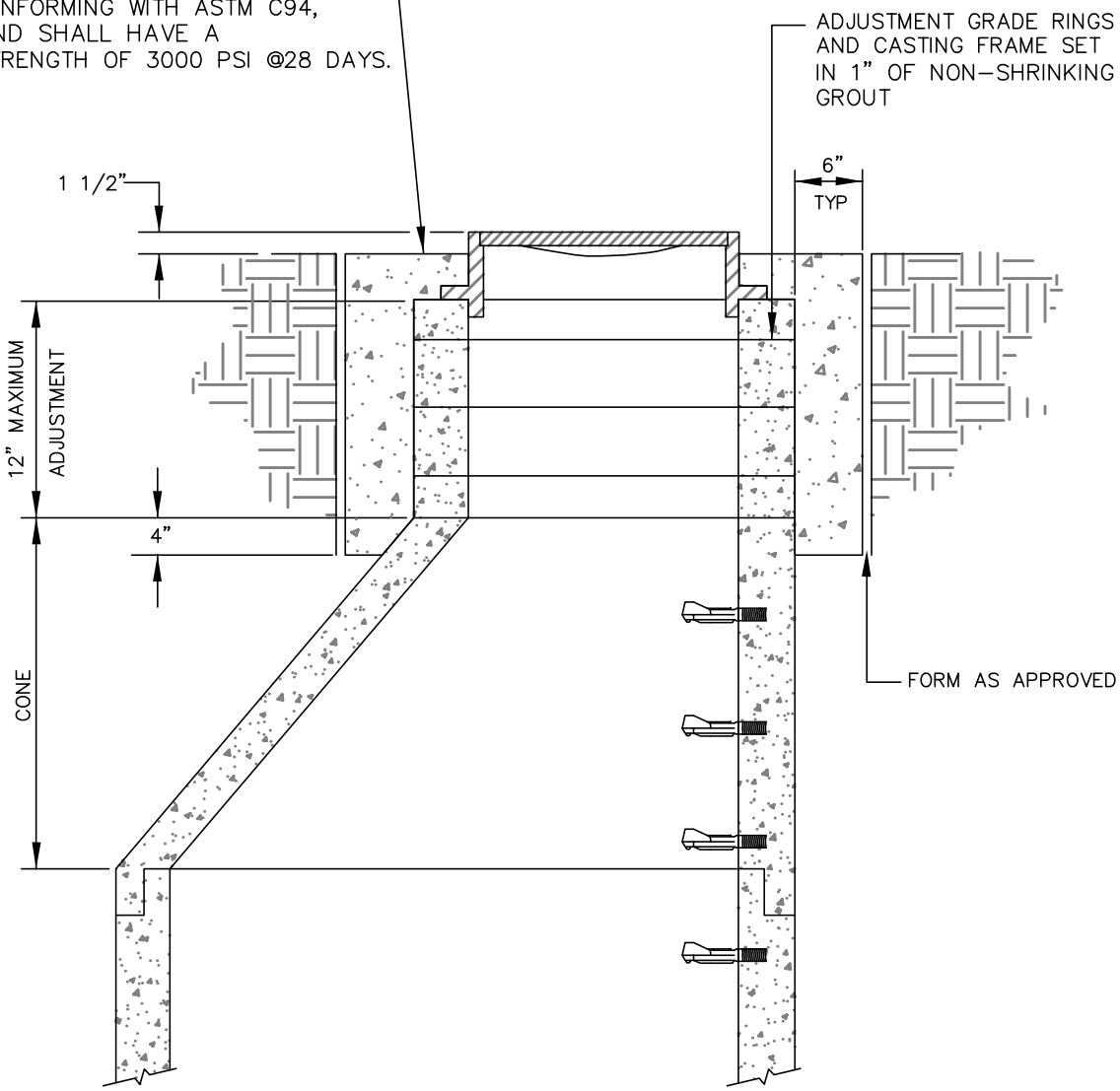
WATERTIGHT MANHOLE FRAME AND COVER

DRAWING NO. 130

REVISED 10–31–19

Clean Water Services

CONCRETE FOR CLOSURE COLLAR SHALL BE READY–MIXED CONFORMING WITH ASTM C94, ALTERNATE 2 AND SHALL HAVE A COMPRESSIVE STRENGTH OF 3000 PSI @28 DAYS.

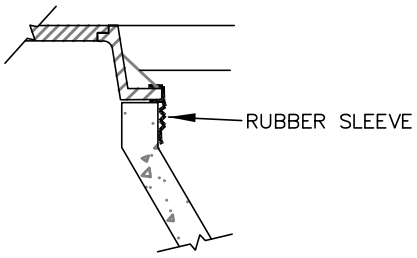


CONCRETE MANHOLE CLOSURE COLLAR

DRAWING NO. 140

REVISED 10–31–19

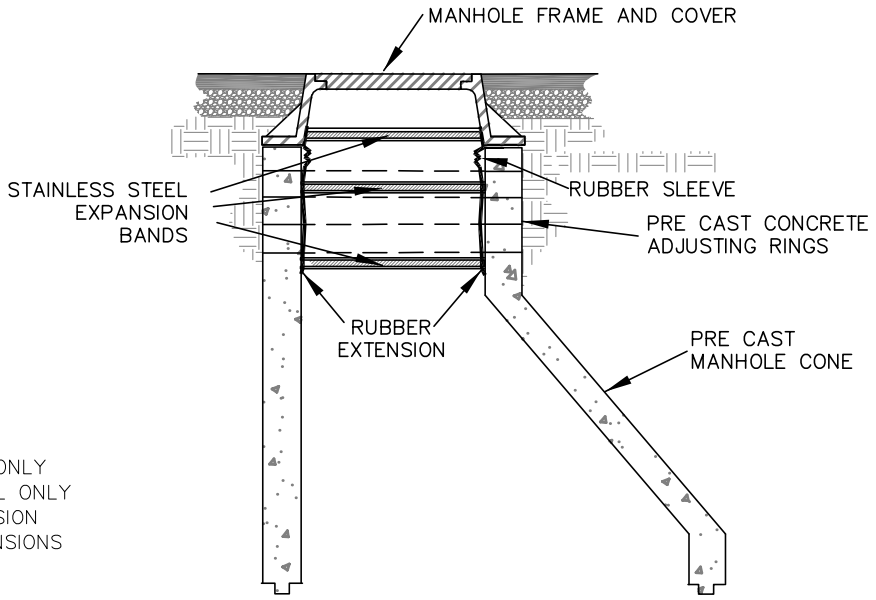
Clean Water Services



NARROW EXTERNAL RUBBER SEAL

TO SPAN CHIMNEY HEIGHTS OF:

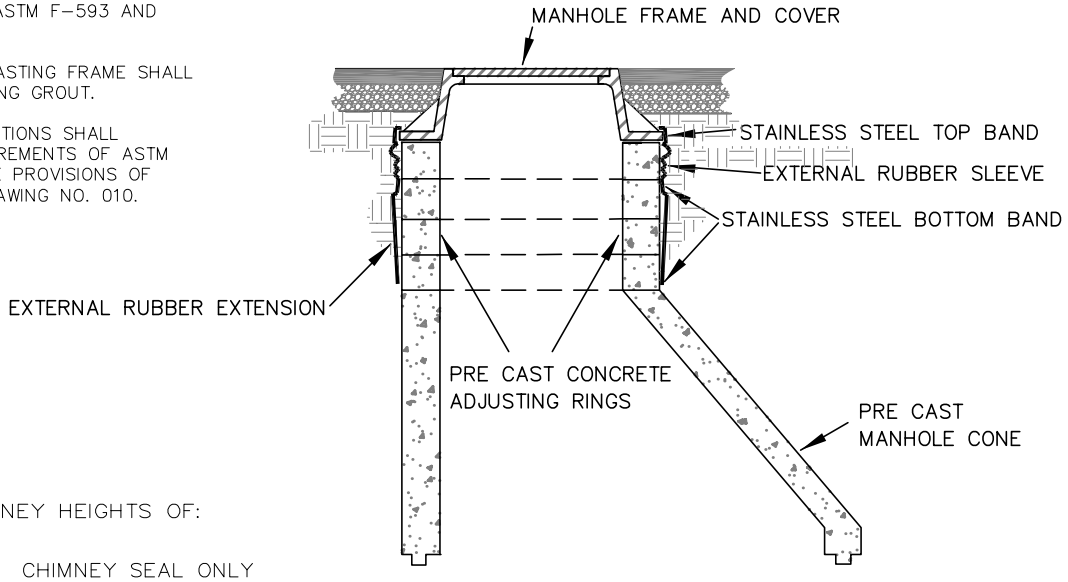
0–3"	–	NARROW (6") SEAL ONLY
OVER 3" – 6 1/2"	–	STANDARD (9") SEAL ONLY
OVER 6 1/2" – 12"	–	STD. SEAL + EXTENSION
OVER 12"	–	SEAL + MULT. EXTENSIONS



INTERNAL MANHOLE CHIMNEY SEAL

NOTES:

1. SLEEVES AND EXTENSIONS SHALL HAVE A MINIMUM OF 3/16" THICKNESS.
2. RUBBER SHALL BE EXTRUDED HIGH GRADE COMPOUND CONFORMING TO ASTM C–923.
3. BANDS SHALL BE FABRICATED FROM 16 GAUGE STAINLESS STEEL CONFORMING TO ASTM A–240, TYPE 304.
4. NUTS AND BOLTS SHALL BE STAINLESS STEEL CONFORMING TO ASTM F–593 AND 594, TYPE 304.
5. ALL GRADE RING AND CASTING FRAME SHALL BE SET IN NON–SHRINKING GROUT.
6. PRE CAST MANHOLE SECTIONS SHALL CONFORM TO THE REQUIREMENTS OF ASTM C–478, AND APPLICABLE PROVISIONS OF STANDARD MANHOLE DRAWING NO. 010.



TO SPAN CHIMNEY HEIGHTS OF:

0–4 1/2"	–	CHIMNEY SEAL ONLY
OVER 4 1/2" – 9"	–	SEAL + 7" EXTENSION
OVER 9"– 12"	–	SEAL + 10" EXTENSION
OVER 12"	–	SEAL + MULT. EXTENSIONS

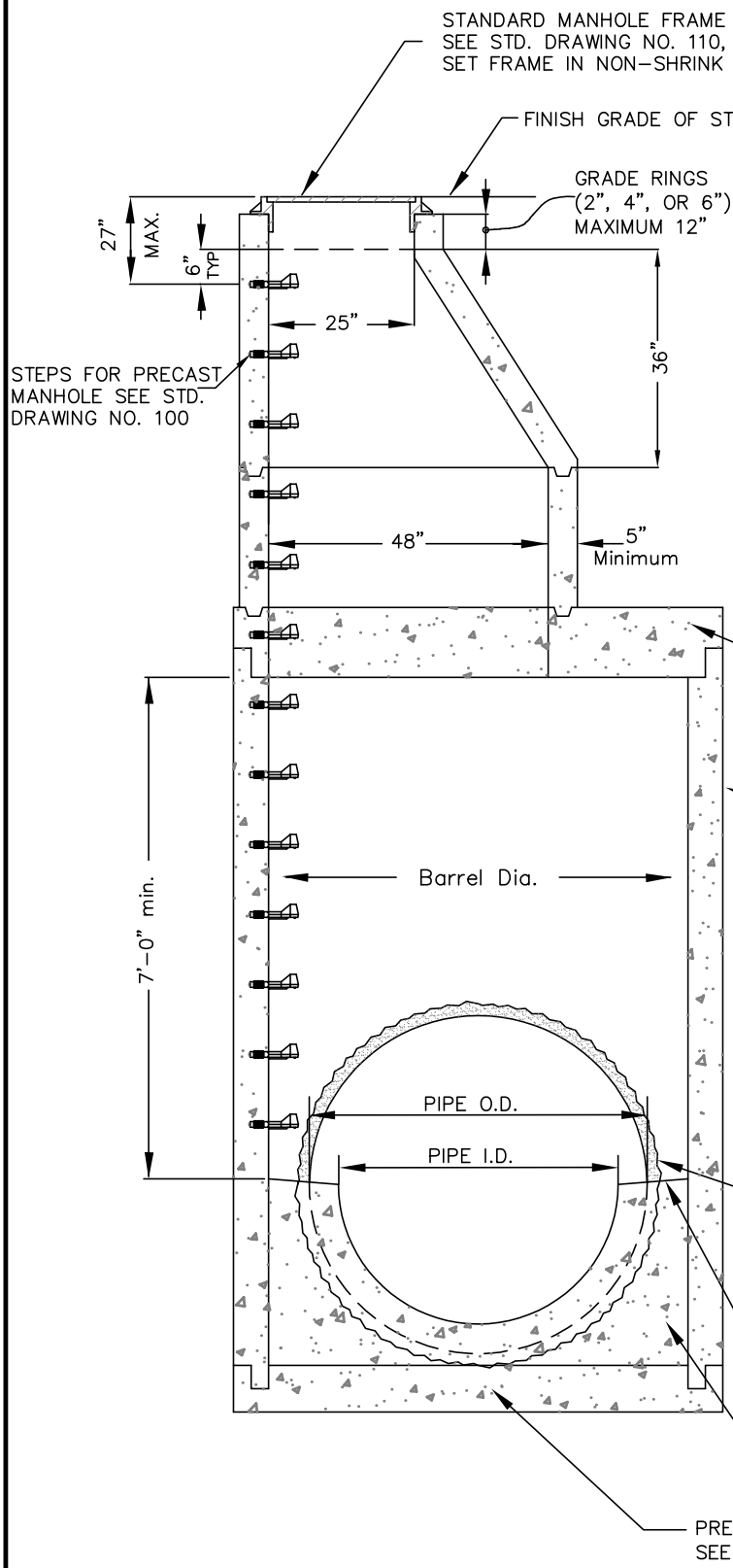
EXTERNAL MANHOLE CHIMNEY SEAL

MANHOLE CHIMNEY SEAL

DRAWING NO. 150

REVISED 10–31–19

Clean Water Services



NOTES:

1. ALL POURED IN PLACE CONCRETE SHALL HAVE A 28 DAY ULTIMATE STRENGTH OF 4000 PSI AND A 2" TO 4" SLUMP.
2. ALL REINFORCEMENT SHALL HAVE A MINIMUM YIELD STRENGTH OF 60,000 PSI (GRADE 60).
3. ALL PRECAST JOINTS SHALL BE GROUTED OR RUBBER GASKETED.
4. SECTIONS AND CONE SHALL BE IN ACCORDANCE WITH ASTM C478.

MAXIMUM THROUGH PIPE SIZES

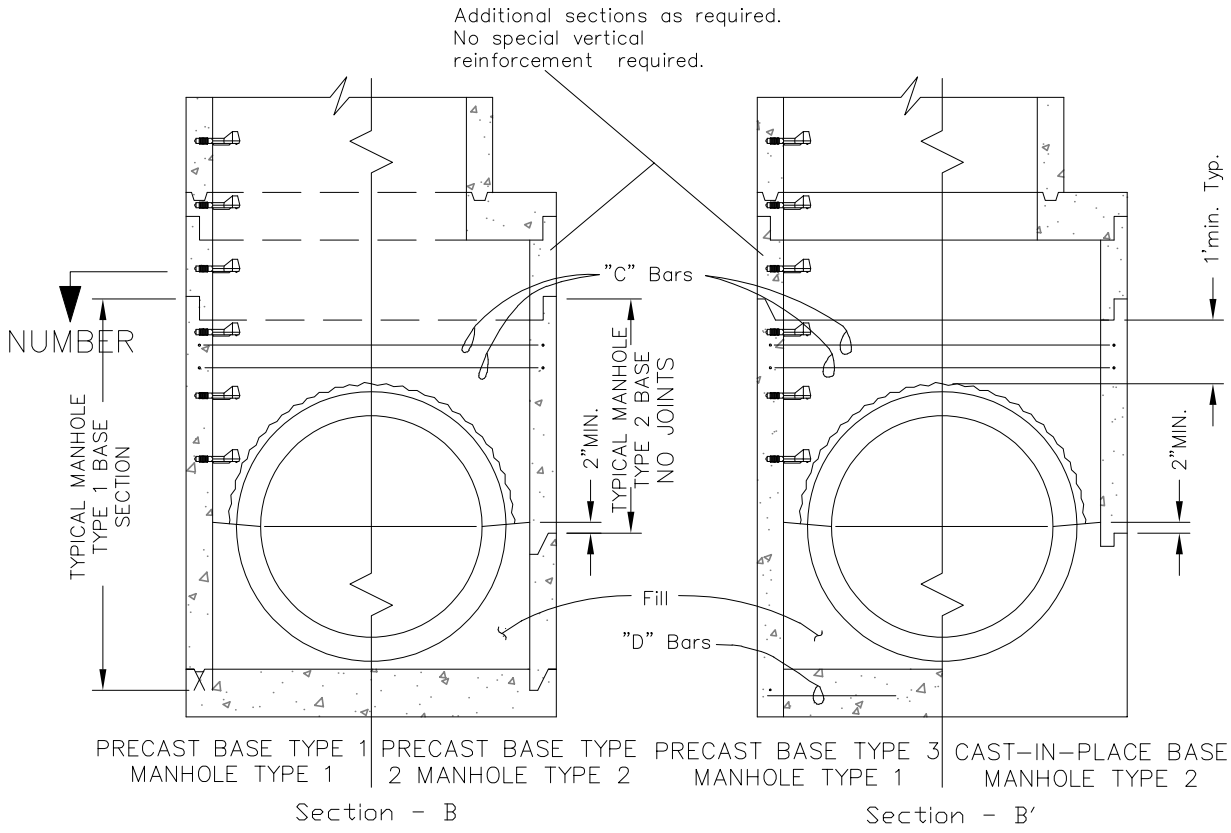
BARREL DIA.	MAX. PIPE DIA.
60"	36"
72"	48"
84"	60"
96"	72"
108"	84"
120"	96"

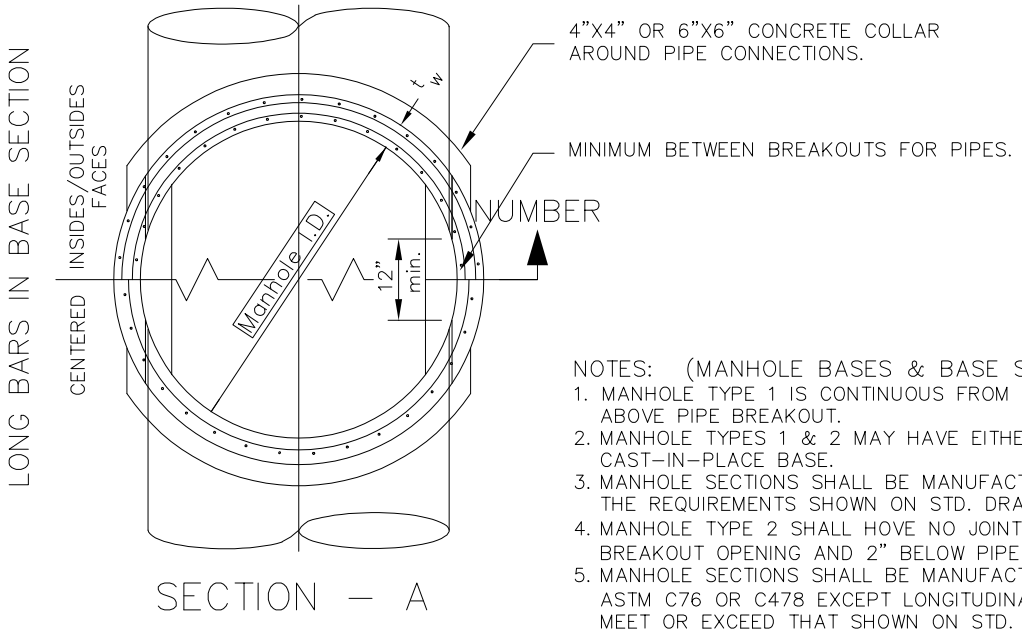
LARGE PRECAST CONCRETE MANHOLE

DRAWING NO. 160

REVISED 10-31-19

Clean Water Services





NOTES: (MANHOLE BASES & BASE SECTIONS)

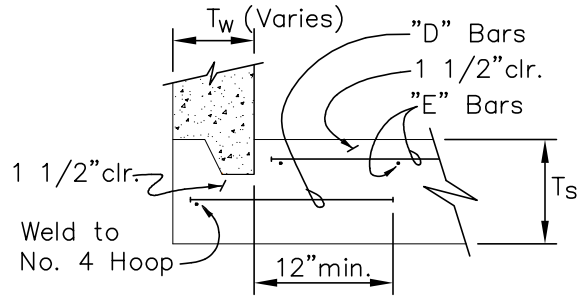
1. MANHOLE TYPE 1 IS CONTINUOUS FROM BOTTOM SLAB TO 12" ABOVE PIPE BREAKOUT.
2. MANHOLE TYPES 1 & 2 MAY HAVE EITHER PRECAST OR CAST-IN-PLACE BASE.
3. MANHOLE SECTIONS SHALL BE MANUFACTURED IN ACCORDANCE TO THE REQUIREMENTS SHOWN ON STD. DRAWING NO. 180 AND 190.
4. MANHOLE TYPE 2 SHALL HOVE NO JOINTS BETWEEN 1' ABOVE PIPE BREAKOUT OPENING AND 2" BELOW PIPE SPRING LINE.
5. MANHOLE SECTIONS SHALL BE MANUFACTURED IN ACCORDANCE WITH ASTM C76 OR C478 EXCEPT LONGITUDINAL (VERT.) STEEL SHALL MEET OR EXCEED THAT SHOWN ON STD. DRAWING NO. 190.

LARGE PRECAST CONCRETE MANHOLE - BASES

Drawing NO. 170

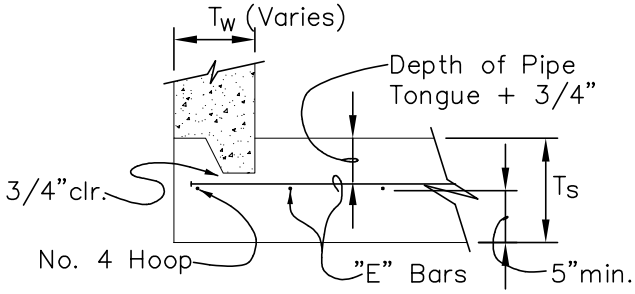
REVISED 10-31-19

Clean Water Services



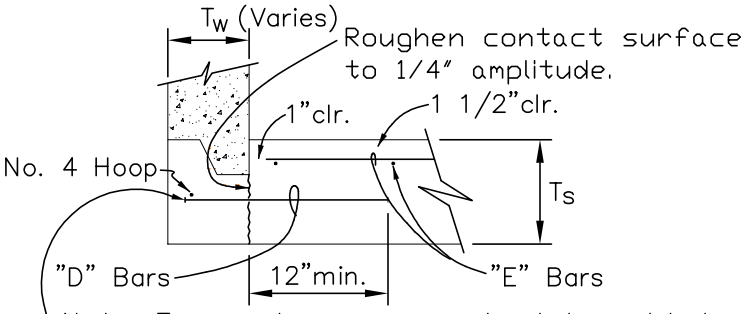
Note: Wall to slab joint shall be grouted when slab is cast separately.

PRECAST BASE SLAB TYPE 1**



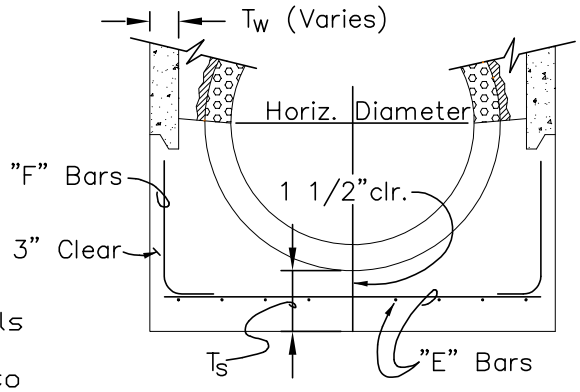
Note: Grout not required for slab cast in contact with manhole section.

PRECAST BASE SLAB TYPE 2**



Note: Expose hoop as required to weld dowels to hoop. Remove only enough concrete to accomplish weld. Patch before casting base to ensure no voids are present.

PRECAST BASE SLAB TYPE 3



CAST-IN-PLACE BASE (OR PRECAST BASE TYPE 4)

SIZE		60"		72"		84"		96"	
Type	Depth*	0'-15'	15'-30'	0'-15'	15'-30'	0'-15'	15'-30'	0'-15'	15'-30'
1	T_S	8.0"	9.0"	8.0"	9.0"	9.0"	10.0"	9.0"	11.0"
	D Bars	#3 @ 12"	#3 @ 12"	#3 @ 12"	#4 @ 10"	#3 @ 10"	#4 @ 11"	#3 @ 9"	#4 @ 11"
	E Bars	#4 @ 12"	#4 @ 9"	#4 @ 9"	#4 @ 6"	#4 @ 8"	#5 @ 9"	#4 @ 7"	#5 @ 8"
2	T_S	11.0"	12.0"	11.0"	12.0"	12.0"	13.0"	12.0"	14.0"
	E Bars	#4 @ 12"	#4 @ 8"	#4 @ 9"	#5 @ 8"	#4" @ 7"	N0.5 @ 7"	#4 @ 5"	#5 @ 6"
3	T_S	7.0"	9.0"	7.0"	9.0"	8.0"	10.0"	9.0"	11.0"
	D Bars	#3 @ 12"	#3 @ 12"	#3 @ 12"	#4 @ 10"	#3 @ 10"	#4 @ 11"	#3 @ 9"	#4 @ 11"
	E Bars	#4 @ 12"	#4 @ 9"	#4 @ 9"	#4 @ 6"	#4 @ 8"	#5 @ 9"	#4" @ 7"	#5 @ 8"
4	T_S	7.0"	9.0"	7.0"	9.0"	8.0"	10.0"	9.0"	11.0"
	E Bars	#4 @ 12"	#4 @ 9"	#4 @ 9"	#4 @ 6"	#4 @ 8"	#5 @ 9"	#4" @ 7"	#5 @ 8"
	F Bars	#4 @ 12"	#4 @ 9"	#4 @ 9"	#4 @ 6"	#4 @ 8"	#5 @ 9"	#4" @ 7"	#5 @ 8"

*Invert to Street Grade

Concrete: $_c f'$ =4,000 psi
Steel: f =Grade 60

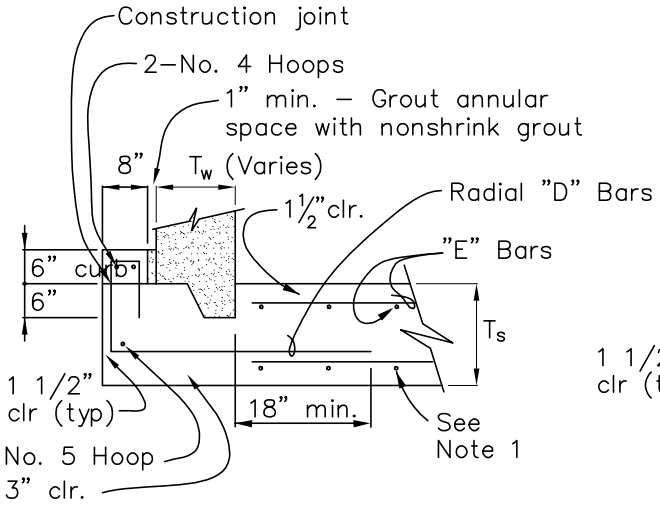
**Fabricator required to cast lifting loops in base slab for handling Type 1 & 2 bases.

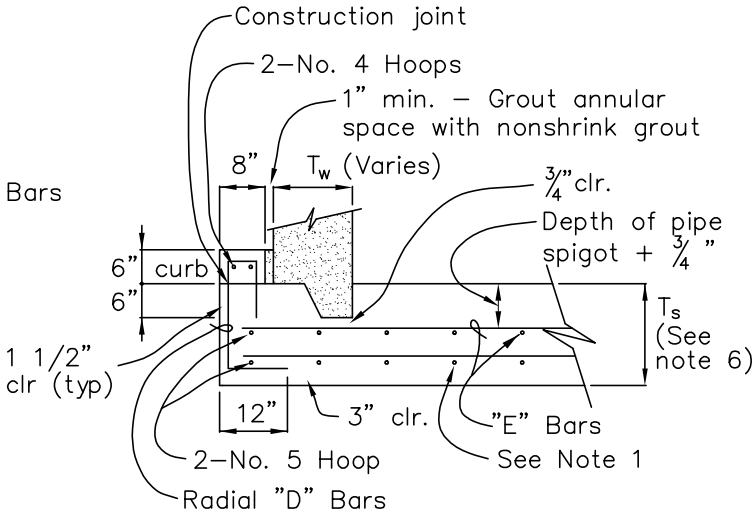
LARGE PRECAST CONCRETE MANHOLE - TYPES

DRAWING NO.180

REVISED 10-31-19

Clean Water Services





PRECAST BASE SLAB TYPE 5

1. Add bottom mat of No. 3 bars each way at same spacing as top mat.
2. Wall to slab joint shall be field grouted.
3. Curb is continuous all around base slab.
4. If curb is not cast monolithic with base slab, provide construction joint as shown.

PRECAST OR CAST–IN–PLACE BASE SLAB TYPE 6

1. Add bottom mat of No. 3 bars each way at same spacing as top mat.
2. Wall to slab joint shall be field grouted. Grout is not required for slab cast in contact with manhole section.
3. Curb is continuous all around base slab.
4. If curb is not cast monolithic with base slab, provide construction joint as shown.
5. Base slab Type 6 may be precast or cast–in–place concrete.
6. Ts for base slab Type 6 assumes a 6 1/4" spigot depth. Adjust Ts for actual spigot depth.
7. Curb may be cast in place against riser pipe without grouting.

SIZE		108"		120"	
Type	Depth*	0'–15'	15'–30'	0'–15'	15'–30'
5	T_s	10"	12"	10"	12"
	"D" Bars	No.4 @ 12"	No.5 @ 12"	No.4 @ 12"	No.5 @ 12"
	"E" Bars	No.5 @ 12"	No.5 @ 12"	No.5 @ 12"	No.6 @ 12"
6	T_s	15.5"	17.5"	15.5"	17.5"
	"D" Bars	No.4 @ 12"	No.5 @ 12"	No.4 @ 12"	No.5 @ 12"
	"E" Bars	No.5 @ 12"	No.5 @ 12"	No.5 @ 12"	No.6 @ 12"

*Invert to Street Grade
Concrete: f'_c = 4,000 psi
Steel: Grade 60

LARGE PRECAST CONRETE MANHOLE BASE SLABS

DRAWING NO. 190

REVISED 10–31–19

Clean Water Services

60"ø Manhole Section

NOTE: MAX. LONG. BAR SPACING IS 12" C.–C.

	INVERT TO STREET GRADE	T_w =5.0"			T_w = 6.0"			T_w =6.75"		
		OUTSIDE	INSIDE	ON CTR.	OUTSIDE	INSIDE	ON CTR.	OUTSIDE	INSIDE	ON CTR.
TYPE 1	0 Ft to 15 Ft	0.16	0.15	0.24	0.16	0.09	0.20	0.13	0.08	0.17
	15 Ft to 30 Ft	0.32	0.18	0.53	0.25	0.19	0.42	0.22	0.16	0.36
TYPE 2	0 Ft to 15 Ft	0.17	0.15	0.28	0.19	0.09	0.22	0.16	0.08	0.20
	15 Ft to 30 Ft	0.37	0.18	0.63	0.28	0.19	0.48	0.24	0.16	0.42

'C' Bars–1 No. 4 hoop req'd. for less than 2'–0" clr. between blockout and top of section.

72"ø Manhole Section

NOTE: MAX. LONG. BAR SPACING IS 12" C.–C.

	INVERT TO STREET GRADE	T_w =6.0"			T_w = 7.0"			T_w =7.75"		
		OUTSIDE	INSIDE	ON CTR.	OUTSIDE	INSIDE	ON CTR.	OUTSIDE	INSIDE	ON CTR.
TYPE 1	0 Ft to 15 Ft	0.19	0.19	0.26	0.17	0.16	0.22	0.16	0.14	0.20
	15 Ft to 30 Ft	0.33	0.28	0.58	0.27	0.23	0.48	0.26	0.26	0.42
TYPE 2	0 Ft to 15 Ft	0.19	0.13	0.28	0.18	0.15	0.23	0.16	0.17	0.28
	15 Ft to 30 Ft	0.36	0.13	0.65	0.29	0.15	0.52	0.26	0.17	0.46

'C' Bars– 2 NO. 5 HOOPS 2" CLR. OF TOP OF MH BARREL
2 NO. 3 HOOPS 2" CLR. OVER PIPE BLOCKOUTS
} REQ'D. FOR LESS THAN 2'–0" CLR. BETWEEN BLOCKOUT AND TOP OF SECTION.

84"ø Manhole Section

NOTE: MAX. LONG. BAR SPACING IS 12" C.–C.

	INVERT TO STREET GRADE	T_w =7.0"			T_w = 8.0"			T_w =8.75"		
		OUTSIDE	INSIDE	ON CTR.	OUTSIDE	INSIDE	ON CTR.	OUTSIDE	INSIDE	ON CTR.
TYPE 1	0 Ft to 15 Ft	0.20	0.13	0.26	0.17	0.12	0.22	0.15	0.10	0.20
	15 Ft to 30 Ft	0.33	0.23	0.59	0.28	0.26	0.50	0.30	0.23	0.45
TYPE 2	0 Ft to 15 Ft	0.23	0.15	0.33	0.21	0.17	0.28	0.19	0.19	0.25
	15 Ft to 30 Ft	0.36	0.15	0.65	0.30	0.17	0.55	0.30	0.19	0.49

'C' Bars– 2 NO. 5 HOOPS 2" CLR. OF TOP OF MH BARREL
2 NO. 3 HOOPS 2" CLR. OVER PIPE BLOCKOUTS
} REQ'D. FOR LESS THAN 2'–0" CLR. BETWEEN BLOCKOUT AND TOP OF SECTION.

96"ø Manhole Section

NOTE: MAX. LONG. BAR SPACING IS 12" C.–C.

	INVERT TO STREET GRADE	T_w =8.0"			T_w = 9.0"			T_w =9.75"		
		OUTSIDE	INSIDE	ON CTR.	OUTSIDE	INSIDE	ON CTR.	OUTSIDE	INSIDE	ON CTR.
TYPE 1	0 Ft to 15 Ft	0.25	0.18	0.33	0.21	0.16	0.29	0.21	0.14	0.27
	15 Ft to 30 Ft	0.41	0.26	0.77	0.35	0.30	0.66	0.37	0.27	0.59
TYPE 2	0 Ft to 15 Ft	0.26	0.17	0.34	0.22	0.19	0.30	0.20	0.21	0.28
	15 Ft to 30 Ft	0.43	0.17	0.82	0.37	0.19	0.70	0.34	0.21	0.63

'C' Bars– 2 NO. 5 HOOPS 2" CLR. OF TOP OF MH BARREL
2 NO. 3 HOOPS 2" CLR. OVER PIPE BLOCKOUTS
} REQ'D. FOR LESS THAN 2'–0" CLR. BETWEEN BLOCKOUT AND TOP OF SECTION.

PROVIDE MIN. LONGITUD. REINF. AS SHOWN, 1" CLR. OF INSIDE AND OUTSIDE FACES, OR AT CENTER OF WALL

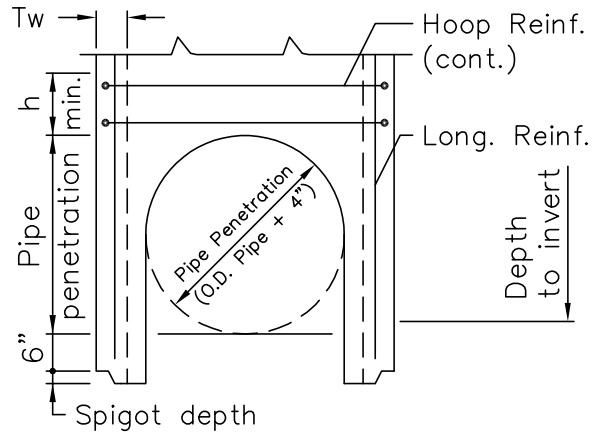
AREAS ARE IN^2/FT OF CIRCUMFERENCE AND MAY BE WELDED WIRE FABRIC, BARS OR A COMBINATION OF BOTH.

LARGE PRECAST CONCRETE MANHOLE– LONG. BASE SECTION REINF.

DRAWING NO. 200

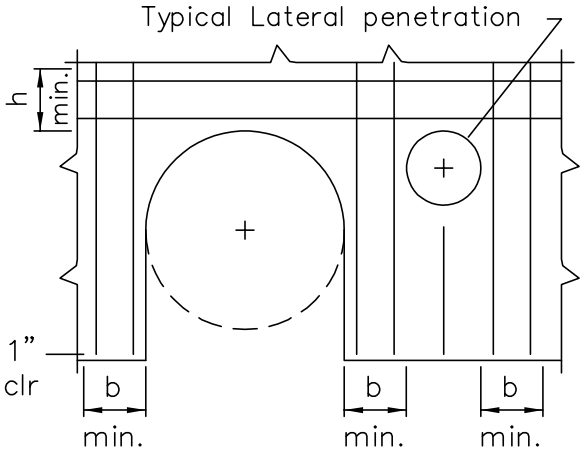
REVISED 10–31–19

Clean Water Services



For Base Slab see 4–08–3A

MANHOLE BASE SECTION ELEVATION



For Base Slab see 4–08–3A

PARTIAL MANHOLE BASE SECTION ROLLOUT

Notes:

1. Manufacture manhole base section and risers above in conformance with ASTM C478 except as noted in specifications and herein. Lap length for hoop reinforcement in band "h" shall be 30 bar diameters and laps shall be staggered.
2. Steel reinforcement in bands "h" and "b" is in addition to that required by ASTM C478 and is shown in square inches per foot of band width. Bar spacing shall not exceed 6".
3. Manhole base sections shall have no joints below top of band "h".
4. Concrete: f'c = 4,000 psi
   Reinforcement steel: Grade 60
5. There shall be no penetrations in hoop band "h" above main line pipe penetrations or in longitudinal bands "b" next to both sides of all openings.
6. Additional longitudinal reinforcement area can be reduced 50% outside of "b" bands.
7. Thickness "Tw" is minimum manhole base section wall thickness for a given pipe diameter.
8. Do not backfill until concrete fill over the manhole base has achieved 90% of its compressive strength (4,000 psi). For shape of concrete fill see Std. Drawing NO. 650.
9. Provide 6"x6" concrete collar around pipe penetrations per Std. Drawing NO. 655.

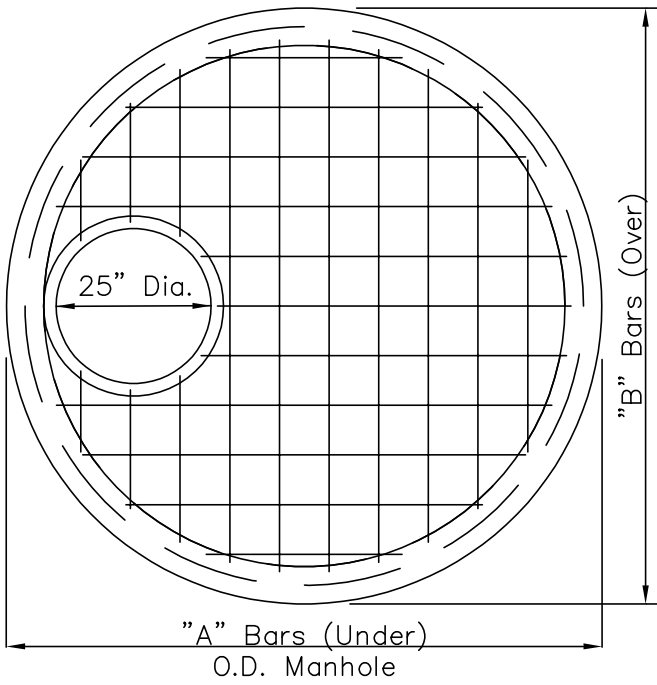
MH Dia. (in)	Thickness Tw min. (in)	Band Width h=b min. (ft)	Depth to Invert max. (ft)	Inside Pipe Dia. (in)	Additional Reinforcement Required			
					Hoop Reinf. (h)		Long. Reinf. (b)	
					Outside Face (in^2/ft)	Inside Face (in^2/ft)	Outside Face (in^2/ft)	Inside Face (in^2/ft)
108	9	1.00	15	48 or less	.381	.381	.260	.260
108	9	1.25	15	54–60	.381	.381	.394	.394
108	10	1.75	15	66–84	.381	.381	.643	.643
108	11	1.00	30	48 or less	.790	.790	.432	.432
108	12	1.25	30	54–60	.790	.790	.576	.576
108	16	1.75	30	66–84	.790	.790	.773	.773
120	10	1.00	15	48 or less	.423	.423	.260	.260
120	10	1.50	15	54–72	.423	.423	.480	.480
120	11	2.00	15	78–96	.423	.423	.713	.713
120	11	1.00	30	48 or less	.880	.880	.432	.432
120	14	1.50	30	54–72	.880	.880	.677	.677
120	17	2.00	30	78–96	.880	.880	.991	.991

LARGE PRECAST CONCRETE MANHOLE BASE SECTION REINF. 108" & 120"

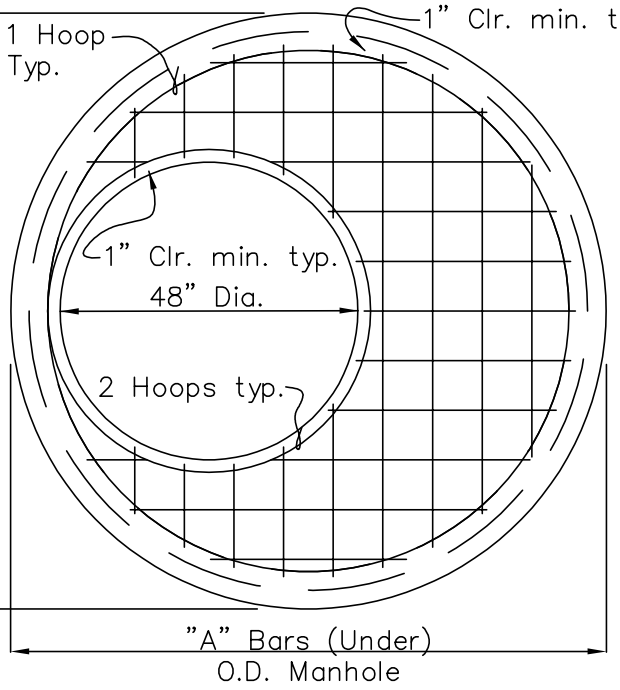
DRAWING NO. 210

REVISED 10–31–19

Clean Water Services



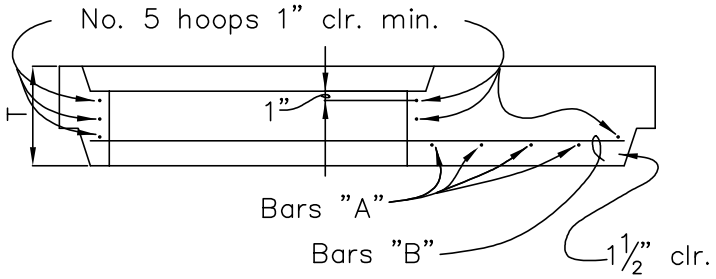
TOP SLAB "A"



TOP SLAB "B"

NOTES:

1. All concrete shall have a 28 day ultimate compressive strength of 4,000 psi.
2. All reinforcement shall have a minimum yield strength of 60,000 psi, (Grade 60).
3. All lap splices shall be 24 bar diameters unless noted otherwise.
4. Add steps as required by Standard Drawing NO. 010



TOP SLAB TYPICAL SECTION

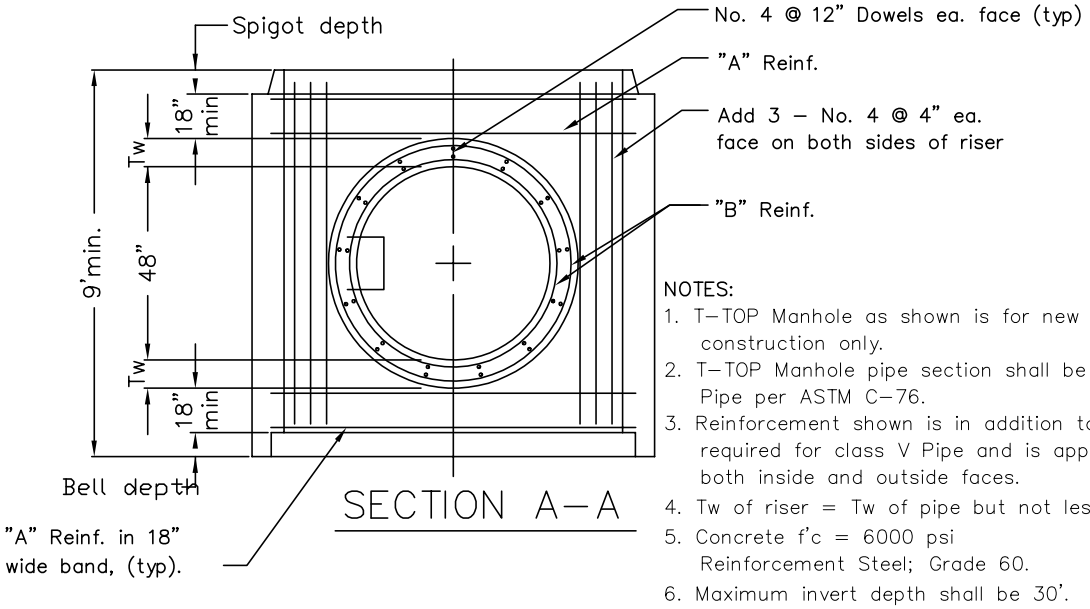
	TOP SLAB "A"			TOP SLAB "B"			TOP SLAB "B"		
	COVER DEPTH								
	6" to 12"			4'–0" to 7'–0"			7'–1" to 22'–0"		
Size	T	"A" Bars	"B" Bars	T	"A" Bars	"B" Bars	T	"A" Bars	"B" Bars
60"	8"	No.5 @ 7½"	No.5 @ 7½"	12"	No.5 @ 9"	No.5 @ 9"	12"	No.5 @ 9"	No.5 @ 9"
72"	10"	No.5 @ 7"	No.5 @ 7"	12"	No.5 @ 9"	No.5 @ 9"	12"	No.5 @ 7"	No.5 @ 7"
84"	11"	No.5 @ 7"	No.5 @ 7"	12"	No.5 @ 6"	No.5 @ 6"	12"	No.6 @ 6"	No.5 @ 7"
96"	12"	No.5 @ 6"	No.5 @ 6"	12"	No.5 @ 6"	No.5 @ 6"	14"	No.6 @ 6"	No.5 @ 6"
108"	N/A	N/A	N/A	12"	No.6 @ 8"	No.6 @ 8"	16"	No.7 @ 9"	No.7 @ 9"
120"	N/A	N/A	N/A	12"	No.6 @ 7"	No.6 @ 7"	16"	No.7 @ 8"	No.7 @ 8"

LARGE PRECAST CONCRETE MANHOLE TOP SLABS

DRAWING NO. 220

REVISED 10–31–19

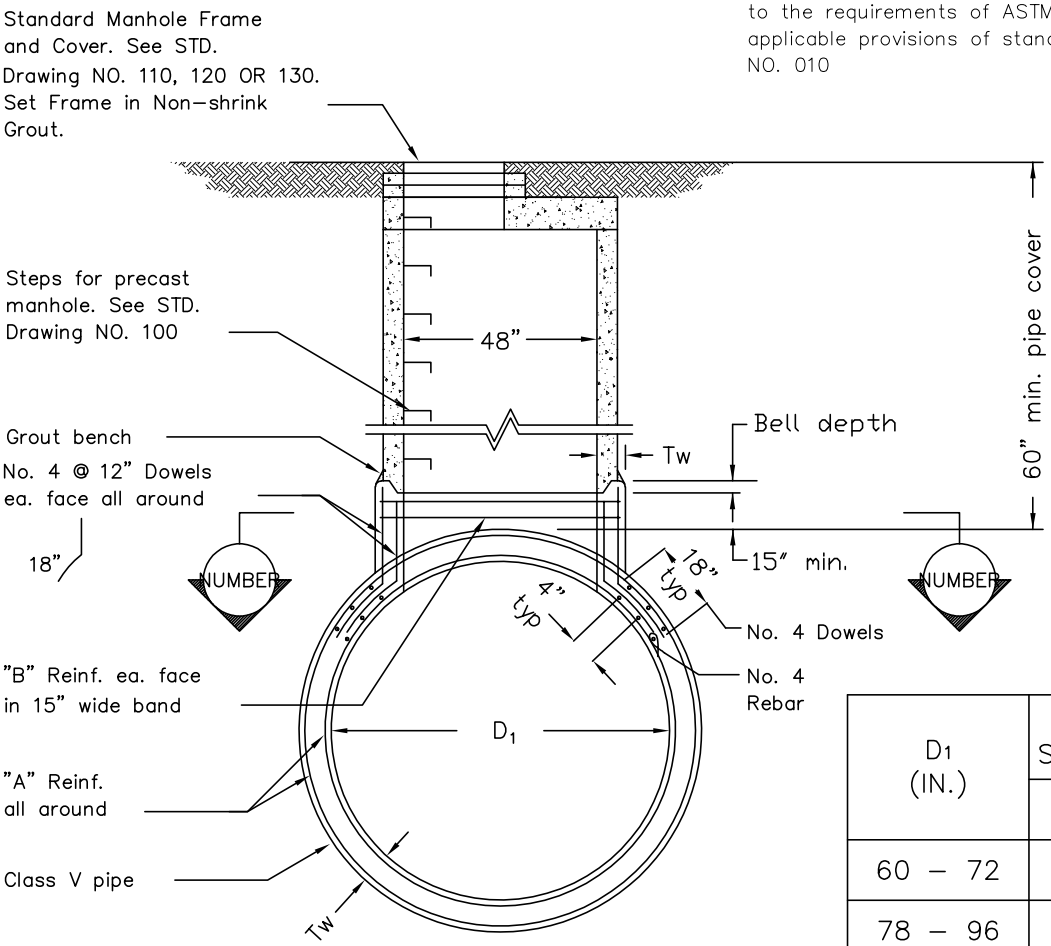
Clean Water Services



SECTION A–A

NOTES:

1. T–TOP Manhole as shown is for new pipline construction only.
2. T–TOP Manhole pipe section shall be Class V Pipe per ASTM C–76.
3. Reinforcement shown is in addition to that required for class V Pipe and is applied in both inside and outside faces.
4. Tw of riser = Tw of pipe but not less than 6".
5. Concrete f'c = 6000 psi Reinforcement Steel; Grade 60.
6. Maximum invert depth shall be 30'.
7. All pre–cast manhole riser sections shall comform to the requirements of ASTM C–478 and applicable provisions of standard manhole drawing NO. 010



CROSS SECTION

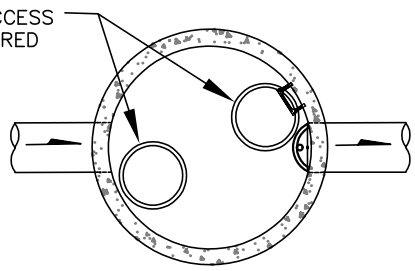
D_1 (IN.)	ADDITIONAL REINF. SQUARE INCHES (TOTAL)	
	"A"	"B"
60 – 72	.177 EA. FACE	.511 EA. FACE
78 – 96	.224 EA. FACE	.584 EA. FACE
102 – 120	.265 EA. FACE	.658 EA. FACE

T–TOP MANHOLE WITH 48" RISER

DRAWING NO. 230

REVISED 10–31–19

Clean Water Services



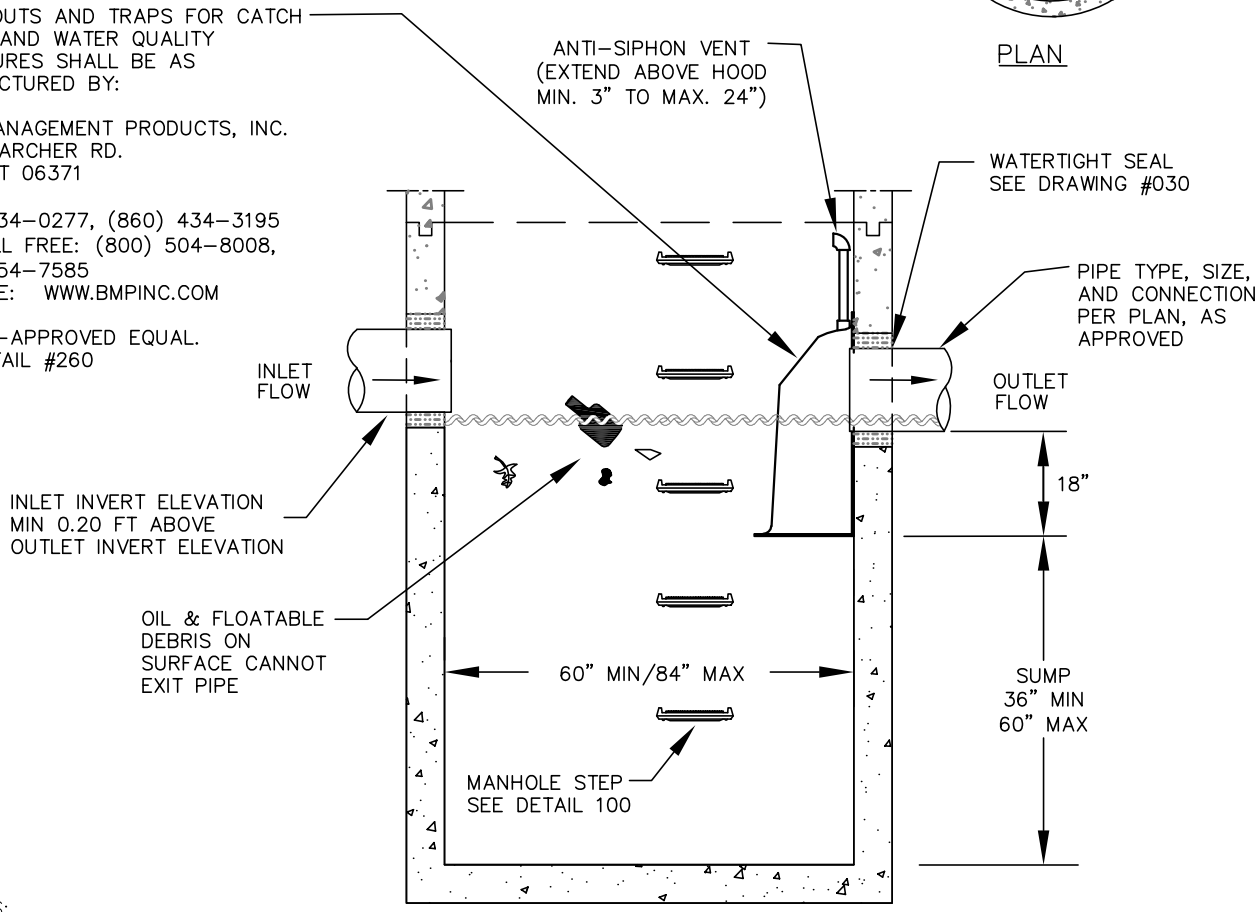
PLAN

ALL SNOUTS AND TRAPS FOR CATCH BASINS AND WATER QUALITY STRUCTURES SHALL BE AS MANUFACTURED BY:

BEST MANAGEMENT PRODUCTS, INC.
53 MT. ARCHER RD.
LYME, CT 06371

(860) 434-0277, (860) 434-3195
FAX TOLL FREE: (800) 504-8008,
(888) 354-7585
WEB SITE: WWW.BMPINC.COM

OR PRE-APPROVED EQUAL.
SEE DETAIL #260



NOTES:

1. ALL MANHOLE SECTIONS SHALL CONFORM TO THE REQUIREMENTS OF ASTM C-478 AND APPLICABLE PROVISIONS OF STD. MANHOLE DRAWING NO. 010.
2. INLET AND OUTLET PIPE NOT TO EXCEED 18" DIA.
3. PROVIDE SPECIAL DETAIL FOR SNOUT, EXCEEDING 18" DIA.
4. THE SIZE AND POSITION OF THE HOOD SHALL BE DETERMINED BY THE OUTLET PIPE SIZE AS PER MANUFACTURER'S RECOMMENDATIONS.
5. ANCHORING HARDWARE FOR THE HOOD SHALL BE EMBEDDED INTO CONCRETE; ANCHORING INTO GROUT IS NOT AUTHORIZED.
6. THE SURFACE OF THE STRUCTURE WHERE THE HOOD IS MOUNTED SHALL BE FINISHED SMOOTH AND FREE OF LOOSE MATERIAL.
7. INSTALL PER MANUFACTURER'S INSTRUCTIONS.
8. ALL MANHOLE FLAT TOPS SHALL CONFORM TO ASTM C-478 AND ARE DESIGNED TO MEET H-20 TRAFFIC LOADING.

SUMP VOLUME AVAILABLE PER DEPTH OF SUMP

	36" MINIMUM	60" MAXIMUM
60" M.H.=	58.9 CF	98.1 CF
72" M.H.=	84.8 CF	141.3 CF
84" M.H.=	115.4 CF	192.4 CF

PROVIDE SPECIAL DETAIL FOR VOLUME REQUIREMENTS EXCEEDING 192.4 CF

SUMP VOLUME REQUIREMENTS
20 CF/1.0 CFS OF INFLOW
58.9 CF MINIMUM REQUIRED

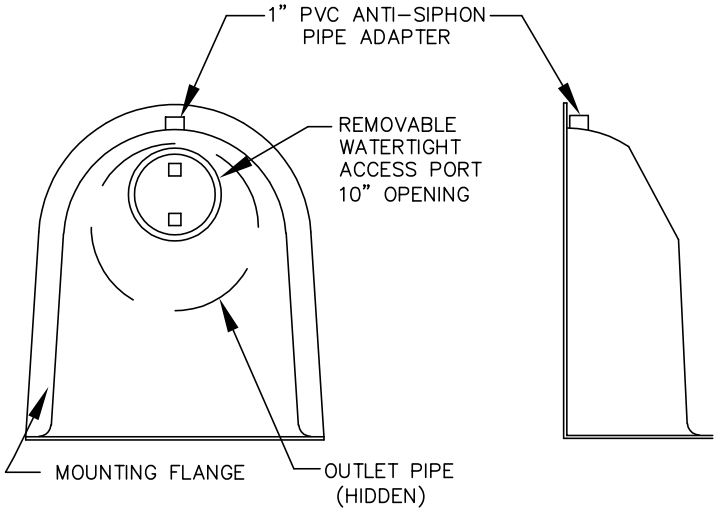
WATER QUALITY MANHOLE (SNOUT) A

DRAWING NO. 250

REVISED 10-31-19

Clean Water Services

CONFIGURATION DETAIL

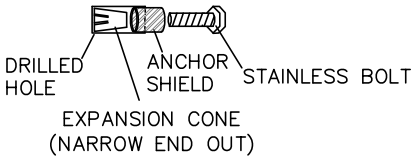


FRONT VIEW

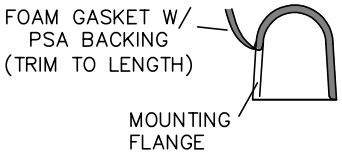
SIDE VIEW

INSTALLATION DETAIL

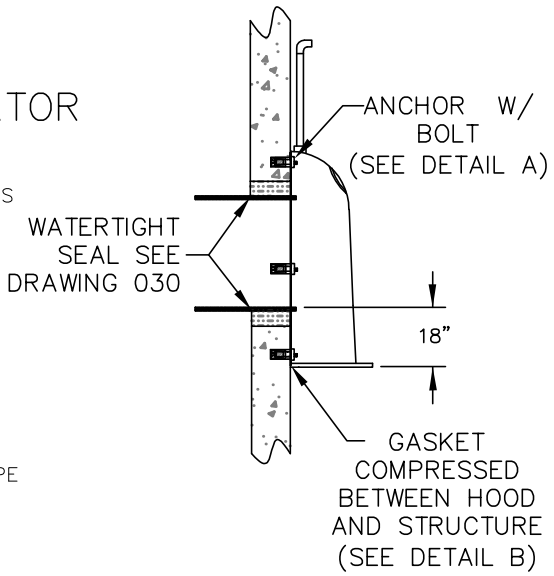
DETAIL A



DETAIL B



SNOUT OIL-WATER-DEBRIS SEPARATOR



NOTES:

1. ALL HOODS AND TRAPS FOR CATCH BASINS AND WATER QUALITY STRUCTURES SHALL BE AS MANUFACTURED BY BEST MANAGEMENT PRODUCTS, INC. OR PRE-APPROVED EQUAL.
2. ALL HOODS SHALL BE CONSTRUCTED OF A GLASS REINFORCED RESIN COMPOSITE WITH ISO GEL COAT EXTERIOR FINISH WITH A MINIMUM 0.125" LAMINATE THICKNESS.
3. ALL HOODS SHALL BE EQUIPPED WITH A MINIMUM 10", WATERTIGHT ACCESS PORT, A MOUNTING FLANGE, AND AN ANTI-SIPHON VENT AS DRAWN. (SEE CONFIGURATION DETAIL)
4. THE SIZE AND POSITION OF THE HOOD SHALL BE DETERMINED BY OUTLET PIPE SIZE AS PER MANUFACTURER'S RECOMMENDATION.
5. THE BOTTOM OF THE HOOD SHALL EXTEND DOWNWARD A DISTANCE OF 18" FROM I.E. OUT.
6. THE ANTI-SIPHON VENT SHALL EXTEND ABOVE HOOD BY MINIMUM OF 3" AND A MAXIMUM OF 24" ACCORDING TO STRUCTURE CONFIGURATION.
7. THE SURFACE OF THE STRUCTURE WHERE THE HOOD IS MOUNTED SHALL BE FINISHED SMOOTH AND FREE OF LOOSE MATERIAL.
8. THE HOOD SHALL BE SECURELY ATTACHED TO STRUCTURE WALL WITH STAINLESS STEEL BOLTS AND OIL-RESISTANT GASKET.
9. ANCHOR BOLTS SHALL BE INSTALLED INTO THE CONCRETE OF THE STRUCTURE'S WALL. (NOT WITHIN GROUT)
10. INSTALLATION INSTRUCTIONS SHALL BE FURNISHED WITH MANUFACTURER SUPPLIED INSTALLATION KIT.
    KIT SHALL INCLUDE:
    A. INSTALLATION INSTRUCTIONS
    B. PVC ANTI-SIPHON VENT PIPE AND ADAPTER
    C. OIL-RESISTANT CRUSHED CELL FOAM GASKET WITH PSA BACKING
    D. 3/8" STAINLESS STEEL BOLTS
    E. ANCHOR SHIELDS

BEST MANAGEMENT PRODUCTS, INC.
53 MT. ARCHER RD.
LYME, CT 06371
TOLL FREE: (800) 504-8008 (888) 354-7585
WEB SITE: WWW.BMPINC.COM

WHEN ORDERING, SPECIFY IF THE STRUCTURE IN WHICH THE HOOD WILL BE ATTACHED IS FLAT OR ROUND.

WATER QUALITY MANHOLE (SNOUT) B

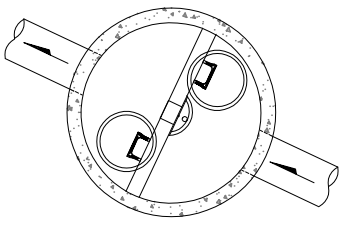
DRAWING NO. 260

REVISED 10-31-19

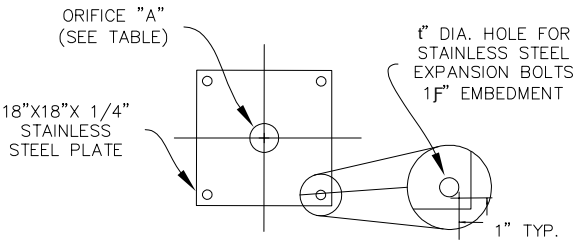
Clean Water Services

NOTES:

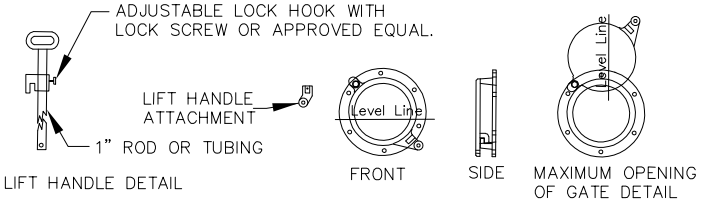
1. BAFFLE WALL SHALL HAVE #4 BAR AT 12" SPACING EACH WAY.
2. PRECAST BAFFLE SHALL BE KEYED AND GROUTED IN PLACE. JOINT BETWEEN CONCRETE BAFFLE AND MANHOLE WALL SHALL BE WATERTIGHT.
3. UPPER FLOW ORIFICE SHALL BE ALUMINUM, ALUMINIZED STEEL OR TREATMENT 1 GALVANIZED STEEL.
4. FRAME AND LADDER OR STEPS ARE TO BE OFFSET SO THAT SHEAR GATE IS VISIBLE FROM THE TOP; CLIMB-DOWN SPACE IS CLEAR OF RISER AND GATE; FRAME IS CLEAR OF CURB.
5. RESTRICTOR PLATE WITH ORIFICE AS SPECIFIED IN THE CONTRACT. OPENING IS TO BE CUT ROUND AND SMOOTH. NEOPRENE GASKET SHALL BE INSTALLED BETWEEN THE ORIFICE PLATE AND CONCRETE BAFFLE TO PROVIDE A WATERTIGHT SEAL.
6. SHEAR GATE SHALL BE MADE OF ALUMINUM ALLOY IN ACCORDANCE WITH ASTM B 26M AND ASTM B 275,
7. DESIGNATION Zg32A OR CAST IRON IN ACCORDANCE WITH ASTM A 48, CLASS 30B. LIFT HANDLE MAY BE SOLID ROD OR HOLLOW TUBING WITH ADJUSTABLE HOOK AS REQUIRED. NEOPRENE RUBBER GASKET REQUIRED BETWEEN RISER MOUNTING FLANGE AND GATE FLANGE. MATING SURFACES OF LID AND BODY SHALL BE MACHINED FOR PROPER FIT. FLANGE MOUNTING BOLTS SHALL BE 3/8" X 16 X 3" LG SS REDHEADS.
8. SHEAR GATE MAXIMUM OPENING SHALL BE CONTROLLED BY LIMITED HINGE MOVEMENT, STOP TAB OR SOME OTHER DEVISE.
9. ALTERNATE SHEAR GATES DESIGNS ARE ACCEPTABLE, IF MATERIAL SPECIFICATIONS ARE MET AND FLANGE BOLT PATTERN MATCHES.
10. ALL MANHOLE FLAT TOPS SHALL CONFORM TO ASTM C-478 AND ARE DESIGNED TO MEET H-20 TRAFFIC LOADING..



PLAN



RESTRICTOR PLATE, ORIFICE



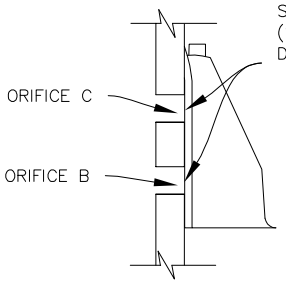
SHEAR GATE
MANUFACTURED BY KENNEDY VALVE OR EQUAL

INSTALLATION NOTE:

POSITION HOOD SUCH THAT BOTTOM FLANGE IS MIN 2" BELOW THE ORIFICE B INVERT.

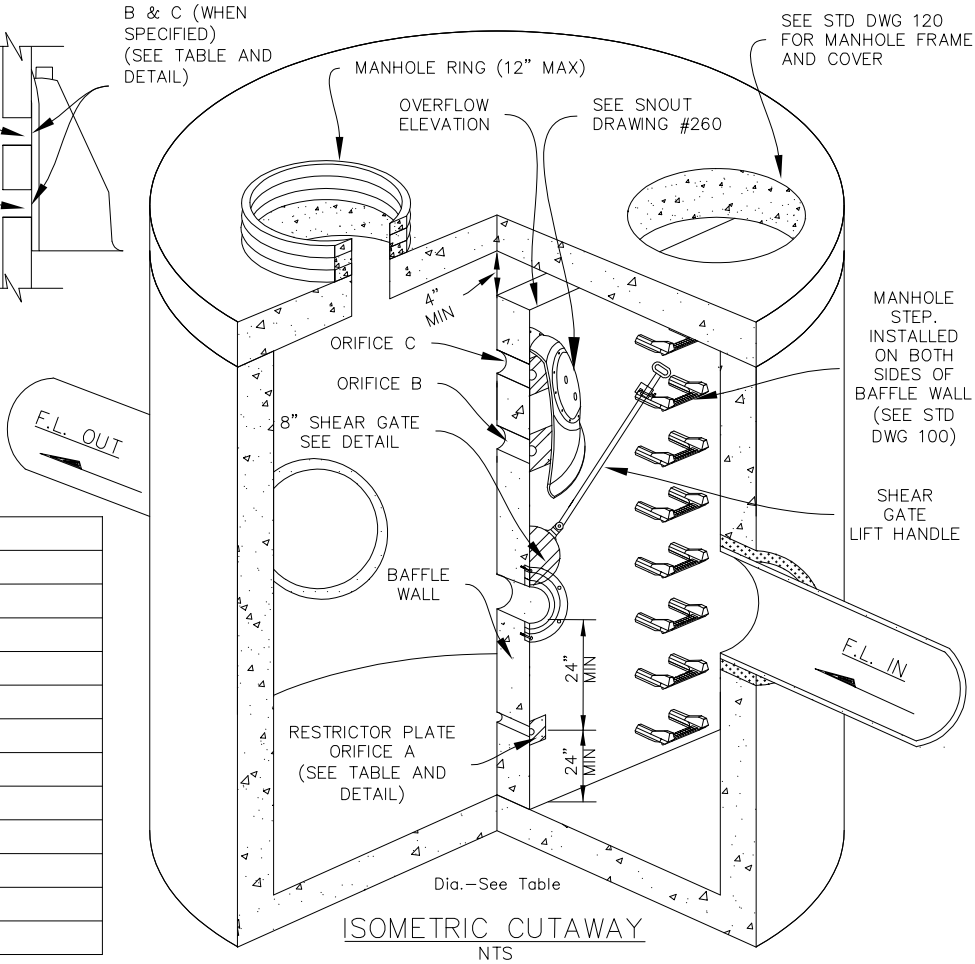
ONE SNOUT MAY BE USED FOR BOTH ORIFICE C AND B.

IT MAY BE NECESSARY TO USE TWO SNOUTS ON OFFSET ORIFICES TO MEET PLAN ELEVATION.



SNOUT DETAIL

RESTRICTOR PLATE ORIFICE WITH ORIFICE B & C (WHEN SPECIFIED) (SEE TABLE AND DETAIL)



ISOMETRIC CUTAWAY
NTS

FLOW CONTROL STRUCTURE TABLE

Diameter Of Manhole (In.) 60" MIN	
F.L. (In)	
F.L. (Out)	
Outlet Pipe Diameter (In.)	
Number Of Orifice	
Orifice A Elevation	
Diameter Of Orifice A (In.)	
Orifice B Elevation	
Diameter Of Orifice B (In.)	
Orifice C Elevation	
Diameter Of Orifice C (In)	
Overflow Elevation	
Rim Elevation	

FLOW CONTROL STRUCTURE DETAIL

DRAWING NO. 270

REVISED 10-31-19

Clean Water Services