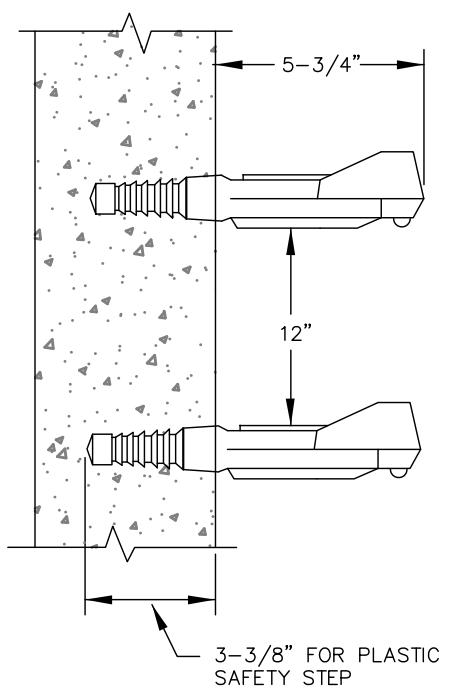


COPOLYMER POLYPROPYLENE PLASTIC

1/2" GRADE 60 REINFORCEMENT

**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.

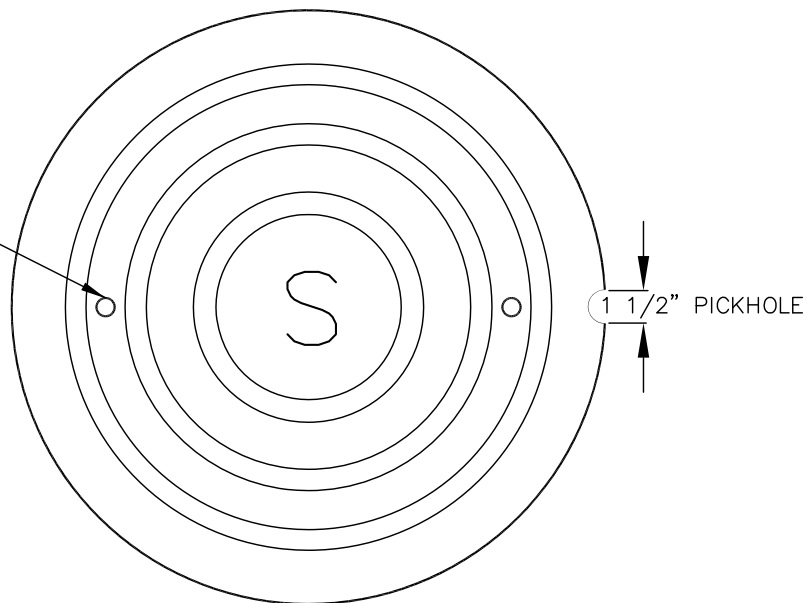


- NOTES:**
1. ALL STEPS SHALL CONFORM TO THE REQUIREMENTS OF ASTM C-478.
  2. MANHOLE STEPS MUST BE TIGHT AND FIRMLY EMBEDDED.
  3. ALL STEPS WITHIN A MANHOLE SHALL BE OF THE SAME DESIGN, TYPE, AND SIZE. (MIXING OF UNMATCHED STEPS IS NOT PERMITTED).
  4. STEPS ADJUSTED OR ADDED SHALL BE EPOXIED IN HOLES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

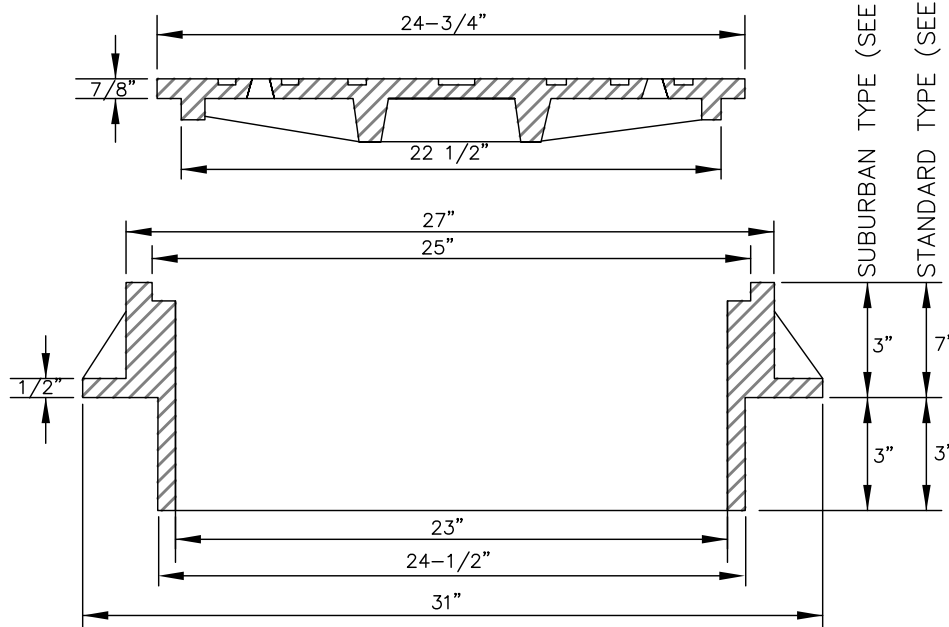
**MANHOLE STEP**



PRE CAST  $\frac{3}{4}$ " CONICAL HOLES (2) SANITARY COVER ONLY



COVER TOP



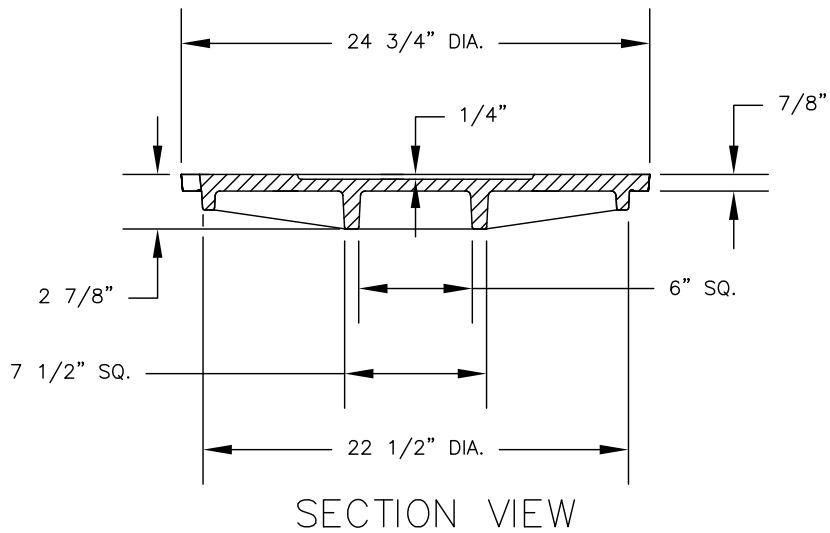
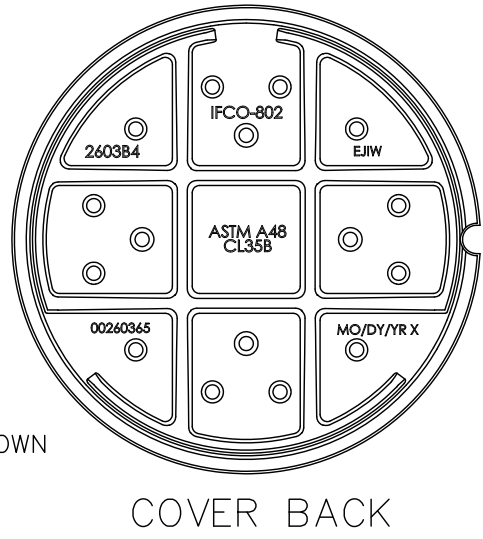
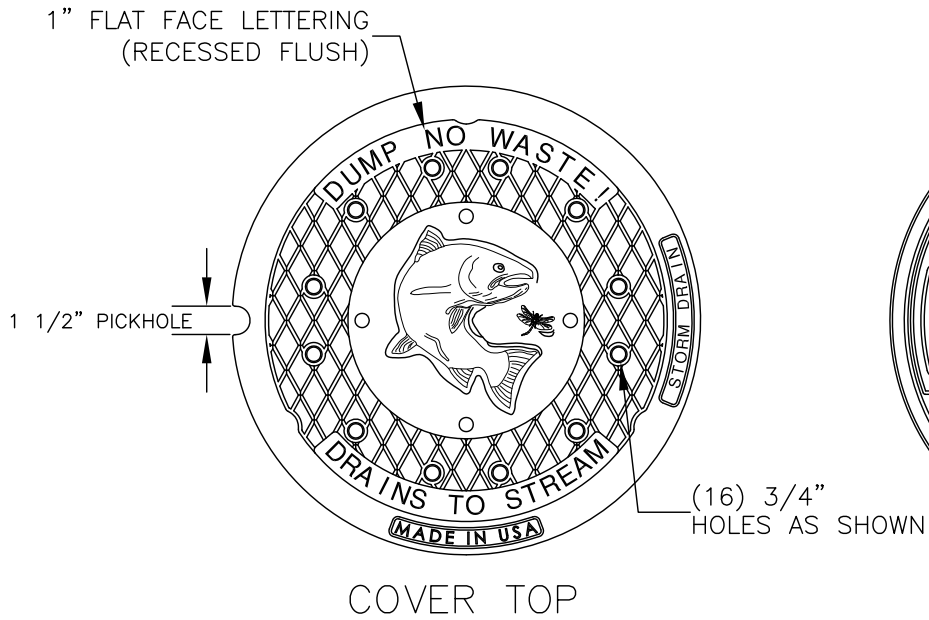
SECTION VIEW

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



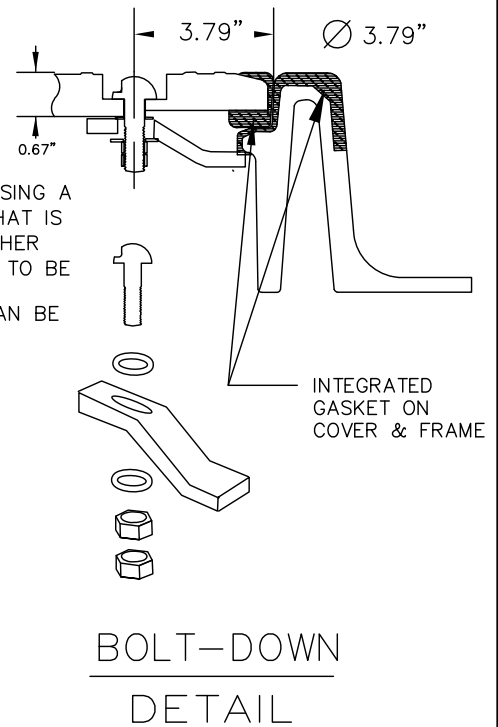
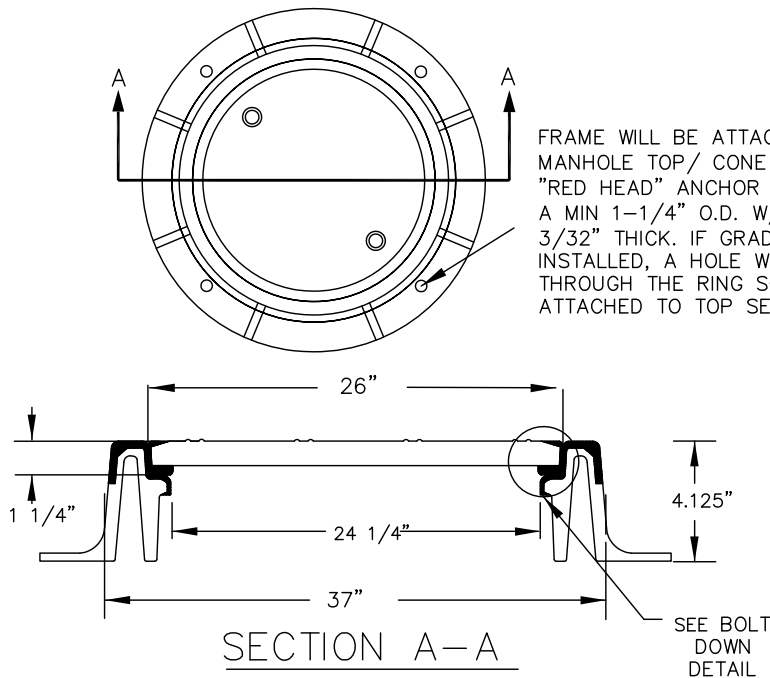


SEE DETAIL #110 FOR MANHOLE FRAME SPECIFICATIONS.

# STORM WATER MANHOLE LID



# WATERTIGHT MANHOLE RING



## NOTES:

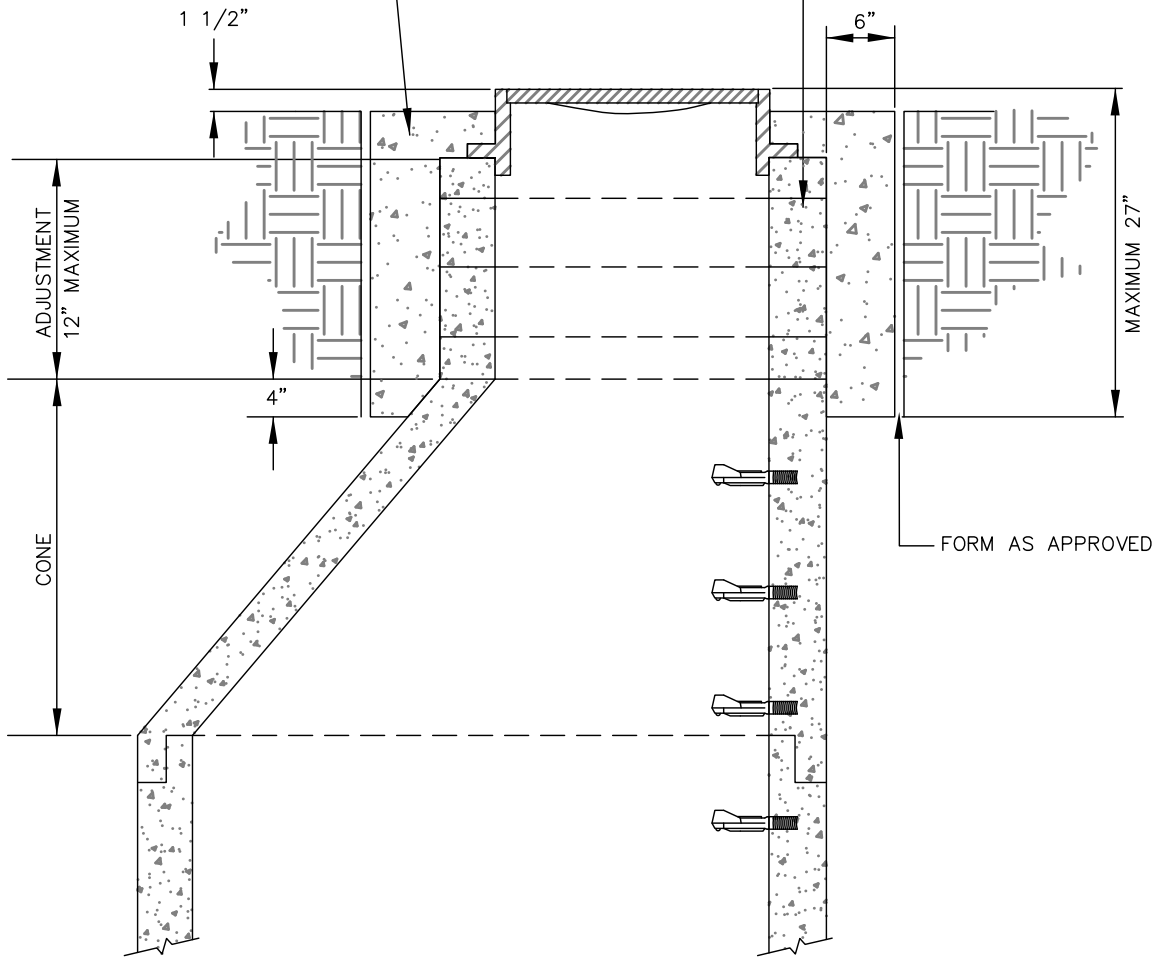
1. COMPOSITE WATERTIGHT/TAMPER PROOF MANHOLE FRAME AND COVER SHALL BE USED IN ALL EASEMENT AND OFF STREET AREAS.
2. THE WATERTIGHT MANHOLE COVER FRAME SHALL BE GMI 2600 SERIES COMPOSITE FRAME AND COVER MANUFACTURED BY TITUS INDUSTRIAL GROUP, INC. OR ITS EQUAL.
3. THE LOCKING MECHANISM SHALL BE A TWISTLIFT® 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



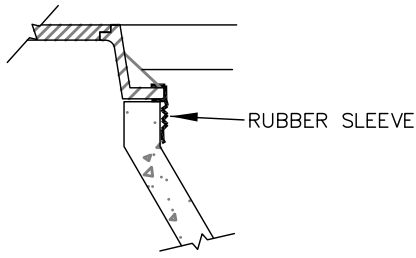
CONCRETE FOR CLOSURE COLLAR SHALL BE READY-MIXED CONFORMING WITH ASTM C94, ALTERNATE 2 AND SHALL HAVE A COMPRESSIVE STRENGTH OF 3000 PSI @28 DAYS.

ADJUSTMENT GRADE RINGS AND CASTING FRAME SET IN 1" OF NON-SHRINKING GROUT



# CONCRETE MANHOLE CLOSURE COLLAR





## NARROW EXTERNAL RUBBER SEAL

TO SPAN CHIMNEY HEIGHTS OF:

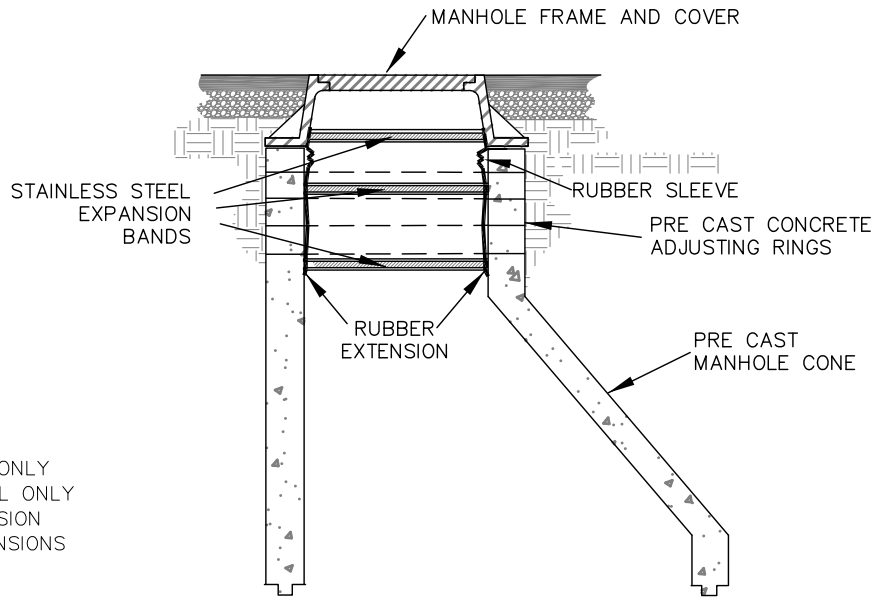
- 0-3" - NARROW (6") SEAL ONLY
- OVER 3" - 6 1/2" - STANDARD (9") SEAL ONLY
- OVER 6 1/2" - 12" - STD. SEAL + EXTENSION
- OVER 12" - SEAL + MULT. EXTENSIONS

### NOTES:

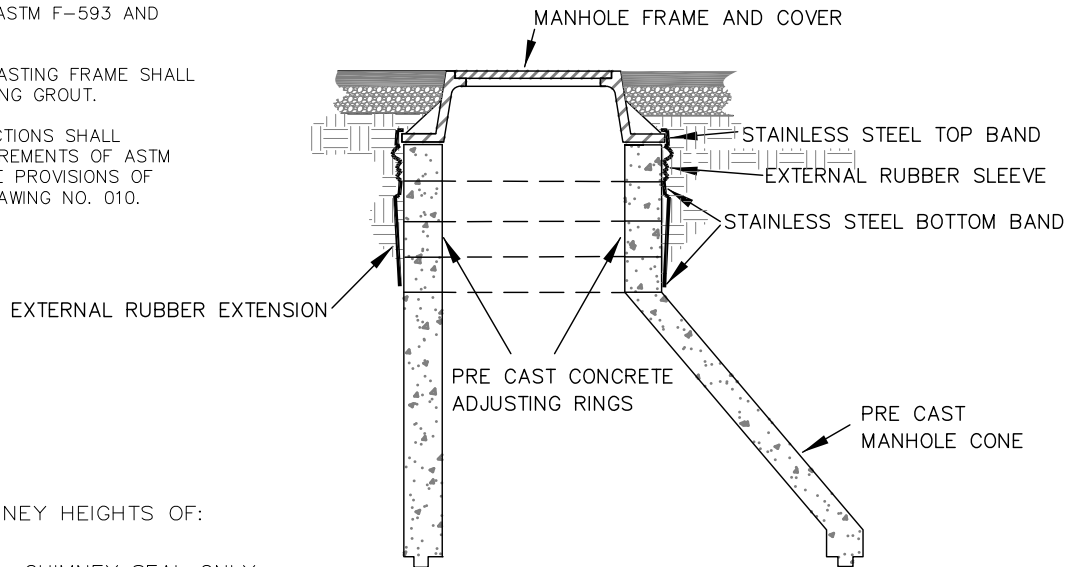
1. SLEEVES AND EXTENSIONS SHALL HAVE A MINIMUM OF  $\frac{3}{16}$ " THICKNESS.
2. RUBBER SHALL BE EXTRUDED HIGH GRADE COMPOUND CONFORMING TO ASTM C-923.
3. BANDS SHALL BE FABRICATED FROM 16 GAUGE STAINLESS STEEL CONFORMING TO ASTM A-240, TYPE 304.
4. NUTS AND BOLTS SHALL BE STAINLESS STEEL CONFORMING 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

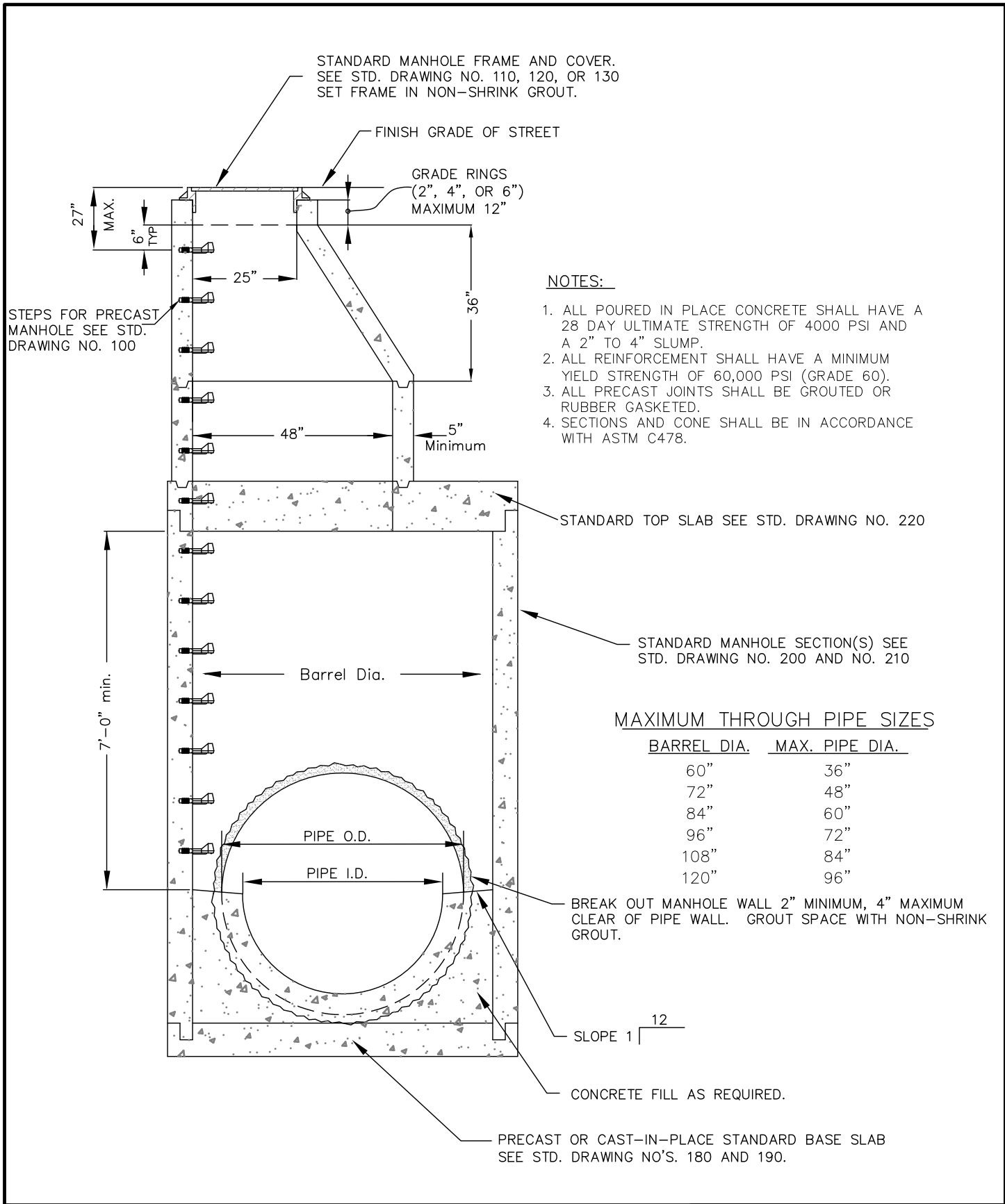


## INTERNAL MANHOLE CHIMNEY SEAL



## EXTERNAL MANHOLE CHIMNEY SEAL

# MANHOLE CHIMNEY SEAL



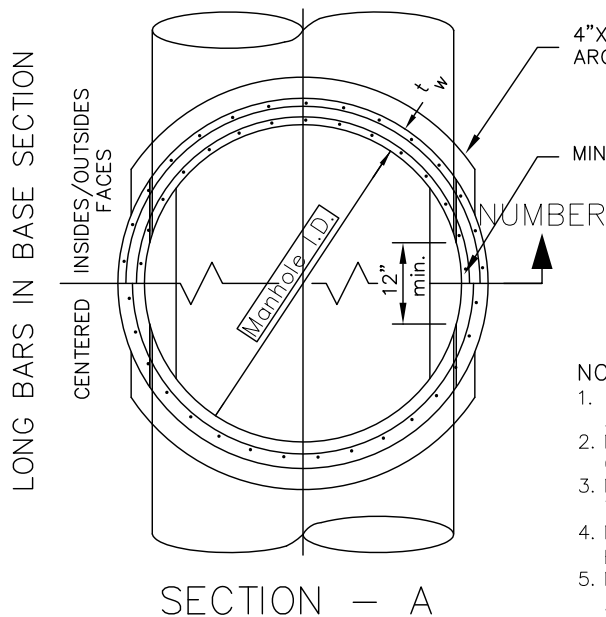
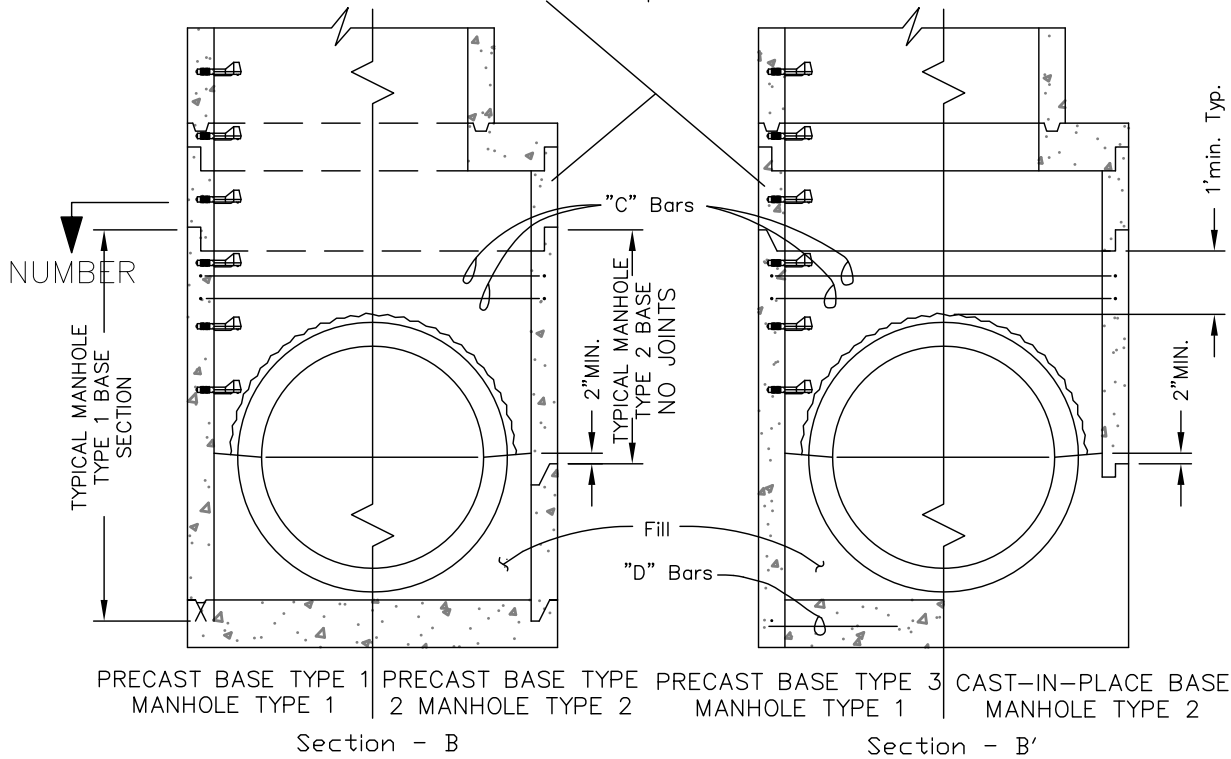
MAXIMUM THROUGH PIPE SIZES

<u>BARREL DIA.</u>	<u>MAX. PIPE DIA.</u>
60"	36"
72"	48"
84"	60"
96"	72"
108"	84"
120"	96"

# LARGE PRECAST CONCRETE MANHOLE



Additional sections as required.  
No special vertical  
reinforcement required.



4"X4" OR 6"X6" CONCRETE COLLAR  
AROUND PIPE CONNECTIONS.

MINIMUM BETWEEN BREAKOUTS FOR PIPES.

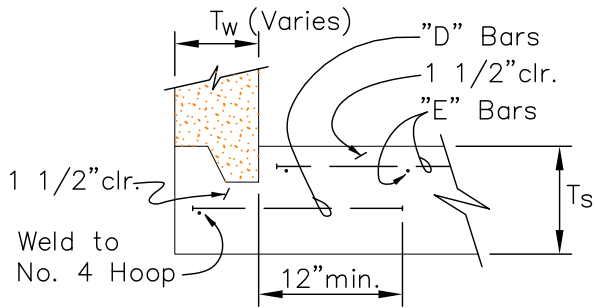
NOTES: (MANHOLE BASES & BASE SECTIONS)

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 HAVE 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

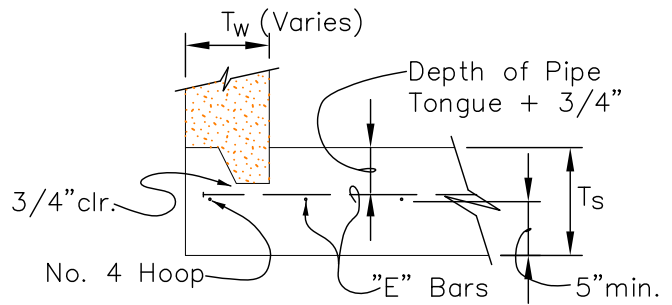






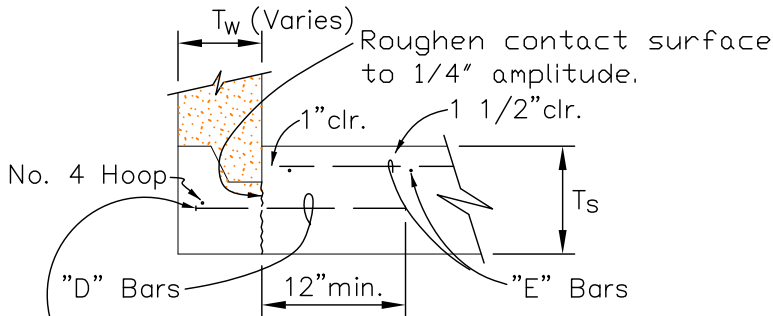
Note: Wall to slab joint shall be grouted when slab is cast separately.

PRECAST BASE SLAB TYPE 1\*\*



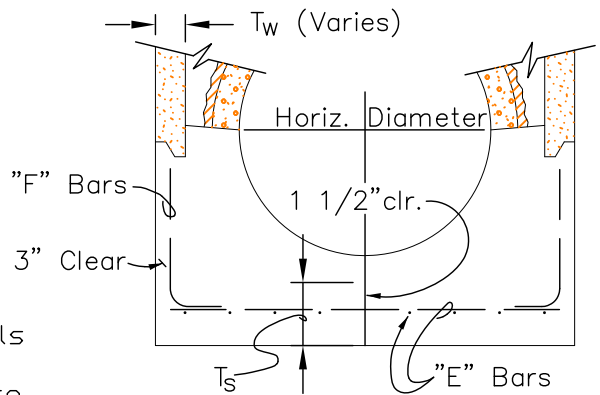
Note: Grout not required for slab cast in contact with manhole section.

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 <sub>s</sub>	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 <sub>s</sub>	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"	#5 @ 7"	#4 @ 5"	#5 @ 6"
3	T <sub>s</sub>	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 <sub>s</sub>	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"

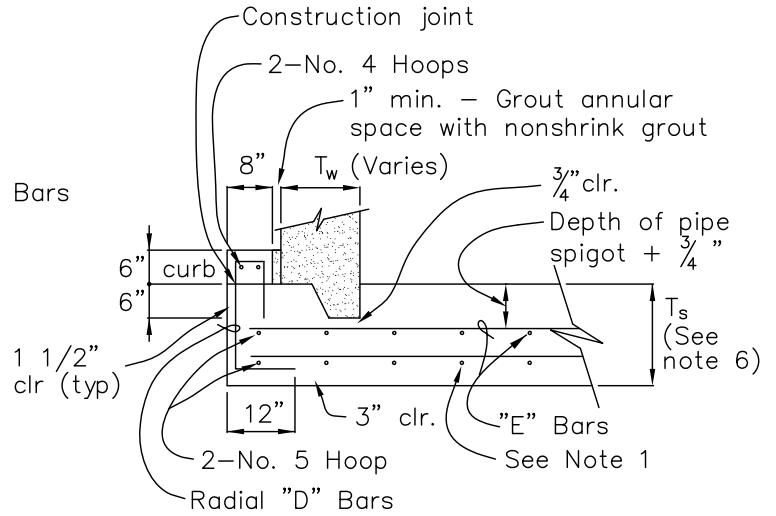
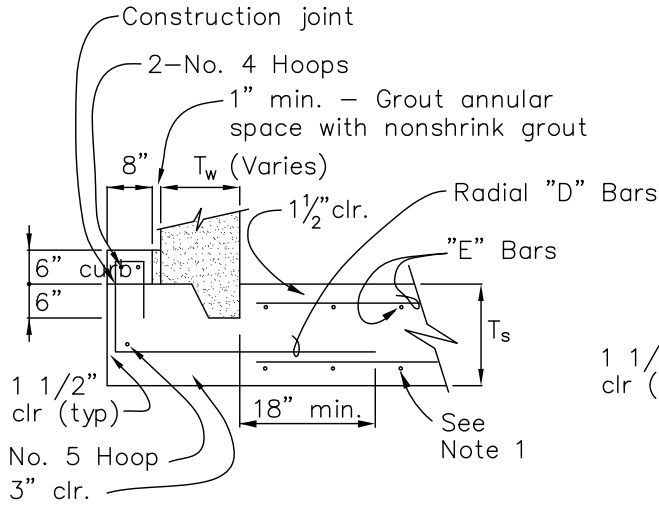
\*Invert to Street Grade

Concrete:  $f'_c = 4,000$  psi  
Steel:  $f_y = \text{Grade 60}$

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

LARGE PRECAST CONCRETE MANHOLE – TYPES





### 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.  $T_s$  for base slab Type 6 assumes a  $6 \frac{1}{4}$ " spigot depth. Adjust  $T_s$  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"	*Invert to Street Grade
	"E" Bars	No.5 @ 12"	No.5 @ 12"	No.5 @ 12"	No.6 @ 12"	Concrete: $f'_c = 4,000$ psi Steel: Grade 60

# LARGE PRECAST CONCRETE MANHOLE BASE SLABS