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 EPOXYED IN HOLES THAT ARE FREE OF MOISTURE AND DEBRIS. (EPOXY TO MEET ASTM C881).
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.
4. COVER AND FRAME TO BE MACHINED TO A TRUE BEARING ALL AROUND.
5. 1 1/2" PICKHOLE IN LID FOR LIFTING HOOK.
1" FLAT FACE LETTERING (RECESSED FLUSH)

COVER TOP

1 1/2" PICKHOLE

(16) 3/4" HOLES AS SHOWN

COVER BACK

24 3/4" DIA.

1/4"

7/8"

2 7/8"

6" SQ.

7 1/2" SQ.

22 1/2" DIA.

SECTION VIEW

SEE DETAIL #110 FOR MANHOLE FRAME SPECIFICATIONS.

STORM WATER MANHOLE LID

DRAWING NO. 120

REVISED 12-06
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

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 NUTS; 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 1/4 TURN OF OPERATION.
11. THE BOLT WILL BE OPERATED BY MEANS OF A SPECIAL 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.
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.

FORM AS APPROVED

CONCRETE MANHOLE CLOSURE COLLAR

DRA WING NO. 140

REVISED 12-06
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 3/8” 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.

INTERNAL MANHOLE CHIMNEY SEAL

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
STANDARD MANHOLE FRAME AND COVER. SEE STD. DRAWING NO. 110, 120, OR 130. SET FRAME IN NON-SHRINK GROUT.

FINISH GRADE OF STREET

GRADE RINGS (2", 4", OR 6") MAXIMUM 12"

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.

STANDARD TOP SLAB SEE STD. DRAWING NO. 220

STANDARD MANHOLE SECTION(S) SEE STD. DRAWING NO. 200 AND NO. 210

MAXIMUM THROUGH PIPE SIZES

<table>
<thead>
<tr>
<th>BARREL DIA.</th>
<th>MAX. PIPE DIA.</th>
</tr>
</thead>
<tbody>
<tr>
<td>60&quot;</td>
<td>36&quot;</td>
</tr>
<tr>
<td>72&quot;</td>
<td>48&quot;</td>
</tr>
<tr>
<td>84&quot;</td>
<td>60&quot;</td>
</tr>
<tr>
<td>96&quot;</td>
<td>72&quot;</td>
</tr>
<tr>
<td>108&quot;</td>
<td>84&quot;</td>
</tr>
<tr>
<td>120&quot;</td>
<td>96&quot;</td>
</tr>
</tbody>
</table>

BREAK OUT MANHOLE WALL 2" MINIMUM, 4" MAXIMUM CLEAR OF PIPE WALL GROUT SPACE WITH NON-SHRINK GROUT.

SLOPE 1

CONCRETE FILL AS REQUIRED.

PRECAST OR CAST-IN-PLACE STANDARD BASE SLAB SEE STD. DRAWING NO'S. 180 AND 190.
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.
**PRECAST BASE SLAB TYPE 1**

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

**PRECAST BASE SLAB TYPE 2**

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

CAST-IN-PLACE BASE

**PRECAST BASE SLAB TYPE 3**

- **Roughen contact surface to 1/4" amplitude.**
- **1 1/2" clr.**

**PRECAST BASE SLAB TYPE 4**

- **Horiz. Diameter**
- **1 1/2" clr.**

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

<table>
<thead>
<tr>
<th>SIZE</th>
<th>60&quot;</th>
<th>72&quot;</th>
<th>84&quot;</th>
<th>96&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Depth*</td>
<td>0'-15'</td>
<td>15'-30'</td>
<td>0'-15'</td>
</tr>
<tr>
<td>1 D Bars</td>
<td>Tₜs</td>
<td>8.0&quot;</td>
<td>9.0&quot;</td>
<td>8.0&quot;</td>
</tr>
<tr>
<td>E Bars</td>
<td>Tₜ</td>
<td>11.0&quot;</td>
<td>8.0&quot;</td>
<td>12.0&quot;</td>
</tr>
<tr>
<td>3 D Bars</td>
<td>Tₜs</td>
<td>7.0&quot;</td>
<td>9.0&quot;</td>
<td>7.0&quot;</td>
</tr>
<tr>
<td>E Bars</td>
<td>Tₜ</td>
<td>7.0&quot;</td>
<td>9.0&quot;</td>
<td>7.0&quot;</td>
</tr>
<tr>
<td>F Bars</td>
<td>Tₜ</td>
<td>9.0&quot;</td>
<td>9.0&quot;</td>
<td>9.0&quot;</td>
</tr>
</tbody>
</table>

*Invert to Street Grade

Concrete: \( \varepsilon = 4,000 \) psi
Steel: \( f_y = \text{Grade 60} \)

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

<table>
<thead>
<tr>
<th>SIZE</th>
<th>108&quot;</th>
<th>120&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Depth*</td>
<td>0'–15'</td>
</tr>
<tr>
<td></td>
<td>$T_s$</td>
<td>10&quot;</td>
</tr>
<tr>
<td>5</td>
<td>&quot;D&quot; Bars</td>
<td>No. 4 @ 12&quot;</td>
</tr>
<tr>
<td></td>
<td>&quot;E&quot; Bars</td>
<td>No. 5 @ 12&quot;</td>
</tr>
<tr>
<td>6</td>
<td>$T_s$</td>
<td>15.5&quot;</td>
</tr>
<tr>
<td></td>
<td>&quot;D&quot; Bars</td>
<td>No. 4 @ 12&quot;</td>
</tr>
<tr>
<td></td>
<td>&quot;E&quot; Bars</td>
<td>No. 5 @ 12&quot;</td>
</tr>
</tbody>
</table>

*Invert to Street Grade
Concrete: $f'_{c} = 4,000$ psi
Steel: Grade 60

LARGE PRECAST CONCRETE MANHOLE BASE SLABS

DRAWING NO. 190
REVISED 12–06