Environmental Protection

SEWER DESIGN STANDARDS

PREPARED BY
CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION
DIVISION OF INFRASTRUCTURE
BUREAU OF DESIGN

(SEPTEMBER 2007) REVISED AUGUST 2018
# Sewer Design Standards

## Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sewer Design Criteria - Manhole Spacing and Location on Pipe Sewers</td>
<td>A</td>
</tr>
<tr>
<td>Vitrified Clay Pipe on Concrete Cradle on Earth or on Rock</td>
<td>SE1</td>
</tr>
<tr>
<td>Vitrified Clay Pipe on Concrete Cradle on Piles</td>
<td>SE2</td>
</tr>
<tr>
<td>Circular Reinforced Concrete Pipe on Concrete Cradle on Earth or on Rock</td>
<td>SE3</td>
</tr>
<tr>
<td>24&quot; Diameter to 48&quot; Diameter Circular Reinforced Concrete Pipe on Concrete Cradle on Piles - 2 Pile Bents (20&quot; and 25&quot; Cover)</td>
<td>SE4</td>
</tr>
<tr>
<td>54&quot; Diameter to 96&quot; Diameter Circular Reinforced Concrete Pipe on Concrete Cradle on Piles - 3 Pile Bents (20&quot; and 25&quot; Cover)</td>
<td>SE5</td>
</tr>
<tr>
<td>24&quot; Diameter to 60&quot; Diameter Circular Reinforced Concrete Pipe on Concrete Cradle on Piles - 2 Pile Bents (6&quot;, 10&quot; and 15&quot; Cover)</td>
<td>SE6</td>
</tr>
<tr>
<td>60&quot; Diameter to 96&quot; Diameter Circular Reinforced Concrete Pipe on Concrete Cradle on Piles - 3 Pile Bents (6&quot;, 10&quot; and 15&quot; Cover)</td>
<td>SE7</td>
</tr>
<tr>
<td>Horizontal Elliptical Reinforced Concrete Pipe on Concrete Cradle on Earth or on Rock</td>
<td>SE8</td>
</tr>
<tr>
<td>23&quot;W x 14&quot;H to 76&quot;W x 48&quot;H Horizontal Elliptical Reinforced Concrete Pipe on Concrete Cradle on Piles - 2 Pile Bents (6&quot;, 10&quot; and 15&quot; Cover)</td>
<td>SE9</td>
</tr>
<tr>
<td>83&quot;W x 53&quot;H to 121&quot;W x 77&quot;H Horizontal Elliptical Reinforced Concrete Pipe on Concrete Cradle on Piles - 3 Pile Bents (6&quot;, 10&quot;, and 15&quot; Cover)</td>
<td>SE10</td>
</tr>
<tr>
<td>Type A-1 and Type A-2 Manholes on 8&quot; Diameter to 30&quot; Diameter Pipe Sewers in Dry Location</td>
<td>SE11</td>
</tr>
<tr>
<td>Type A-1 and Type A-2 Manholes on 8&quot; Diameter to 30&quot; Diameter Pipe Sewers on Piles in Dry Location</td>
<td>SE12</td>
</tr>
<tr>
<td>Type A-3 Shallow Manhole on 8&quot; Diameter to 30&quot; Diameter Pipe Sewers</td>
<td>SE13</td>
</tr>
<tr>
<td>Type B-1 and Type B-2 Manholes on 8&quot; Diameter to 30&quot; Diameter Pipe Sewers in Wet Location</td>
<td>SE14</td>
</tr>
<tr>
<td>Type B-1 and Type B-2 Manholes on 8&quot; Diameter to 30&quot; Diameter Pipe Sewers on Piles in Wet Location</td>
<td>SE15</td>
</tr>
<tr>
<td>Type C-1 and Type C-2 Manholes on 36&quot; Diameter to 60&quot; Diameter Reinforced Concrete Pipe Sewers</td>
<td>SE16</td>
</tr>
<tr>
<td>Type C-1 and Type C-2 Manholes on 36&quot; Diameter to 60&quot; Diameter Reinforced Concrete Pipe Sewers on Piles</td>
<td>SE17</td>
</tr>
<tr>
<td>Type D-1 and Type D-2 Manholes on 60&quot; Diameter to 96&quot; Diameter Reinforced Concrete Pipe Sewers</td>
<td>SE18</td>
</tr>
<tr>
<td>Type D-1 and Type D-2 Manholes on 60&quot; Diameter to 96&quot; Diameter Reinforced Concrete Pipe Sewers on Piles</td>
<td>SE19</td>
</tr>
<tr>
<td>Type E-1 Manhole on 23&quot;W x 14&quot;H to 60&quot;W x 38&quot;H Horizontal Elliptical Reinforced Concrete Pipe Sewers</td>
<td>SE20</td>
</tr>
<tr>
<td>Type E-1 Manhole on 23&quot;W x 14&quot;H to 60&quot;W x 38&quot;H Horizontal Elliptical Reinforced Concrete Pipe Sewers on Piles</td>
<td>SE21</td>
</tr>
<tr>
<td>Type E-2 Manhole on 68&quot;W x 43&quot;H to 121&quot;W x 77&quot;H Horizontal Elliptical Reinforced Concrete Pipe Sewers</td>
<td>SE22</td>
</tr>
<tr>
<td>Type E-2 Manhole on 68&quot;W x 43&quot;H to 121&quot;W x 77&quot;H Horizontal Elliptical Reinforced Concrete Pipe Sewers on Piles</td>
<td>SE23</td>
</tr>
<tr>
<td>Drop Pipe Manhole (Type I) on 10&quot; Diameter to 24&quot; Diameter Pipe Sewers</td>
<td>SE24</td>
</tr>
<tr>
<td>Drop Pipe Manhole (Type I) on 10&quot; Diameter to 24&quot; Diameter Pipe Sewers on Piles</td>
<td>SE25</td>
</tr>
<tr>
<td>Drop Pipe Manhole (Type II) (for 10&quot; Diameter to 24&quot; Diameter Incoming Drop Pipe Sewers)</td>
<td>SE26</td>
</tr>
<tr>
<td>CONTENTS</td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>---</td>
</tr>
<tr>
<td>DROP PIPE MANHOLE (TYPE II) ON PILES (FOR 10&quot; DIAMETER TO 24&quot; DIAMETER INCOMING DROP PIPE SEWERS)</td>
<td>SE27</td>
</tr>
<tr>
<td>4'-0&quot; DIAMETER PRECAST MANHOLE (4 DRAWINGS)</td>
<td>SE28A, SE28B, SE28C &amp; SE28D</td>
</tr>
<tr>
<td>5'-0&quot; DIAMETER PRECAST MANHOLE (4 DRAWINGS)</td>
<td>SE29A, SE29B SE29C &amp; SE29D</td>
</tr>
<tr>
<td>6'-0&quot;, 7'-0&quot;, 8'-0&quot; AND 10'-0&quot; DIAMETER PRECAST MANHOLE (4 DRAWINGS)</td>
<td>SE30A, SE30B, SE30C &amp; SE30D</td>
</tr>
<tr>
<td>PRECAST MANHOLE DETAILS (3 DRAWINGS)</td>
<td>SE31A, SE31B &amp; SE31C</td>
</tr>
<tr>
<td>ALTERNATE MONOLITHIC BASE SECTION FOR PRECAST MANHOLES (POURED IN PLACE)</td>
<td>SE32</td>
</tr>
<tr>
<td>PRECAST DROP PIPE MANHOLE (TYPE I)</td>
<td>SE33</td>
</tr>
<tr>
<td>PRECAST DROP PIPE MANHOLE (TYPE II)</td>
<td>SE34</td>
</tr>
<tr>
<td>REMOVABLE PRECAST REINFORCED CONCRETE SLAB</td>
<td>SE35</td>
</tr>
<tr>
<td>REMOVABLE PRECAST REINFORCED CONCRETE SLAB FOR DROP PIPE MANHOLE (TYPE I)</td>
<td>SE36</td>
</tr>
<tr>
<td>REMOVABLE PRECAST REINFORCED CONCRETE SLAB FOR DROP PIPE MANHOLE (TYPE II)</td>
<td>SE37</td>
</tr>
<tr>
<td>MANHOLE CHIMNEY DETAIL (WHEN LEGAL GRADE IS BELOW FINAL GRADE)</td>
<td>SE38</td>
</tr>
<tr>
<td>27&quot; DIAMETER CAST IRON MANHOLE FRAME AND COVER (FOR ACCESS OR CLEANOUT)</td>
<td>SE39</td>
</tr>
<tr>
<td>27&quot; DIAMETER CAST IRON EXTENSION RING FOR 27&quot; DIAMETER MANHOLE FRAME AND COVER</td>
<td>SE40</td>
</tr>
<tr>
<td>36&quot; DIAMETER CAST IRON MANHOLE FRAME AND COVER FOR CLEANOUT</td>
<td>SE41</td>
</tr>
<tr>
<td>24&quot; DIAMETER CAST IRON MANHOLE COVER</td>
<td>SE42</td>
</tr>
<tr>
<td>CAST IRON MANHOLE STEP</td>
<td>SE43</td>
</tr>
<tr>
<td>CAST IRON MANHOLE STEP (BOLT-ON TYPE)</td>
<td>SE44</td>
</tr>
<tr>
<td>CIRCULAR CAST IRON MANHOLE STEP (BOLT-ON TYPE)</td>
<td>SE45</td>
</tr>
<tr>
<td>PLASTIC MANHOLE STEP</td>
<td>SE46</td>
</tr>
<tr>
<td>TYPE 1 CATCH BASIN (WITH CURB PIECE)</td>
<td>SE47</td>
</tr>
<tr>
<td>TYPE 2 CATCH BASIN (WITHOUT CURB PIECE)</td>
<td>SE48</td>
</tr>
<tr>
<td>TYPE 3 CATCH BASIN (WITHOUT CURB PIECE)</td>
<td>SE49A, SE49B</td>
</tr>
<tr>
<td>TYPE 3 CATCH BASIN (WITH CURB PIECE)</td>
<td>SE50A, SE50B</td>
</tr>
<tr>
<td>DOUBLE CATCH BASIN (WITHOUT CURB PIECE)</td>
<td>SE50B</td>
</tr>
<tr>
<td>MODIFICATION OF EXISTING TYPE 2 CATCH BASIN</td>
<td>(NOT INCLUDED)</td>
</tr>
<tr>
<td>Section</td>
<td>Page</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>PRECAST TYPE 1 CATCH BASIN</td>
<td>SE52A</td>
</tr>
<tr>
<td>SPLIT PRECAST TYPE 1 CATCH BASIN</td>
<td>SE52B</td>
</tr>
<tr>
<td>PRECAST TYPE 2 CATCH BASIN</td>
<td>SE52A</td>
</tr>
<tr>
<td>SPLIT PRECAST TYPE 2 CATCH BASIN</td>
<td>SE52B</td>
</tr>
<tr>
<td>PRECAST TYPE 3 CATCH BASIN (WITHOUT CURB PIECE)</td>
<td>SE53A</td>
</tr>
<tr>
<td>PRECAST TYPE 3 CATCH BASIN (WITH CURB PIECE)</td>
<td>SE53B</td>
</tr>
<tr>
<td>PRECAST DOUBLE CATCH BASIN (WITHOUT CURB PIECE) (2 DRAWINGS)</td>
<td>SE54A</td>
</tr>
<tr>
<td>PRECAST DOUBLE CATCH BASIN (WITH CURB PIECE)</td>
<td>SE54B</td>
</tr>
<tr>
<td>PRECAST SEEPAGE BASIN (4 DRAWINGS)</td>
<td>SE55A</td>
</tr>
<tr>
<td>CAST IRON FRAME FOR CATCH BASINS (WITH CURB PIECE)</td>
<td>SE55B</td>
</tr>
<tr>
<td>CAST IRON FRAME FOR CATCH BASINS (WITHOUT CURB PIECE)</td>
<td>SE55C</td>
</tr>
<tr>
<td>CAST IRON FRAME FOR TYPE 3 CATCH BASINS (WITH CURB PIECE)</td>
<td>SE55D</td>
</tr>
<tr>
<td>CAST IRON GRATING, BACK PLATE, AND CURB PIECE FOR CATCH BASINS (WITH H=6&quot;)</td>
<td>SE56A</td>
</tr>
<tr>
<td>CAST IRON GRATING, BACK PLATE, AND CURB PIECE FOR CATCH BASINS (WITH H=8&quot;)</td>
<td>SE56B</td>
</tr>
<tr>
<td>CAST IRON HOOD AND HOOKS FOR CATCH BASINS</td>
<td>SE56C</td>
</tr>
<tr>
<td>DUCTILE IRON PIPE ALTERNATE</td>
<td>SE56D</td>
</tr>
<tr>
<td>HOUSE CONNECTIONS (FOR 6&quot; AND 8&quot; DIAMETER CAST IRON SOIL PIPE OR VITRIFIED CLAY PIPE ON CONCRETE CRADLE OR ENCASED IN CONCRETE ON EARTH OR ON ROCK)</td>
<td>SE56E</td>
</tr>
<tr>
<td>RISER ON 10&quot; DIAMETER TO 18&quot; DIAMETER VITRIFIED CLAY PIPE SEWERS ON CONCRETE CRADLE</td>
<td>SE56F</td>
</tr>
<tr>
<td>RISER ON PRECAST REINFORCED CONCRETE PIPE SEWERS ON CONCRETE CRADLE</td>
<td>SE56G</td>
</tr>
<tr>
<td>27&quot; DIAMETER ALUMINUM FLOOR GRATING</td>
<td>SE56H</td>
</tr>
<tr>
<td>30&quot; DIAMETER ALUMINUM FLOOR GRATING</td>
<td>SE56I</td>
</tr>
<tr>
<td>CONSTRUCTION OF CATCH BASIN (NO EXISTING CURB)</td>
<td>SE57A</td>
</tr>
<tr>
<td>RECONSTRUCTION OF EXISTING MANHOLE AND REPLACEMENT OF EXISTING MANHOLE FRAME AND COVER</td>
<td>SE57B</td>
</tr>
<tr>
<td>ROADWAY RESURFACING (Pavement Key - Type B)</td>
<td>SE57C</td>
</tr>
<tr>
<td>MINIMUM LOAD DIAGRAM FOR NON-WATERTIGHT SHEETING DESIGN</td>
<td>SE57D</td>
</tr>
<tr>
<td>MINIMUM LOAD DIAGRAM FOR WATERTIGHT SHEETING DESIGN</td>
<td>SE57E</td>
</tr>
</tbody>
</table>
### STANDARD FOR SEWER DESIGN CRITERIA - MANHOLE SPACING AND LOCATION ON PIPE SEWERS

#### A. MAXIMUM SPACING OF MANHOLE ON PIPE SEWERS

<table>
<thead>
<tr>
<th>PIPE SIZE:</th>
<th>RECOMMENDED MAXIMUM SPACING</th>
<th>ABSOLUTE MAXIMUM SPACING</th>
</tr>
</thead>
<tbody>
<tr>
<td>10&quot; DIA. TO 36&quot; DIA. CIRCULAR PIPE</td>
<td>250'</td>
<td>300'</td>
</tr>
<tr>
<td>14&quot;H x 23&quot;W TO 29&quot;H x 45&quot;W HORIZONTAL ELLIPTICAL PIPE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23&quot;H x 14&quot;W TO 45&quot;H x 23&quot;W VERTICAL ELLIPTICAL PIPE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>42&quot; DIA. TO 72&quot; DIA. CIRCULAR PIPE</td>
<td>400'</td>
<td>500'</td>
</tr>
<tr>
<td>34&quot;H x 53&quot;W TO 58&quot;H x 91&quot;W HORIZONTAL ELLIPTICAL PIPE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>55&quot;H x 34&quot;W TO 91&quot;H x 55&quot;W VERTICAL ELLIPTICAL PIPE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>78&quot; DIA. AND LARGER CIRCULAR PIPE</td>
<td>600'</td>
<td>800'</td>
</tr>
<tr>
<td>63&quot;H x 98&quot;W AND LARGER HORIZONTAL ELLIPTICAL PIPE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>98&quot;H x 63&quot;W AND LARGER VERTICAL ELLIPTICAL PIPE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### B. MANHOLE LOCATION ON PIPE SEWERS

1. AT ALL CHANGES IN GRADE OR ELEVATION FOR ALL SIZES OF SEWERS.
2. AT ALL CHANGES IN ALIGNMENT FOR ALL SIZES OF SEWERS.
3. AT ALL STREET INTERSECTIONS FOR SEWERS UP TO AND INCLUDING 24" DIAMETER.
4. AT ALL JUNCTIONS OF 2 OR MORE SEWERS.
5. AT ALL CATCH BASIN CONNECTIONS WHERE IT IS NOT PRACTICAL TO CONNECT DIRECTLY TO THE SEWER. A DIRECT CONNECTION SHALL NOT BE MADE TO A SEWER LESS THAN 60" IN DIAMETER.
6. THE TERM "DRY LOCATION" SHALL MEAN ANY LOCATION WHERE THE ENTIRE MANHOLE IS LOCATED ABOVE THE WATER TABLE AND IS IN NORMALLY DRY SOIL.
7. THE TERM "WET LOCATION" SHALL MEAN ANY LOCATION WHERE THE MANHOLE IS LOCATED IN WHOLE OR IN PART BELOW THE WATER TABLE OR IN NORMALLY WET SOIL.
8. SPECIAL CONSIDERATION WILL BE REQUIRED FOR SITUATIONS NOT COVERED HEREIN.

---

**Associate Commissioner, Design**

**Executive Director of Engineering**

---

**Signature**

**Date**

**Signature**

**Date**
STANDARD FOR VITRIFIED CLAY PIPE ON CONCRETE CRADLE ON EARTH OR ON ROCK

NOTES:
(1) CRADLE AND ENCASEMENT ARE CLASS 40 CONCRETE.
(2) ENTIRE CRADLE OR ENCASEMENT IS TO BE PLACED MONOLITHICALLY.
(3) ENCASEMENT REQUIRED ON PIPE WHICH HAS A COVER, FROM FINAL GRADE TO THE OUTER TOP OF THE PIPE, OF LESS THAN FOUR (4) FEET OR WHEN THE UPPER LIMIT OF COVER IS EXCEEDED.
(4) UNLESS OTHERWISE APPROVED BY THE ENGINEER, THE MAX. WIDTH OF TRENCH SHALL BE SUCH THAT THE MAX. WIDTH BETWEEN INNER FACES OF THE LOWEST STAGE OF SHEETING OR ROCK CUT LINES, FROM SUBGRADE OF TRENCH TO A MIN. HEIGHT OF TWO (2) FEET ABOVE THE OUTER TOP OF THE PIPE, SHALL NOT BE GREATER THAN THE STANDARD CRADLE WIDTH PLUS EIGHTEEN (18) INCHES MAXIMUM EACH SIDE.
(5) SIX (6) INCH MINIMUM SHALL BE MAINTAINED AT ALL TIMES, EXCEPT WHERE SHEETING IS TO BE USED AS FORMWORK.

SECTION ON ROCK

SECTION ON EARTH

SECTION A-A
BREAK JOINTS TO CONCRETE BEDDING

D  A  MAX. COVER WITHOUT ENCSMT.  CONC. CRADLE CU. YD./L.F.  CONC. ENCSMT. CU. YD./L.F.
5"  1'-0"  22'  0.0406  0.0815
10"  2'-0"  20'  0.0596  0.1191
12"  2'-3"  18'  0.0708  0.1415
15"  2'-6"  16'  0.0831  0.1661
18"  2'-10"  15'  0.0966  0.1996

1" THICK FOAM BOARD (EXTRUDED POLYSTYRENE) OR OTHER APPROVED MATERIAL

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

THOMAS LEYNE P.E.  8/14/18

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

GARDNER S. RAMI P.E.  8/14/18

DATE

DATE
# City of New York Department of Environmental Protection

## Standard for Vitrified Clay Pipe on Concrete Cradle on Piles

### Maximum Width of Trench

**1'-6" Max.**

**Inner Face of Sheeting**

**Encasement Where Required (See Note 3)**

**Maximum Pile Spacing**

**Additional Items/L.F.**

**Stone Ballast Cu. Yd. per l.f.**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>8&quot;</td>
<td>1'-4&quot;</td>
<td>6'-0&quot;</td>
<td>6'-0&quot;</td>
<td>5'-0&quot;</td>
<td>6'-0&quot;</td>
<td>0.0232</td>
<td>6.65</td>
<td>6.65</td>
</tr>
<tr>
<td>10&quot;</td>
<td>2'-0&quot;</td>
<td>6'-0&quot;</td>
<td>6'-0&quot;</td>
<td>5'-0&quot;</td>
<td>6'-0&quot;</td>
<td>0.0200</td>
<td>7.65</td>
<td>7.65</td>
</tr>
<tr>
<td>12&quot;</td>
<td>2'-6&quot;</td>
<td>6'-0&quot;</td>
<td>6'-0&quot;</td>
<td>6'-0&quot;</td>
<td>6'-0&quot;</td>
<td>0.0348</td>
<td>8.35</td>
<td>8.35</td>
</tr>
<tr>
<td>15&quot;</td>
<td>2'-6&quot;</td>
<td>6'-0&quot;</td>
<td>6'-0&quot;</td>
<td>6'-0&quot;</td>
<td>6'-0&quot;</td>
<td>0.0396</td>
<td>11.65</td>
<td>11.65</td>
</tr>
<tr>
<td>18&quot;</td>
<td>2'-10&quot;</td>
<td>6'-0&quot;</td>
<td>5'-0&quot;</td>
<td>4'-0&quot;</td>
<td>3'-4&quot;</td>
<td>0.0438</td>
<td>12.52</td>
<td>12.77</td>
</tr>
</tbody>
</table>

### Additional Steel Reinforcement

**Longitudinal Bars**

- 3/8" over piles for all sizes of pipes
- 1/2" on each side for 12" and 18" pipes

**Transverse Bars**

- 3/8" over piles
- #8 @ 12" O.C. between piles

### Notes:
1. Cradle and encasement are Class 40 concrete, Rebars-Grade 60.
2. Entire cradle or encasement is to be placed monolithically.
3. Encasement required on pipe which has a cover, from final grade to the outer top of the pipe, of less than four (4) feet or when the upper limit of cover is exceeded.
4. Unless otherwise approved by the engineer, the max. width of trench shall be such that the max. width between inner faces of the lowest stage of sheeting or rock cut lines, from subgrade of trench to a min. height of two (2) feet above the outer top of the pipe, shall not be greater than the standard cradle width plus eighteen (18) inches maximum each side.
5. Six (6) inch minimum shall be maintained at all times, except where sheeting is to be used as formwork.

---

**Signature and Date:**

- **G. S. Saini**
  - Associate Commissioner, Design
  - Department of Design and Construction
  - 8/14/18
- **Thomas W. Lynne**
  - Executive Director of Engineering
  - Department of Environmental Protection
  - 8/14/18
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR CIRCULAR REINFORCED CONCRETE PIPE ON CONCRETE CRADLE ON EARTH OR ON ROCK

NOTES:

(1) CRADLE AND ENCASEMENT ARE CLASS 40 CONCRETE.
(2) ENTIRE CRADLE OR ENCASEMENT IS TO BE PLACED MONOLITHICALLY.
(3) ENCASEMENT REQUIRED ON PIPE WHICH HAS A COVER, FROM FINAL GRADE TO THE OUTER TOP OF THE PIPE, OF LESS THAN FOUR (4) FEET OR WHEN THE UPPER LIMIT OF COVER FOR CLASS V PIPE IS EXCEEDED.
(4) UNLESS OTHERWISE APPROVED BY THE ENGINEER, THE MAX. WIDTH OF TRENCH SHALL BE SUCH THAT THE MAX. WIDTH BETWEEN INNER FACES OF THE LOWEST STAGE OF SHEETING OR Rock CUT LINES, FROM SUBGRADE OF TRENCH TO A MIN. HEIGHT OF TWO (2) FEET ABOVE THE OUTER TOP OF THE PIPE, SHALL NOT BE GREATER THAN THE STANDARD CRADLE WIDTH PLUS EIGHTEEN (18) INCHES MAXIMUM EACH SIDE.
(5) SIX (6) INCH MINIMUM SHALL BE MAINTAINED AT ALL TIMES, EXCEPT WHERE SHEETING IS TO BE USED AS FORMWORK.
(6) CRADLE WIDTH "A" IS BASED ON MINIMUM WALL THICKNESS PER ASTM C76 FOR "WALL B" FOR CLASS II, IV & V - R.C.P.

<table>
<thead>
<tr>
<th>D</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>CONC. CRADLE CU. YD.L.F.</th>
<th>CONC. ENCSMT. CU. YD.L.F.</th>
<th>MAX. COVER FOR PIPE CLASS</th>
</tr>
</thead>
<tbody>
<tr>
<td>24&quot;</td>
<td>3'-4&quot;</td>
<td>6&quot;</td>
<td>1'-2&quot;</td>
<td>0.1124</td>
<td>0.2719</td>
<td>12'-0&quot;</td>
</tr>
<tr>
<td>30&quot;</td>
<td>4'-1&quot;</td>
<td>8&quot;</td>
<td>1'-4&quot;</td>
<td>0.1414</td>
<td>0.3410</td>
<td>12'-0&quot;</td>
</tr>
<tr>
<td>36&quot;</td>
<td>4'-6&quot;</td>
<td>10&quot;</td>
<td>1'-6&quot;</td>
<td>0.1839</td>
<td>0.4360</td>
<td>12'-0&quot;</td>
</tr>
<tr>
<td>42&quot;</td>
<td>5'-2&quot;</td>
<td>8&quot;</td>
<td>1'-0&quot;</td>
<td>0.2348</td>
<td>0.5279</td>
<td>12'-0&quot;</td>
</tr>
<tr>
<td>48&quot;</td>
<td>5'-10&quot;</td>
<td>9&quot;</td>
<td>2'-0&quot;</td>
<td>0.2928</td>
<td>0.6348</td>
<td>12'-0&quot;</td>
</tr>
<tr>
<td>54&quot;</td>
<td>6'-0&quot;</td>
<td>10&quot;</td>
<td>2'-5&quot;</td>
<td>0.3570</td>
<td>0.7507</td>
<td>12'-0&quot;</td>
</tr>
<tr>
<td>60&quot;</td>
<td>7'-0&quot;</td>
<td>11&quot;</td>
<td>2'-9&quot;</td>
<td>0.4219</td>
<td>0.8757</td>
<td>12'-0&quot;</td>
</tr>
<tr>
<td>68&quot;</td>
<td>7'-7&quot;</td>
<td>12&quot;</td>
<td>2'-10&quot;</td>
<td>0.4881</td>
<td>1.0087</td>
<td>13'-0&quot;</td>
</tr>
<tr>
<td>72&quot;</td>
<td>8'-4&quot;</td>
<td>13&quot;</td>
<td>3'-11&quot;</td>
<td>0.5626</td>
<td>1.1526</td>
<td>13'-0&quot;</td>
</tr>
<tr>
<td>78&quot;</td>
<td>8'-6&quot;</td>
<td>14&quot;</td>
<td>3'-2&quot;</td>
<td>0.6691</td>
<td>1.3046</td>
<td>13'-0&quot;</td>
</tr>
<tr>
<td>84&quot;</td>
<td>9'-4&quot;</td>
<td>15&quot;</td>
<td>3'-4&quot;</td>
<td>0.7574</td>
<td>1.4656</td>
<td>13'-0&quot;</td>
</tr>
<tr>
<td>90&quot;</td>
<td>9'-11&quot;</td>
<td>17&quot;</td>
<td>3'-6&quot;</td>
<td>0.8886</td>
<td>1.6662</td>
<td>14'-0&quot;</td>
</tr>
<tr>
<td>96&quot;</td>
<td>10'-0&quot;</td>
<td>18&quot;</td>
<td>3'-11&quot;</td>
<td>0.9972</td>
<td>1.8470</td>
<td>14'-0&quot;</td>
</tr>
</tbody>
</table>

Sandeep S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

Thomas Wayne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR 24" DIA. TO 48" DIA. CIRCULAR REINFORCED CONCRETE PIPE ON CONCRETE CRADLE ON PILES - 2 PILE BENTS
(20' AND 25' COVER)

NOTES:
(1) CRADLE AND ENCASTEMENT ARE CLASS 40 CONCRETE. REBARS-CLASS 60.
(2) ENTIRE CRADLE OR ENCASTEMENT IS TO BE PLACED MONOLITHICALLY ABOVE THE CONSTRUCTION JOINT.
(3) ENCASTEMENT REQUIRED ON PIPE WHICH HAS A COVER, FROM FINAL GRADE TO OUTER TOP OF THE PIPE, OF LESS THAN FOUR (4) FEET OR WHEN THE UPPER LIMIT OF COVER FOR CLASS V PIPE IS EXCEEDED.
(4) UNLESS OTHERWISE APPROVED BY THE ENGINEER, THE MAX. WIDTH OF TRENCH SHALL BE SUCH THAT THE MAX. WIDTH BETWEEN INNER FACES OF THE LOWEST STAGE OF SHEETING OR ROUGH CUT LINES, FROM SUBGRADE OF TRENCH TO A MIN. HEIGHT OF TWO (2) FEET ABOVE THE OUTER TOP OF THE PIPE, SHALL NOT BE GREATER THAN THE STANDARD CRADLE WIDTH PLUS EIGHTEEN (18) INCHES MAXIMUM EACH SIDE.
(5) SIX (6) INCH MINIMUM SHALL BE MAINTAINED AT ALL TIMES, EXCEPT WHERE SHEETING IS TO BE USED AS FORMWORK.
(6) CRADLE WIDTH "A" IS BASED ON MINIMUM WALL THICKNESS PER ASTM C65 FOR "WALL B" FOR CLASS III, IV, V - R.C.P.
(7) CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PREVENT PROPER SUPPORT OF PIPE.

D A B C E F G
24" 3'-0" 5'-0" 1'-0" 9" 2'-0" 10" 6'-0" 6'-0" 7 16.66 10.86 0.1201 0.1204
30" 4'-0" 8" 1'-0" 9" 2'-0" 8" 5'-0" 5'-0" 7 17.69 18.40 0.1099 0.1312
36" 4'-0" 7" 1'-0" 10" 2'-0" 6" 5'-0" 4'-0" 7 19.63 19.20 0.1265 0.1420
42" 5'-0" 9" 2'-0" 12" 3'-0" 6" 4'-0" 4'-0" 8 22.45 23.10 0.0973 0.1528
48" 5'-10" 9" 2'-3" 13" 2'-0" 6" 3'-0" 3'-0" 9 26.74 25.32 0.1281 0.1635

ADD. STEEL REINF. (LBS.)
ADD. CONC. PER LF.
ADD. CONC. PER YD.
ADD. CONC. PER LF.

20 TON TIMBER PILE
SEE TABLE FOR MAX.
PILE BENT SPACING

2'-CLEARANCE
1'-0" MINIMUM OR AS REQUIRED

G - DEPTH OF ADDITIONAL CONC.
CLEARANCE OVER PILES

STONE BALLAST
6" MINIMUM OR AS REQUIRED

3'-0"
3'-0"
3'-0"
6" MIN. (SEE NOTE 6)

MATERIALS, SPACING, AND CLEARANCE ARE SHOWN ON SHEET.
STANDARD FOR 54" DIA. TO 96" DIA. CIRCULAR REINFORCED CONCRETE PIPE ON CONCRETE CRADLE ON PILES - 3 PILE BENTS (20' AND 25' COVER)

MAXIMUM WIDTH OF TRENCH

ADDITIONAL STEEL REINF.
LONGITUDINAL BARS
3-BARS OVER PILES
6-BARS BETWEEN PILES
SEE TABLE FOR THE TOTAL NUMBER OF LONG. BARS

TRANSVERSE BARS
3-BARS OVER PILES
6@12" O.C. BETWEEN PILES

ENCASMENT WHERE REQUIRED (SEE NOTE 3)

WALL B"

MAXIMUM BENT SPACING

ADDITIONAL ITEMS/L.

D A B C E F
54" 6'-6" 10" 2'-4" 8" 2'-6" 12" 4'-4" 6'-0"
60" 7'-0" 11" 2'-8" 12" 4'-4" 12" 4'-4" 6'-3"
66" 7'-6" 12" 2'-11" 12" 4'-3" 12" 4'-3" 6'-3"
72" 8'-2" 13" 3'-2" 12" 3'-1" 13" 4'-4" 3'-4"
78" 8'-8" 14" 3'-5" 12" 3'-4" 13" 3'-4" 3'-3"
84" 9'-4" 15" 3'-8" 12" 3'-3" 15" 3'-3" 3'-4"
90" 9'-10" 16" 3'-11" 12" 0'-11 12" 2'-9" 2'-9"
96" 10'-6" 18" 4'-2" 12" 4'-3" 15" 4'-4" 2'-4"

2" CLEARANCE

1" CLEARANCE OVER PILES

STONE BALLAST 6" MINIMUM OR AS REQUIRED

NOTES:
(1) CRADLE AND ENCASCMENT ARE CLASS 40 CONCRETE, REBAR: GRADE 60.
(2) ENTIRE CRADLE OR ENCAPSULATION IS TO BE PLACED MONOLITHICALLY ABOVE THE CONSTRUCTION JOINT.
(3) ENCAPSULATION REQUIRED ON PIPE WHICH HAS A COVER, FROM FINAL GRADE TO OUTER TOP OF THE PIPE, OF LESS THAN FOUR (4) FEET OR WHEN THE UPPER LIMIT OF COVER FOR CLASS V PIPE IS EXCEEDED.
(4) UNLESS OTHERWISE APPROVED BY THE ENGINEER, THE MAX. WIDTH OF TRENCH SHALL BE SUCH THAT THE MAX. WIDTH BETWEEN INNER FACES OF THE LOWEST STAGE OF SHEETING OR ROCK CUT LINES, FROM SUBGRADE OF TRENCH TO A MINIMUM OF TWO (2) FEET ABOVE THE OUTER TOP OF THE PIPE, SHALL NOT BE GREATER THAN THE STANDARD CRADLE WIDTH PLUS EIGHTEEN (18) INCHES MAXIMUM EACH SIDE.
(5) SIX (6) INCH MINIMUM SHALL BE MAINTAINED AT ALL TIMES, EXCEPT WHERE SHEETING IS TO BE LEFT IN PLACE AS FORMWORK.
(6) CRADLE WIDTH "A" IS BASED ON MINIMUM WALL THICKNESS PER ASTM C65 FOR "WALL B" FOR CLASS B, IV-LV, R.C.P.
(7) CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PREVENT PROPER SUPPORT OF PIPE.

Sundip S. Saikia
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18
DATE

Thomas Wynn
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18
DATE
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR 24" DIA. TO 60" DIA. CIRCULAR REINFORCED CONCRETE PIPE ON CONCRETE CRADLE ON PILES - 2 PILE BENTS
(5', 10' AND 15' COVER)

NOTES:
1. CRADLE AND ENCASEMENT ARE CLASS 40 CONCRETE. REBARS-GRADE 60.
2. ENTIRE CRADLE OR ENCASEMENT IS TO BE PLACED MONOLITHICALLY ABOVE THE CONSTRUCTION JOINT.
3. ENCASEMENT REQUIRED ON PIPE WHICH HAS A COVER, FROM FINAL GRADING TO OUTER TOP OF THE PIPE OF LESS THAN FOUR (4) FEET OR WHEN THE UPPER LIMIT OF COVER FOR CLASS V PIPE IS EXCEEDED.
4. UNLESS OTHERWISE APPROVED BY THE ENGINEER, THE MAX. WIDTH OF TRENCH SHALL BE SUCH THAT THE MAX. WIDTH BETWEEN INNER FACES OF THE LOWEST STAGE OF SHEETING OR ROCK CUT LINES, FROM SUBGRADE OF TRENCH TO A MIN. HEIGHT OF TWO (2) FEET ABOVE THE OUTER TOP OF THE PIPE, SHALL NOT BE GREATER THAN THE STANDARD CRADLE WIDTH PLUS EIGHTEEN (18) INCHES MAXIMUM EACH SIDE.
5. SIX (6) INCH MINIMUM CAN BE MAINTAINED AT ALL TIMES, EXCEPT WHERE SHEETING IS TO BE USED AS FORMWORK.
6. CRADLE WIDTH "A" IS BASED ON MINIMUM WALL THICKNESS PER ASTM C66 FOR "WALL B" FOR CLASS II, IV & V - R.C.P.
7. CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PREVENT PROPER SUPPORT OF PIPE.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E. 8/14/18
DATE

P.E. 5/14/18
DATE
STANDARD FOR 66" DIA. TO 96" DIA. CIRCULAR REINFORCED CONCRETE PIPE ON CONCRETE CRADLE ON PILES - 3 PILE BENTS (5', 10' AND 15' COVER)

NOTES:

1. CRADLE AND ENCASMENT ARE CLASS 40 CONCRETE, REBARS-GRD60.
2. ENTIRE CRADLE OR ENCASMENT IS TO BE PLACED MONOLITHICALLY ABOVE THE CONSTRUCTION JOINT.
3. ENCASMENT REQUIRED ON PIPE WHICH HAS A COVER, FROM FINAL GRADE TO OUT TOP OF THE PIPE, OF LESS THAN FOUR (4) FEET OR WHEN THE UPPER LIMIT OF COVER FOR CLASS V PIPE IS EXCEEDED.
4. UNLESS OTHERWISE APPROVED BY THE ENGINEER, THE MAX. WIDTH OF TRENCH SHALL BE SUCH THAT THE MAX. WIDTH BETWEEN INNER FACES OF THE LOWEST STAGE OF SHEETING OR ROCK CUT LINES, FROM SUBGRADE OF TRENCH TO A MIN. HEIGHT OF TWO (2) FEET ABOVE THE OUTER TOP OF THE PIPE, SHALL NOT BE GREATER THAN THE STANDARD CRADLE WIDTH PLUS EIGHTEEN (18) INCHES MAXIMUM EACH SIDE.
5. SIX (6) INCH MINIMUM SHALL BE MAINTAINED AT ALL TIMES, EXCEPT WHERE SHEETING IS TO BE USED AS FORMWORK.
6. CRADLE WIDTH "A" IS BASED ON MINIMUM WALL THICKNESS PER ASTM C756 FOR "WALL B" FOR CLASS III V-RC(P.
7. CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PREVENT PROPER SUPPORT OF PIPE.
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR HORIZONTAL ELLIPTICAL REINFORCED CONCRETE PIPE ON CONCRETE CRADLE ON EARTH OR ON ROCK

SECTION ON ROCK

SECTION ON EARTH

MAXIMUM COVER FOR PIPE CLASS
HE-III HE-IV

<table>
<thead>
<tr>
<th>W</th>
<th>H</th>
<th>EQUIV.</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>CONC. CRADLE</th>
<th>CONC. ENCSMT.</th>
<th>MAXIMUM COVER</th>
</tr>
</thead>
<tbody>
<tr>
<td>23&quot;</td>
<td>14&quot;</td>
<td>10&quot;</td>
<td>5-8&quot;</td>
<td>2&quot;</td>
<td>6-11&quot;</td>
<td>0.0981</td>
<td>0.2291</td>
<td>12'-0&quot;</td>
</tr>
<tr>
<td>30&quot;</td>
<td>19&quot;</td>
<td>24&quot;</td>
<td>4-11&quot;</td>
<td>6&quot;</td>
<td>1-1&quot;</td>
<td>0.1239</td>
<td>0.2946</td>
<td>15'-0&quot;</td>
</tr>
<tr>
<td>38&quot;</td>
<td>24&quot;</td>
<td>30&quot;</td>
<td>4-10&quot;</td>
<td>6&quot;</td>
<td>1-2&quot;</td>
<td>0.1510</td>
<td>0.3594</td>
<td>19'-0&quot;</td>
</tr>
<tr>
<td>45&quot;</td>
<td>29&quot;</td>
<td>36&quot;</td>
<td>5-9&quot;</td>
<td>6&quot;</td>
<td>1-4&quot;</td>
<td>0.1845</td>
<td>0.4343</td>
<td>19'-0&quot;</td>
</tr>
<tr>
<td>53&quot;</td>
<td>34&quot;</td>
<td>42&quot;</td>
<td>6-3&quot;</td>
<td>7&quot;</td>
<td>1-6&quot;</td>
<td>0.2377</td>
<td>0.5395</td>
<td>23'-0&quot;</td>
</tr>
<tr>
<td>60&quot;</td>
<td>38&quot;</td>
<td>46&quot;</td>
<td>6-11&quot;</td>
<td>7&quot;</td>
<td>1-7&quot;</td>
<td>0.2721</td>
<td>0.6207</td>
<td>23'-0&quot;</td>
</tr>
<tr>
<td>68&quot;</td>
<td>43&quot;</td>
<td>54&quot;</td>
<td>7-8&quot;</td>
<td>8&quot;</td>
<td>1-10&quot;</td>
<td>0.3422</td>
<td>0.7437</td>
<td>23'-0&quot;</td>
</tr>
<tr>
<td>76&quot;</td>
<td>48&quot;</td>
<td>60&quot;</td>
<td>8-5&quot;</td>
<td>9&quot;</td>
<td>2-0&quot;</td>
<td>0.4139</td>
<td>0.8774</td>
<td>23'-0&quot;</td>
</tr>
<tr>
<td>83&quot;</td>
<td>53&quot;</td>
<td>66&quot;</td>
<td>9-1&quot;</td>
<td>10&quot;</td>
<td>2-3&quot;</td>
<td>0.4947</td>
<td>1.0137</td>
<td>23'-0&quot;</td>
</tr>
<tr>
<td>91&quot;</td>
<td>58&quot;</td>
<td>72&quot;</td>
<td>9-10&quot;</td>
<td>10&quot;</td>
<td>2-4&quot;</td>
<td>0.5499</td>
<td>1.1376</td>
<td>21'-0&quot;</td>
</tr>
<tr>
<td>98&quot;</td>
<td>63&quot;</td>
<td>78&quot;</td>
<td>10-6&quot;</td>
<td>11&quot;</td>
<td>2-7&quot;</td>
<td>0.6385</td>
<td>1.2725</td>
<td>21'-0&quot;</td>
</tr>
<tr>
<td>106&quot;</td>
<td>68&quot;</td>
<td>84&quot;</td>
<td>11-3&quot;</td>
<td>12&quot;</td>
<td>2-10&quot;</td>
<td>0.7487</td>
<td>1.4638</td>
<td>21'-0&quot;</td>
</tr>
<tr>
<td>113&quot;</td>
<td>72&quot;</td>
<td>90&quot;</td>
<td>12-4&quot;</td>
<td>13&quot;</td>
<td>3-0&quot;</td>
<td>0.8434</td>
<td>1.6266</td>
<td>21'-0&quot;</td>
</tr>
<tr>
<td>121&quot;</td>
<td>77&quot;</td>
<td>96&quot;</td>
<td>12-6&quot;</td>
<td>14&quot;</td>
<td>3-2&quot;</td>
<td>0.9544</td>
<td>1.8192</td>
<td>21'-0&quot;</td>
</tr>
</tbody>
</table>

NOTES:

(1) CRADLE AND ENCASEMENT ARE CLASS 40 CONCRETE.
(2) ENTIRE CRADLE OR ENCASEMENT IS TO BE PLACED MONOLITHICALLY.
(3) ENCASEMENT REQUIRED ON PIPE WHICH HAS A COVER, FROM FINAL GRADE TO OUTER TOP OF THE PIPE, OF LESS THAN FOUR (4) FEET OR WHEN THE UPPER LIMIT OF COVER FOR CLASS HE-IV PIPE IS EXCEEDED.
(4) UNLESS OTHERWISE APPROVED BY THE ENGINEER, THE MAX. WIDTH OF TRENCH SHALL BE SUCH THAT THE MAX. WIDTH BETWEEN INNER FACES OF THE LOWEST STAGE OF SHEETING OR ROCK CUT LINES, FROM SUBGRADE OF TRENCH TO A MIN. HEIGHT OF TWO (2) FEET ABOVE THE OUTER TOP OF THE PIPE, SHALL NOT BE GREATER THAN THE STANDARD CRADLE WIDTH PLUS EIGHTEEN (18) INCHES MAXIMUM EACH SIDE.
(5) SIX (6) INCH MINIMUM SHALL BE MAINTAINED AT ALL TIMES, EXCEPT WHERE SHEETING IS TO BE USED AS FORMWORK.
(6) CRADLE WIDTH "A" IS BASED ON MINIMUM WALL THICKNESS PER ASTM C507 FOR "WALL B" FOR CLASS HE-III AND HE-IV - R.C.P.
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR 23"W X 14"H TO 76"W X 48"H HORIZONTAL ELLIPTICAL REINFORCED CONCRETE PIPE ON CONCRETE CRADLE ON PILES - 2 PILE BENTS (5', 10' AND 15' COVER)

MAXIMUM WIDTH OF TRENCH
SEE NOTE 4

INNER FACE OF SHEETING

ENGAGEMENT WHERE REQD. (SEE NOTE 2)

WALL WIDTH

G - DEPTH OF ADDITIONAL CONCRETE OVER PILES

CONSTRUCTION JOINT (SEE NOTE 7)

MIN. (SEE NOTE 5)

ADDITIONAL STEEL REINF.

LONGITUDINAL BARS
3-@6 OVER PILES
#6 BARS BETWEEN PILES
SEE TABLE FOR THE TOTAL NUMBER OF LONG. BARS

TRANSVERSE BARS
3-@6 OVER PILES
#6@12" O.C. BETWEEN PILES

20 TON TIMBER PILE
SEE TABLE FOR MAX.
PILE BENT SPACING

MAXIMUM PILE BENT SPACING

ADDITIONAL ITEMS/L.F.

STONE BALLAST
CU. YD. PER L.F.

NOTES:

1. CRADLE AND ENGAGEMENT ARE CLASS 40 CONCRETE. REBAR - GRADE 60.
2. ENTIRE CRADLE OR ENGAGEMENT IS TO BE PLACED MONOLITHICALLY ABOVE THE CONSTRUCTION JOINT.
3. ENGAGEMENT REQUIRED ON PIPE WHICH HAS A COVER FROM FINAL GRADE TO OUTER TOP OF THE PIPE, OF LESS THAN FOUR (4) FEET OR WHEN THE UPPER LIMIT OF COVER FOR CLASS HE-4 PIPE IS EXCEEDED.
4. UNLESS OTHERWISE APPROVED BY THE ENGINEER, THE MAX. WIDTH BETWEEN INNER FACES OF THE LOWEST STAGE OF SHEETING OR ROCK CUT LINES, FROM SUBGRADE OF TRENCH TO A MIN. HEIGHT OF TWO (2) FEET ABOVE THE OUTER TOP OF THE PIPE, SHALL NOT BE GREATER THAN THE STANDARD CRADLE WIDTH PLUS EIGHTEEN (18) INCHES MAXIMUM EACH SIDE.
5. SIX (6) INCH MINIMUM SHALL BE MAINTAINED AT ALL TIMES, EXCEPT WHERE SHEETING IS TO BE USED AS FORMWORK.
6. CRADLE WIDTH "A" IS BASED ON MINIMUM WALL THICKNESS PER ASTM C667 FOR "WALL B" FOR CLASS HE-30 AND HE-4-R.G.P.
7. CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PREVENT PROPER SUPPORT OF PIPE.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18

8/14/18
# CITY OF NEW YORK
# DEPARTMENT OF ENVIRONMENTAL PROTECTION

## STANDARD FOR 83"W x 53"H TO 121"W x 77"H HORIZONTAL ELLIPTICAL REINFORCED CONCRETE PIPE ON CONCRETE CRADLE ON PILES - 3 PILE BENTS (5', 10' AND 15' COVER)

### ADDITIONAL STEEL REINF.

#### LONGITUDINAL BARS

- 3/8" OVER PILES
- #6 BARS BETWEEN PILES
- SEE TABLE FOR THE TOTAL NUMBER OF LONG. BARS

#### TRANSVERSE BARS

- 3/8" OVER PILES
- #6 BARS BETWEEN BARS

### MAXIMUM WIDTH OF TRENCH

- 1'-0" MAX.

### INNER FACE OF SHEETING

### MAXIMUM SHEETING SPACING

### ENCASEMENT WHERE REQ'D.

(SEE NOTE 2)

### ENCASEMENT WHERE REQUIRED

(SEE NOTE 1)

### W H EQUIV.

<table>
<thead>
<tr>
<th>W</th>
<th>H</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>E</th>
<th>F</th>
<th>MAXIMUM PILE BENT SPACING</th>
<th>ADD. STL. REINF. (LBS.)</th>
<th>ADD. CONC. CONC. C/ YO. PER L.F.</th>
</tr>
</thead>
<tbody>
<tr>
<td>96&quot;</td>
<td>53&quot;</td>
<td>96&quot;</td>
<td>5'-1&quot;</td>
<td>10&quot;</td>
<td>2'-4&quot;</td>
<td>12&quot;</td>
<td>3'-6 1/2&quot;</td>
<td>6'-0&quot;</td>
<td>5'-0&quot;</td>
</tr>
<tr>
<td>90&quot;</td>
<td>53&quot;</td>
<td>90&quot;</td>
<td>5'-0&quot;</td>
<td>10&quot;</td>
<td>2'-2&quot;</td>
<td>12&quot;</td>
<td>3'-11&quot;</td>
<td>6'-0&quot;</td>
<td>5'-0&quot;</td>
</tr>
<tr>
<td>85&quot;</td>
<td>53&quot;</td>
<td>85&quot;</td>
<td>4'-10&quot;</td>
<td>11&quot;</td>
<td>2'-10&quot;</td>
<td>12&quot;</td>
<td>4'-3&quot;</td>
<td>6'-0&quot;</td>
<td>4'-6&quot;</td>
</tr>
<tr>
<td>106&quot;</td>
<td>64&quot;</td>
<td>115&quot;</td>
<td>12&quot;</td>
<td>3'-3&quot;</td>
<td>12&quot;</td>
<td>4'-1 1/2&quot;</td>
<td>5'-0&quot;</td>
<td>4'-0&quot;</td>
<td>3'-0&quot;</td>
</tr>
<tr>
<td>110&quot;</td>
<td>64&quot;</td>
<td>111&quot;</td>
<td>12&quot;</td>
<td>3'-0&quot;</td>
<td>12&quot;</td>
<td>4'-11 1/2&quot;</td>
<td>5'-0&quot;</td>
<td>3'-9&quot;</td>
<td>3'-0&quot;</td>
</tr>
</tbody>
</table>

### NOTES:

1. CRADLE AND ENCASEMENT ARE CLASS 40 CONCRETE, REBARS-GRADE 60.
2. ENTIRE CRADLE OR ENCASEMENT IS TO BE PLACED MONOLITHICALLY ABOVE THE CONSTRUCTION JOINT.
3. ENCASEMENT REQUIRED ON PIPE WHICH HAS A COVER, FROM FINAL GRADE TO OUTER TOP OF THE PIPE, OF LESS THAN FOUR (4) FEET OR WHEN THE UPPER LIMIT OF COVER FOR CLASS HE-IV PIPE IS EXCEEDED.
4. UNLESS OTHERWISE APPROVED BY THE ENGINEER, THE MAX. WIDTH OF TRENCH SHALL BE SUCH THAT THE MAX. WIDTH BETWEEN INNER FACES OF THE LOWEST STAGE OF SHETING OR ROCK CUT LINES, FROM SUBGRADE OF TRENCH TO A MIN. HEIGHT OF TWO (2) FEET ABOVE THE OUTER TOP OF THE PIPE, SHALL NOT BE GREATER THAN THE STANDARD CRADLE WIDTH PLUS EIGHTEEN (18) INCHES MAXIMUM.
5. SIX (6) INCH MINIMUM SHALL BE MAINTAINED AT ALL TIMES, EXCEPT WHERE SHEETING IS TO BE USED AS FORMWORK.
6. CRADLE WIDTH "A" IS BASED ON MINIMUM WALL THICKNESS PER ASTM C557 OF "WALL 11" FOR CLASS HE-III AND HE-IV - R.C.P.
7. CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PREVENT PROPER SUPPORT OF PIPE.

---

Signed: [Signature]

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

Date: 8/14/18

---

Signed: [Signature]

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Date: 8/14/18
STANDARD FOR MANHOLE ON 8" DIA. TO 30" DIA. PIPE SEWERS IN DRY LOCATION
TYPE A-1 (12' MAX. COVER) AND TYPE A-2 (25' MAX. COVER)

NOTES:
(1) WHEN LEGAL GRADE IS BELOW FINAL GRADE SEE SEWER STANDARD NO. 36.
(2) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
(3) CONCRETE IS TO BE CLASS 40, REBARS-GRADE 60.
(4) FOR ALL PIPE SEWERS EIGHTEEN (18) INCHES IN DIAMETER AND GREATER, ADD 3-#5@3' ABOVE AND BELOW THE PIPE.
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR SHALLOW MANHOLE
ON 8" DIA. TO 30" DIA. PIPE SEWERS
TYPE A-3 (LESS THAN 4'-0" COVER)

NOTES:
(1) WHEN PILES ARE REQUIRED, REFER TO STANDARD MANHOLE TYPE A-2 FOR PILE DETAILS.
(2) CONCRETE IS TO BE CLASS 40, REBARS-GRADE 60.

EDWIG S. SAINT
P.E. 8/14/18
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

THOMAS WYMA
P.E. 8/14/18
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
STANDARD FOR MANHOLE ON 8" DIA. TO 30" DIA. PIPE SEWERS IN WET LOCATION
TYPE B-1 (12' MAX. COVER) AND TYPE B-2 (25' MAX. COVER)

NOTES:
(1) WHEN LEGAL GRADE IS BELOW FINAL GRADE SEE SEWER STANDARD NO. 38.
(2) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
(3) CONCRETE IS TO BE CLASS 40. REBARS-GRADE 60.
(4) FOR ALL PIPE SEWERS EIGHTEEN (18) INCHES IN DIAMETER AND GREATER, ADD 3-#4@12" ABOVE AND BELOW THE PIPE.

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION
STANDARD FOR MANHOLE ON 8" DIA. TO 30" DIA.
PIPE SEWERS ON PILES IN WET LOCATION
TYPE B-1 (12' MAX. COVER) AND TYPE B-2 (25' MAX. COVER)

NOTES:
(1) WHEN LEGAL GRADE IS BELOW FINAL GRADE SEE SEWER STANDARD NO. 38.
(2) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
(3) CONCRETE IS TO BE CLASS 40, REBARS-GR AnDE 60.
(4) FOR ALL PIPE SEWERS EIGHTEEN (18) INCHES IN DIAMETER AND GREATER, ADD 3-#8@3" ABOVE AND BELOW THE PIPE.
(5) CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PREVENT SUPPORT OF PIPE.

[Diagram of manhole and pipe sewer on piles in wet location]

ASSOCIATE COMMISSIONER, DESIGN DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING DEPARTMENT OF ENVIRONMENTAL PROTECTION
STANDARD FOR MANHOLE ON 36" DIA. TO 60" DIA. R.C.P. SEWERS
TYPE C-1 (12' MAX. COVER) AND TYPE C-2 (25' MAX. COVER)

NOTES:
(1) WHEN LEGAL GRADE IS BELOW FINAL GRADE SEE SEWER STANDARD NO. 38.
(2) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
(3) CONCRETE IS TO BE CLASS 40. REBARS GRADE 60.
(4) STEEL REINFORCEMENT IS #6@12" UNLESS OTHERWISE SPECIFIED.
FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.

<table>
<thead>
<tr>
<th>D</th>
<th>1</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>E</th>
<th>F</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>38&quot;</td>
<td>4</td>
<td>6.4&quot;</td>
<td>5.10&quot;</td>
<td>12&quot;</td>
<td>16&quot;</td>
<td>6.0&quot;</td>
<td>1</td>
</tr>
<tr>
<td>42&quot;</td>
<td>5.5&quot;</td>
<td>4.12&quot;</td>
<td>7.0&quot;</td>
<td>5.5&quot;</td>
<td>12&quot;</td>
<td>15&quot;</td>
<td>5</td>
</tr>
<tr>
<td>48&quot;</td>
<td>5</td>
<td>5.0&quot;</td>
<td>7.0&quot;</td>
<td>7.5&quot;</td>
<td>12&quot;</td>
<td>17&quot;</td>
<td>4</td>
</tr>
<tr>
<td>54&quot;</td>
<td>5.5&quot;</td>
<td>5.12&quot;</td>
<td>8.0&quot;</td>
<td>8.1&quot;</td>
<td>14&quot;</td>
<td>11&quot;</td>
<td>5</td>
</tr>
<tr>
<td>60&quot;</td>
<td>6</td>
<td>6.0&quot;</td>
<td>8.6&quot;</td>
<td>8.5&quot;</td>
<td>17&quot;</td>
<td>12&quot;</td>
<td>6</td>
</tr>
</tbody>
</table>

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18
STANDARD FOR MANHOLE ON 36" DIA. TO 60" DIA. R.C.P. SEWERS ON PILES

TYPE C-1 (12' MAX. COVER) AND TYPE C-2 (25' MAX. COVER)

NOTES:

(1) WHEN LEGAL GRADE IS BELOW FINAL GRADE SEE SEWER STANDARD NO. 36.
(2) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
(3) CONCRETE IS TO BE CLASS 40, REBAR'S GRADE 60.
(4) STEEL REINFORCEMENT IS #6 @ 12" UNLESS OTHERWISE SPECIFIED, COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.
(5) CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PREVENT SUPPORT OF PIPE.

Gurdev S. Saini  P.E.  8/14/18
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

Thomas Frye  P.E.  8/14/18
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
STANDARD FOR MANHOLE ON 66" DIA. TO 96" DIA. R.C.P. SEWERS

TYPE D-1 (12' MAX. COVER) AND TYPE D-2 (25' MAX. COVER)

NOTES:
(1) WHEN LEGAL GRADE IS BELOW FINAL GRADE SEE SEWER STANDARD NO. 36.
(2) KEYS CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
(3) CONCRETE IS TO BE CLASS 40, REPAIR GRADE 40.
(4) STEEL REINFORCEMENT IS #6@12" UNLESS OTHERWISE SPECIFIED. COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.

Sarjit S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18
DATE

Thomas Wyman
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18
DATE
STANDARD FOR MANHOLE ON 66" DIA. TO 96" DIA. R.C.P. SEWERS ON PILES

TYPE D-1 (12' MAX. COVER) AND TYPE D-2 (25' MAX. COVER)

NOTES:
(1) WHEN LEGAL GRADE IS BELOW FINAL GRADE SEE SEWER STANDARD NO. 38.
(2) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
(3) CONCRETE IS TO BE CLASS 40, REBARS-GRADE 60.
(4) STEEL REINFORCEMENT IS #3@12" UNLESS OTHERWISE SPECIFIED. COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.
(5) CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PREVENT SUPPORT OF PIPE.

ASSOCIATE COMMISSIONER, DESIGN DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING DEPARTMENT OF ENVIRONMENTAL PROTECTION

DATE: 2/11/18  DATE: 7/1/18
STANDARD FOR MANHOLE ON 23" W X 14" H TO 60" W X 38" H
HORIZONTAL ELLIPTICAL R.C.P. SEWERS
TYPE E-1 (12' MAX. COVER)

NOTES:
(1) WHEN LEGAL GRADE IS BELOW FINAL GRADE SEE SEWER STANDARD NO. 39.
(2) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
(3) CONCRETE IS TO BE CLASS 40. REBARS-GRADE 60.
(4) STEEL REINFORCEMENT IS @12" UNLESS OTHERWISE SPECIFIED. COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR, ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR MANHOLE ON 23"W x 14"H TO 60"W x 38"H
HORIZONTAL ELLIPTICAL R.C.P. SEWERS ON PILES

TYPE E-1 (12' MAX. COVER)

SECTIONS A-A

SECTION B-B

NOTES:
1. WHEN LEGAL GRADE IS BELOW FINAL GRADE SEE SEWER STANDARD NO. 38.
2. KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
3. CONCRETE IS TO BE CLASS 40, REBAR GRADE 60.
4. STEEL REINFORCEMENT IS #4@12" UNLESS OTHERWISE SPECIFIED.
5. COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.
6. CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PREVENT SUPPORT OF PIPE.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
STANDARD FOR MANHOLE ON 68"W x 43"H TO 121"W x 77"H
HORIZONTAL ELLIPTICAL R.C.P. SEWERS
TYPE E-2 (12" MAX. COVER)

NOTES:
(1) WHEN LEGAL GRADE IS BELOW FINAL GRADE SEE SEWER STANDARD NO. 38.
(2) KEVED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
(3) CONCRETE IS TO BE CLASS 40, REBARS GRADE 60.
(4) STEEL REINFORCEMENT IS NO 1/2" UNLESS OTHERWISE SPECIFIED.
COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18
8/14/18
STANDARD FOR MANHOLE ON 68"W x 43"H TO 121"W x 77"H
HORIZONTAL ELLIPTICAL R.C.P. SEWERS ON PILES
TYPE E-2 (12" MAX. COVER)

NOTES:
1. WHEN LEGAL GRADE IS BELOW FINAL GRADE SEE SEWER STANDARD NO. 38.
2. KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
3. CONCRETE IS TO BE CLASS 40. REBARS=GRADE 60.
4. STEEL REINFORCEMENT IS #4@12" UNLESS OTHERWISE SPECIFIED.
   COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.
5. CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PREVENT SUPPORT OF PIPE.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
STANDARD FOR DROP PIPE MANHOLE (TYPE II) ON PILES

FOR 10" TO 24" INCOMING DROP PIPE SEWERS

NOTES:
(1) WHEN LEGAL GRACE IS BELOW FINAL GRADE SEE SEWER STANDARD NO. 38.
(2) KEYS CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
(3) CONCRETE IS TO BE CLASS 40, REBAR GRADE 60.
(4) STEEL REINFORCEMENT IS #8 X 12" UNLESS OTHERWISE SPECIFIED.
(5) COVER FOR ALL REINFORCEMENT IS 8" CLEARANCE UNLESS OTHERWISE SPECIFIED.
(6) FOR PIPE SEWERS 10" TO 30" IN DIAMETER 1' SHALL BE 3".
(7) FOR PIPE SEWERS 38" TO 60" IN DIAMETER 1' SHALL BE ZERO.
(8) CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PREVENT SUPPORT OF PIPE.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR 4'-0" DIAMETER PRECAST MANHOLE (DWG. 3 OF 4)
(MONOLITHIC TOP SECTION AND ALTERNATE LOOSE BOTTOM SLAB)

SECTION C-C

REMVAL OF THIS SECTION FROM THE RISER IS STRICTLY PROHIBITED
AND SHALL NOT BE PERMITTED UNDER ANY CIRCUMSTANCES

INSERT & DOWEL
SEE PIPES TO MANHOLE CONNECTION DETAILS OF STANDARD FOR PRECAST
MANHOLE DETAILS - SE31A (DWG. 1 OF 3)

PLAN OF BOTTOM REINFORCING
SEE SE28D - NOTE 'B' (DWG. 4 OF 4)

8/14/18
P.E.
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18
P.E.
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
STANDARD FOR 4'-0" DIAMETER PRECAST MANHOLE (DWG. 4 OF 4)
(MISCELLANEOUS DETAIL, NOTES AND SCHEDULE)

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

GENERAL NOTES:

1. THIS 4'-0" DIA. PRECAST MANHOLE MAY BE SUBSTITUTED FOR STANDARD MANHOLE TYPES A-1, A-2, B-1 AND B-2 ON SEWERS 24" IN DIAMETER AND LESS ONLY.

2. MANHOLE RISER REINFORCING COMPLIES WITH AREA REQUIREMENTS OF ASTM C 65, EXCEPT THAT ALL WALL SECTIONS SHALL BE REINFORCED WITH WWM, a = 0.12, DR. 5, FOR 1'-0" HOOPS AROUND ALL CAST PIPE OPENINGS (1-E.F.). THE 2'-0" HOOPS WILL NOT BE REQUIRED AT CORED OPENINGS FOR BASIN CONNECTIONS. ALL VALUES OF AREA OF WWM a ARE IN SQUARE INCHES AND ARE A MINIMUM.

3. CORED OPENINGS WILL BE PERMITTED FOR 12" DIA. BASIN CONNECTIONS ONLY. THE MAXIMUM CORED OPENING SHALL BE 16" FOR THESE BASIN CONNECTIONS. CORED OPENINGS WILL NOT BE PERMITTED FOR SHALLOW MANHOLES.

4. FOR DETAILS OF STEPS, JOINTS, GASKETS, PRECAST COLLARS, PIPE TO MANHOLE CONNECTIONS, PILE CAP AND POUR PLUS IN PLACE ALTERNATE MONOLITHIC BASE, SEE STANDARD FOR PRECAST MANHOLE DETAILS. STANDARD FOR MANHOLE STEPS AND STANDARD FOR ALTERNATE MONOLITHIC BASE SECTIONS FOR PRECAST MANHOLES (POURED IN PLACE).

5. THE MAXIMUM DEPTH OF COVER OF THE 4'-0" DIA. PRECAST MANHOLE, FROM FINAL GRADE TO THE OUTER TOP OF THE RIFLE, SHALL BE TWENTYFOUR (24) FEET.

6. ALL COVER DISTANCES SHOWN FOR REINFORCEMENT ARE CLEAR DISTANCES.

7. LIFTING HOLES SHALL BE LOCATED IN THE SECTIONS AS PER MANUFACTURER'S RECOMMENDATIONS AND GROUTED PRIOR TO BACKFILLING.

8. THE VALUES OF THE WALL AND SLAB THICKNESSES ARE A MINIMUM.

9. CONCRETE DESIGN MIX = 5,000 PSI (MIN. 28 DAY STRENGTH = 4,000 PSI); MAX. F, C = 0.47, REBARS = 0.00, WWM = 0.00, PSIP.

10. INSERT SHELVES SHALL HAVE A 1/2" PER LINEAR FOOT PITCH TOWARDS THE SEWER.

11. THE OPENING DIAMETERS SHOWN IN THE SCHEDULE ARE MAXIMUM VALUES. THE MINIMUM OPENING DIAMETERS SHALL BE AS FOLLOWS: 8" TO 24" DIA. HOLES = 0.5".

12. BELL-UP TYPE JOINTS SHALL BE ALLOWED FOR 4'-0" DIA. PRECAST MANHOLE, WITH THE FOLLOWING MODIFICATION TO THE LOOSE TOP SLAB:
   (A) THE MINIMUM SLAB THICKNESS SHALL BE 5/8" (WHERE Y IS JOINT DEPTH), BUT IN NO CASE SHALL IT BE LESS THAN 5/8" THICK AND (B) THE EMBEDMENT LENGTH SHALL BE 3" (WHERE Y IS THE THICKNESS OF RISER WALL). SEE DETAIL "A" ON DWG. 1 OF 4.

PLAN OF BASE SECTION

A, B, C

D-DEFLECTION ANGLE (SEE SCHEDULE THIS PAGE)

R (RADIUS OF CURVATURE) = \frac{2}{\tan (\Delta d)}

NOTE 1:
9" MIN. TO 20" MAX.; 0" BRICK MIN. LAYS IN PANELS, USE 1 OR 2 PRECAST COLLARS OR BRICK AS REQUIRED. (4" BRICK MIN. ONLY FOR SHALLOW MANHOLE CONSTRUCTION.)

NOTE 2:
ALTERNATE LOOSE BOTTOM SLAB TO BE USED ONLY IN SHALL MANHOLE CONSTRUCTION.
MANHOLE RISER MAY NOT BE REQUIRED IN SHALLOW MANHOLE CONSTRUCTION.
A SHALLOW MANHOLE IS A MANHOLE ON A SEWER WHICH HAS A COVER FROM FINAL GRADE TO THE OUTER TOP OF THE PIPE OF LESS THAN 6'-0".

NOTE 3:
USE OF LOOSE BOTTOM SLAB IN CONJUNCTION WITH LOOSE TOP SLAB WILL NOT BE PERMITTED.

NOTE 4:
PIPE OPENINGS WILL NOT BE PERMITTED THROUGH JOINTS, DISTANCE FROM TOP OR BOTTOM OF ANY SECTION SHALL BE A MINIMUM OF 3" PLUS THE JOINT DEPTH FOR CAST PIPE OPENINGS AND A MINIMUM OF 12" PLUS THE JOINT DEPTH FOR CORED OPENINGS FOR BASIN CONNECTIONS.

NOTE 5:
THE MANUFACTURER SHALL ENSURE "THAT ALL PRECAST MANHOLE SECTIONS ARE ADDITIONALLY REINFORCED WHERE REQUIRED TO RESIST DAMAGE FROM HANDLING, SHIPPIING AND INSTALLATION STRAINSES.

SCHEDULE

<table>
<thead>
<tr>
<th>PIPE DIA.</th>
<th>OPENING</th>
<th>MAX</th>
</tr>
</thead>
<tbody>
<tr>
<td>8&quot;</td>
<td>4&quot;</td>
<td>113&quot;</td>
</tr>
<tr>
<td>10&quot;</td>
<td>6&quot;</td>
<td>121&quot;</td>
</tr>
<tr>
<td>12&quot;</td>
<td>9&quot;</td>
<td>164&quot;</td>
</tr>
<tr>
<td>15&quot;</td>
<td>12&quot;</td>
<td>95&quot;</td>
</tr>
<tr>
<td>18&quot;</td>
<td>18&quot;</td>
<td>83&quot;</td>
</tr>
<tr>
<td>24&quot;</td>
<td>24&quot;</td>
<td>60&quot;</td>
</tr>
</tbody>
</table>

* SEE NOTE 11

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E. 8/14/18

DATE
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR 5'-0" DIAMETER PRECAST MANHOLE (DWG. 1 OF 4)
(LOOSE TOP SLAB AND MONOLITHIC BASE SECTION)

SECTION A-A

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

THOMAS WYRNE P.E.
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

DATE 8/14/18
STANDARD FOR 5'-0" DIAMETER PRECAST MANHOLE (DWG. 4 OF 4)

(MISCELLANEOUS DETAIL, NOTES AND SCHEDULE)

NOTE A:
9" MIN. TO 20" MAX.; 9" BRICK MIN. LAID RADIAILY, USE 1 OR 2 PRECAST COLLARS OR BRICK AS REQUIRED. (4" BRICK MIN. ONLY FOR SHALLOW MANHOLE CONSTRUCTION.)

NOTE B:
ALTERNATE LOOSE BOTTOM SLAB TO BE USED ONLY IN SHALLOW MANHOLE CONSTRUCTION. MANHOLE RISER MAY NOT BE REQUIRED IN SHALLOW MANHOLE CONSTRUCTION.

A SHALLOW MANHOLE IS A MANHOLE ON A SEWER WHICH HAS A COVER FROM FINAL GRADE TO THE OUTER TOP OF THE PIPE OF LESS THAN 4'-0". USE OF LOOSE BOTTOM SLAB IN CONJUNCTION WITH LOOSE TOP SLAB WILL NOT BE PERMITTED.

NOTE C:
PLOTE OPENINGS WILL NOT BE PERMITTED THROUGH JOINTS, DISTANCE FROM TOP OR BOTTOM OF ANY SECTION SHALL BE A MINIMUM OF 3" PLUS THE JOINT DEPTH FOR CAST PIPE OPENINGS AND A MINIMUM OF 12" PLUS THE JOINT DEPTH FOR CORED OPENINGS FOR BASE CONNECTIONS.

NOTE D:
The manufacturer shall ensure that all precast manhole sections are additionally reinforced where required to resist damage from handling, shipping and installation stresses.

SCHEDULE

<table>
<thead>
<tr>
<th>PIPE</th>
<th>OPENING</th>
<th>Δ MAX</th>
</tr>
</thead>
<tbody>
<tr>
<td>12&quot;</td>
<td>10°</td>
<td>118&quot;</td>
</tr>
<tr>
<td>18&quot;</td>
<td>26&quot;</td>
<td>96&quot;</td>
</tr>
<tr>
<td>24&quot;</td>
<td>34°</td>
<td>79°</td>
</tr>
<tr>
<td>30&quot;</td>
<td>42°</td>
<td>67°</td>
</tr>
<tr>
<td>36&quot;</td>
<td>49°</td>
<td>47°</td>
</tr>
</tbody>
</table>

*SEE NOTE 11

GENERAL NOTES:

(1) THIS 5'-0" DIA. PRECAST MANHOLE MAY BE SUBSTITUTED FOR STANDARD MANHOLE TYPES A-1, A-2, B-1, B-2, C-1 AND C-2 ON SEWERS 36" IN DIAMETER AND LESS ONLY.

(2) MANHOLE RISER REINFORCING COMPLIES WITH AREA REQUIREMENTS OF ASTM C478, EXCEPT THAT ALL WALL SECTIONS SHALL BE REINFORCED WITH WAM, A40.15, CIRC. X 0.075 LONG., E-F, WITH 2#4 HOOPS AROUND ALL CAST PIPE OPENINGS 1-8 FT. (THE 3#4 HOOPS WILL NOT BE REQUIRED AT CORED OPENINGS FOR BASE CONNECTIONS.) (ALL VALUES OF AREA OF STEEL (A) ARE IN SQUARE INCHES AND ARE A MINIMUM.)

(3) CORED OPENINGS WILL BE PERMITTED FOR 12" DIA. BASE CONNECTIONS ONLY. THE MAXIMUM CORED OPENING SHALL BE 10" FOR THESE BASE CONNECTIONS. CORED OPENING WILL NOT BE PERMITTED FOR SHALLOW MANHOLE.

(4) FOR DETAILS OF STEPS, JOINTS, GASKETS, PRECAST COLLARS, PIPE TO MANHOLE CONNECTIONS, PIPE CAP AND PLACED IN PLACE ALTERNATE MONOLITHIC BASE CONSTRUCTION SEE STANDARD FOR PRECAST MANHOLE DETAIL, STANDARD FOR MANHOLE STEPS AND STANDARD FOR ALTERNATE MONOLITHIC BASE SECTIONS FOR PRECAST MANHOLE (Poured In Place).  

(5) THE MAXIMUM DEPTH OF COVER OF THE 5'-0" DIA. PRECAST MANHOLE, FROM FINAL GRADE TO THE OUTER TOP OF THE PIPE, SHALL BE TWENTY-FIVE (25) FEET.

(6) ALL COVER DISTANCES SHOWN FOR REINFORCEMENT ARE CLEAR DISTANCES.

(7) LIFTING HOLES SHALL BE LOCATED IN THE SECTIONS AS PER MANUFACTURER'S RECOMMENDATIONS AND GRADED PRIOR TO BACKFILLING.

(8) THE VALUES OF THE WALL AND SLAB THICKNESSES ARE A MINIMUM.

(9) CONCRETE DESIGN MIX = 5,000 PSI (MIN. 28 DAY STRENGTH = 4,000 PSI), MAX. W/C = 0.47, REBARS = 50,000 PSI, WAM = 50,000 PSI.

(10) INVERT SHELTS SHALL HAVE A 1/2" PER LINEAR FOOT SLOPE TOWARDS THE SEWER.

(11) THE OPENING DIAMETERS SHOWN IN THE SCHEDULE ARE MAXIMAL VALUES, THE MINIMUM OPENING DIAMETERS SHALL BE AS FOLLOWS: 8" TO 24" DIA., PIPES = 0.0" TO 36" DIA., PIPES = 0.0" TO 47.5".

(12) BELL-UP TYPE JOINTS SHALL BE ALLOWED FOR 5'-0" DIA. PRECAST MANHOLE, WITH THE FOLLOWING MODIFICATION TO THE LOOSE TOP SLAB: (A) THE MINIMUM SLAB THICKNESS SHALL BE 1/4" (WHERE "X" IS JOINT DEPTH), BUT IN NO CASE SHALL IT BE LESS THAN 1/2" THICK AND (B) THE EMBEDMENT LENGTH SHALL BE 1/4" (WHERE "Y" IS THE THICKNESS OF RISER WALL). (SEE DETAIL "X" ON DWG. 1 OF 4.)

8/14/18

Thomas L. Wynn
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18

Gordi S. Saini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR PRECAST MANHOLE (DWG. 2 OF 4)
(FOR 6'-0", 7'-0", 8'-0" AND 10'-0" DIA. PRECAST MANHOLE)
(MONOLITHIC TOP SECTION AND MONOLITHIC BASE SECTION)

PLAN OF MONOLITHIC TOP SECTION

SECTION B-B

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18  8/14/18
STANDARD FOR PRECAST MANHOLE (DWG. 3 OF 4)

(FOR 6'-0", 7'-0", 8'-0" AND 10'-0" DIA. PRECAST MANHOLE)

(PRECAST MANHOLE MISCELLANEOUS DETAIL, NOTES AND SCHEDULES)

NOTE 1:
5'-9" MIN. TO 20'-0" MAX. 5'-9" BRICK MIN. LAY RADIALY, USE 1 OR 2 PRECAST COLLARS OR BRICK AS REQUIRED. (4'-9" BRICK MIN. ONLY FOR SHALLOW MANHOLE CONSTRUCTION.)

NOTE 2:
USE OF ALTERNATE LOOSE BOTTOM SLAB WILL NOT BE PERMITTED FOR THE 6'-0", 7'-0", 6'-0" AND 10'-0" DIA. PRECAST MANHOLE.

MANHOLE RIDER REINFORCING COMPLIES WITH AREA REQUIREMENTS OF ASTM C478. EXCEPT THAT ALL WALL SECTIONS SHALL BE REINFORCED WITH WM-4 PER CHART A - DWG 4 OF 4. E.F.T. WITH 0.45 HOOPS AROUND ALL CAST PIPE OPENINGS (E-F-T). (THE 2.54 HOOPS WILL NOT BE REQUIRED AT CORED OPENINGS FOR BASKET CONNECTIONS.) ALL VALUES OF AREA OF STEEL (A) ARE IN SQUARE INCHES AND ARE A MINIMUM.

GENERAL NOTES:

(1) THESE PRECAST MANHOLE MAY BE SUBSTITUTED FOR STANDARD MANHOLE TYPES A-1, A-2, B-1, B-2, C-1, C-2, D-1 AND D-2 ON SEWERS 84" IN DIAMETER AND LESS ONLY (AS SHOWN IN SCHEDULES).

(2) MANHOLE RIDER REINFORCING COMPLIES WITH AREA REQUIREMENTS OF ASTM C478. EXCEPT THAT ALL WALL SECTIONS SHALL BE REINFORCED WITH WM-4 PER CHART A - DWG. 4 OF 4. E.F.T. WITH 0.45 HOOPS AROUND ALL CAST PIPE OPENINGS (E-F-T). (THE 2.54 HOOPS WILL NOT BE REQUIRED AT CORED OPENINGS FOR BASKET CONNECTIONS.) ALL VALUES OF AREA OF STEEL (A) ARE IN SQUARE INCHES AND ARE A MINIMUM.

(3) CORED OPENINGS WILL BE PERMITTED FOR 12" DIA. BASKET CONNECTIONS ONLY. THE MAXIMUM CORED OPENING SHALL BE 1" FOR THESE BASKET CONNECTIONS. CORED OPENING WILL NOT BE PERMITTED FOR SHALLOW MANHOLE.

(4) FOR DETAILS OF STEPS, JOWLS, GASKETS, PRECAST COLLARS, PIPE TO MANHOLE CONNECTIONS, PIPE CAPS, POURED IN PLACE ALTERNATE MONOLITHIC BASE SECTIONS AND 4-DIA. PRECAST MANHOLE UNITS SEE STANDARD FOR PRECAST MANHOLE DETAILS, STD. FOR MA: STEPS, STD. FOR ALTERNATE MONOLITHIC BASE SECTIONS FOR PRECAST MANHOLE POURED IN PLACE AND STD. FOR 4-DIA. PRECAST MANHOLE, TYPICAL 4-DIA. PRECAST RIDER SECTION WILL NOT BE REQUIRED FOR SHALLOW MANHOLE CONSTRUCTION.

(5) THE MAXIMUM DEPTH OF COVER OF THE 6'-0", 7'-0", 6'-0" AND 10'-0" DIA. PRECAST MANHOLE, FROM FINAL GRADE TO THE OUTER TOP OF THE PIPE, SHALL BE TWENTY-FIVE (25) FEET.

(6) ALL COVER DISTANCES SHOWN FOR REINFORCEMENT ARE CLEAR DISTANCES.

(7) LIFTING HOLES SHALL BE LOCATED IN THE SECTIONS AS PER MANUFACTURER'S RECOMMENDATIONS AND GROUTED PRIOR TO BACKFILLING.

(8) THE VALUES OF THE WALL AND SLAB THICKNESSES ARE A MINIMUM.

(9) CONCRETE DESIGN MIX = 5,000 PSI (MIN. 20 DAY STRENGTH = 4,000 PSI); MAX. W/C = 0.47; REBARS = Fy = 60,000 PSI; WWM = Fy = 60,000 PSI.

(10) INVERT SHELVES SHALL HAVE A 1/2" PER LINEAR FOOT PITCH TOWARDS THE SEWER.

(11) THE OPENING DIAMETERS SHOWN IN THE SCHEDULE ARE MAXIMUM VALUES. THE MINIMUM OPENING DIAMETERS SHALL BE AS FOLLOWS: 6'-0" DIA. PIPES = O.D.+3"; 2'-0" TO 6'-0" DIA. PIPES = O.D.+4" AND 5'-0" TO 8'-0" DIA. PIPES = O.D.+5".

(12) BELL-UP TYPE JOINTS SHALL BE ALLOWED FOR 6'-0", 7'-0", 8'-0" AND 10'-0" DIA. PRECAST MANHOLE, WITH THE FOLLOWING MODIFICATION TO THE LODGE TOP SLAB. (A) THE MINIMUM SLAB THICKNESS SHALL BE 3/4" (WHERE Y IS JOINT DEPTH), BUT IN NO CASE SHALL IT BE LESS THAN 1/2" THICK AND (B) THE IMBEDMENT LENGTH SHALL BE 1.5" (WHERE Y IS THE THICKNESS OF RIDER WALL). SEE DETAIL "A" ON DWG. 1 OF 4.
# STANDARD FOR PRECAST MANHOLE (DWG. 4 OF 4)

## FOR 6'-0", 7'-0", 8'-0" AND 10'-0" DIA. PRECAST MANHOLES

### CHART A

<table>
<thead>
<tr>
<th>d</th>
<th>D</th>
<th>t</th>
<th>H</th>
<th>As</th>
<th>E</th>
<th>h</th>
</tr>
</thead>
<tbody>
<tr>
<td>6'-0&quot;</td>
<td>7'-2&quot;</td>
<td>7&quot;</td>
<td>11'-6&quot; MAX.; 3'-5&quot; MIN.</td>
<td>0.18 X 0.09</td>
<td>#4</td>
<td>15&quot; TO 18&quot;</td>
</tr>
<tr>
<td>7'-0&quot;</td>
<td>8'-4&quot;</td>
<td>8&quot;</td>
<td>11'-6&quot; MAX.; 3'-6&quot; MIN.</td>
<td>0.21 X 0.10</td>
<td>#4</td>
<td>15&quot; TO 18&quot;</td>
</tr>
<tr>
<td>8'-0&quot;</td>
<td>9'-6&quot;</td>
<td>9&quot;</td>
<td>11'-6&quot; MAX.; 4'-11&quot; MIN.</td>
<td>0.24 X 0.12</td>
<td>#5</td>
<td>15&quot; TO 20&quot;</td>
</tr>
<tr>
<td>10'-0&quot;</td>
<td>11'-10&quot;</td>
<td>11&quot;</td>
<td>11'-6&quot; MAX.; 5'-4&quot; MIN.</td>
<td>0.30 X 0.15</td>
<td>#6</td>
<td>15&quot; TO 20&quot;</td>
</tr>
</tbody>
</table>

### CHART B

<table>
<thead>
<tr>
<th>d</th>
<th>DOWELS IN MONOLITHIC TOP SECTION</th>
<th>DOWELS IN MONOLITHIC BASE SECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>6'-0&quot;</td>
<td>19-# DOWELS @12&quot; O.C. (17@23&quot; x 32&quot;) (2@23&quot; x 10&quot;)</td>
<td>15-# DOWELS @12&quot; O.C. (3@23&quot; x 25&quot;) (4@23&quot; x 23&quot;) (2@23&quot; x 20&quot;) (2@23&quot; x 17&quot;) (2@23&quot; x 13&quot;) (2@23&quot; x 9&quot;)</td>
</tr>
<tr>
<td>7'-0&quot;</td>
<td>23-# DOWELS @12&quot; O.C. (21@23&quot; x 38&quot;) (2@23&quot; x 10&quot;)</td>
<td>19-# DOWELS @12&quot; O.C. (5@23&quot; x 38&quot;) (4@23&quot; x 35&quot;) (2@23&quot; x 31&quot;) (2@23&quot; x 28&quot;) (2@23&quot; x 23&quot;) (2@23&quot; x 12&quot;)</td>
</tr>
<tr>
<td>8'-0&quot;</td>
<td>27-# DOWELS @12&quot; O.C. (25@23&quot; x 40&quot;) (2@23&quot; x 10&quot;)</td>
<td>23-# DOWELS @12&quot; O.C. (15@23&quot; x 40&quot;) (2@23&quot; x 28&quot;) (2@23&quot; x 25&quot;) (2@23&quot; x 14&quot;)</td>
</tr>
<tr>
<td>10'-0&quot;</td>
<td>33-# DOWELS @12&quot; O.C. (33@23&quot; x 46&quot;)</td>
<td>31-# DOWELS @12&quot; O.C. (25@23&quot; x 46&quot;) (2@23&quot; x 28&quot;) (2@23&quot; x 16&quot;)</td>
</tr>
<tr>
<td></td>
<td>34-# DOWELS @12&quot; 3/4&quot; O.C. (46&quot;)</td>
<td>34-# DOWELS @12&quot; 3/4&quot; O.C. (46&quot;)</td>
</tr>
</tbody>
</table>

---

[Signatures and dates]

**Sanjay S. Ca pian**  P.E. **8/14/18**  
ASSOCIATE COMMISSIONER, DESIGN  
DEPARTMENT OF DESIGN AND CONSTRUCTION

**Thomas Wayne**  P.E. **8/14/18**  
EXECUTIVE DIRECTOR OF ENGINEERING  
DEPARTMENT OF ENVIRONMENTAL PROTECTION
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR PRECAST MANHOLE DETAILS (DWG. 1 OF 3)
(PIPE TO MANHOLE CONNECTION DETAILS)

SECTIONAL PROFILE

NOTE A:
LEVELING PAD AND/OR PILE CAP - FOR MIFS ON GRADE, USE 9" WELL COMPACTED STONE BALLAST. FOR MIFS ON PILES, USE A CLASS 40 REINFORCED CONCRETE PILE CAP AS SHOWN ON THE STANDARD FOR PRECAST MANHOLE DETAILS DWG. 2 OF 2. IN EACH CASE, THE SHAPE SHALL BE SQUARE AND 3" LARGER THAN THE O.D. OF THE STRUCTURE, UNLESS OTHERWISE SPECIFIED.

GENERAL NOTES:
(1) EPOXY BONDING AGENT TO BE ROCKWELL 'C' AS MANUFACTURED BY PRECO CHEMICAL CO. OR EQUAL.
(2) NON-SHRINK GROUT TO BE SIKA-SET MORTAR AS MANUFACTURED BY SIKACITE OR EQUAL.
(3) THERMOPLASTIC INSERT AS MANUFACTURED BY PENNSYLVANIA INSERT CORP. OR EQUAL.

Sandeep S. Sanii
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION
8/14/18
DATE

Rameh Wayne
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
8/14/18
DATE
STANDARD FOR PRECAST MANHOLE DETAILS (DWG. 2 OF 3)
(JOINTS, GASKETS AND PRECAST COLLAR DETAILS)

BUTYL JOINT

'O' RING JOINT

PLAN OF 6"H X 8"W PRECAST COLLAR

<table>
<thead>
<tr>
<th>JOINT DETAILS</th>
<th>M.H. I.D.</th>
<th>&quot;X&quot;</th>
<th>&quot;D&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>4'-0&quot;</td>
<td>3' TO 5&quot;</td>
<td>5/8&quot; DIA.</td>
<td></td>
</tr>
<tr>
<td>5'-0&quot;</td>
<td>2' TO 5&quot;</td>
<td>3/4&quot; DIA.</td>
<td></td>
</tr>
<tr>
<td>6'-0&quot; AND 7'-0&quot;</td>
<td>3' TO 6&quot;</td>
<td>3/4&quot; DIA.</td>
<td></td>
</tr>
<tr>
<td>8'-0&quot; AND 10'-0&quot;</td>
<td>3' TO 8&quot;</td>
<td>3/4&quot; DIA.</td>
<td></td>
</tr>
</tbody>
</table>

#2 HOOPS

1 1/2" (TYP.)

2'-3"  8"  6"

SECTION A-A

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
STANDARD FOR PRECAST MANHOLE DETAILS (DWG. 3 OF 3)
(PRECAST MANHOLE PILE CAP DETAILS)

NOTES:
(1) CONCRETE SHALL BE CLASS 40. STEEL REINFORCEMENT BARS SHALL BE GRADE 60.
(2) COST FOR ALL LABOR, MATERIAL ETC. REQUIRED FOR THE PLACEMENT OF PILE CAP(S) SHALL BE MADE UNDER THE FOLLOWING CONTRACT ITEMS:
(A) ADDITIONAL EARTH EXCAVATION INCLUDING TEST PITS
(B) ADDITIONAL CONCRETE
(C) ADDITIONAL STEEL, REINFORCING BARS
(D) STONE BALLAST

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18
STANDARD FOR ALTERNATE MONOLITHIC BASE SECTION FOR PRECAST MANHOLES (POURED IN PLACE)
(FOR 4'-0", 5'-0", 6'-0", 7'-0", 8'-0" AND 10'-0" DIA. PRECAST MANHOLES)

SECTION A-A

NOTE:
The contractor shall be allowed to pour in place either a circular or square shaped outer wall for the alternate monolithic base section.

Section B-B

ADD 3-F@12" OVER 6 UNDER (TYP. FOR ALL PIPE)

REBARS SHALL BE PLACED CIRCULARLY

SECTION C-C

MANNELHO STEPS TO BE LOCATED AS DIRECTED BY THE ENGINEER

NOTE:
STEEL FORM TO BE UTILIZED TO MAKE JOINT COMPATIBLE WITH RISER SECTION.

<table>
<thead>
<tr>
<th>d</th>
<th>t</th>
<th>X</th>
<th>C</th>
<th>E</th>
<th>F</th>
<th>H</th>
<th>A0</th>
</tr>
</thead>
<tbody>
<tr>
<td>4'-0&quot;</td>
<td>5&quot;</td>
<td>3&quot; to 5&quot;</td>
<td>12&quot;</td>
<td>84</td>
<td>65</td>
<td>2'-0&quot;</td>
<td>0.12 X 0.06</td>
</tr>
<tr>
<td>5'-0&quot;</td>
<td>6&quot;</td>
<td>3&quot; to 5&quot;</td>
<td>12&quot;</td>
<td>84</td>
<td>65</td>
<td>2'-0&quot;</td>
<td>0.15 X 0.07</td>
</tr>
<tr>
<td>6'-0&quot;</td>
<td>7&quot;</td>
<td>3&quot; to 6&quot;</td>
<td>14&quot;</td>
<td>84</td>
<td>65</td>
<td>2'-0&quot;</td>
<td>0.16 X 0.09</td>
</tr>
<tr>
<td>7'-0&quot;</td>
<td>8&quot;</td>
<td>3&quot; to 6&quot;</td>
<td>15 1/2&quot;</td>
<td>85</td>
<td>65</td>
<td>2'-0&quot;</td>
<td>0.21 X 0.10</td>
</tr>
<tr>
<td>8'-0&quot;</td>
<td>9&quot;</td>
<td>3&quot; to 8&quot;</td>
<td>18 1/2&quot;</td>
<td>85</td>
<td>65</td>
<td>3'-0&quot;</td>
<td>0.24 X 0.12</td>
</tr>
<tr>
<td>10'-0&quot;</td>
<td>11&quot;</td>
<td>3&quot; to 8&quot;</td>
<td>23&quot;</td>
<td>85</td>
<td>65</td>
<td>3'-0&quot;</td>
<td>0.30 X 0.15</td>
</tr>
</tbody>
</table>

7 1/16" OR 1" DIA. SELF SEALING BUTYL GASKET, QUALITY EQUAL TO FED. SPEC. 955-950210

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E.  9/14/18

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E.  9/14/18

DATE

DATE
STANDARD FOR PRECAST DROP PIPE MANHOLE (TYPE I)
(ON 10" DIA. TO 24" DIA. SEWERS)

INVERT AND DROP PIPE TO BE CAST IN PLACE
(SEE NOTES 3, 4, 5, 6)

DUCTILE IRON PIPE CLASS 52

SQUARE HOOPS (TYP.) AROUND OPENING

PLAN OF LOOSE TOP SLAB

NOTES:
(1) THERMOPLASTIC INSERT AS MANUFACTURED BY PENNSYLVANIA INSERT CORP. OR EQUAL.
(2) EXCEPT AS OTHERWISE SHOWN OR SPECIFIED THE PRECAST MANHOLE SHALL CONFORM TO ALL REQUIREMENTS OF THE STANDARD FOR 6"-DIA. TO 10"-DIA. PRECAST MANHOLES.
(3) INVERT SLEEVES SHALL HAVE A 1/2" PER LINEAR FOOT PITCH TOWARDS THE SEWER.
(4) CONCRETE IS TO BE CLASS 40, REBARS- GRADE 60.
(5) STEEL REINFORCEMENT IS #6@12" EACH WAY IN THE MIDDLE OF DROP PIPE WALL.
(6) COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.

SECTION A-A

SECTION B-B

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E. 8/14/18

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E. 8/14/18
STANDARD FOR REMOVABLE PRECAST REINFORCED CONCRETE SLAB

NOTES:
(1) ALL STEEL REINFORCEMENT ARE #6 BARS.
(2) CONCRETE IS TO BE CLASS 40, REBARS-GRADE 60.
STANDARD FOR REMOVABLE PRECAST REINFORCED CONCRETE SLAB FOR DROP PIPE MANHOLE (TYPE I)

NOTES:

1. ALL STEEL REINFORCEMENT ARE #6 BARS.

2. CONCRETE IS TO BE CLASS 40, REBARS-Grade 60.
STANDARD FOR REMOVABLE PRECAST REINFORCED CONCRETE SLAB FOR DROP PIPE MANHOLE (TYPE II)

NOTES:
(1) ALL STEEL, REINFORCEMENT ARE #6 BARS.
(2) CONCRETE IS TO BE CLASS 40, REBARS-GRADE 60.
STANDARD FOR MANHOLE CHIMNEY DETAIL
(WHEN LEGAL GRADE IS BELOW FINAL GRADE)

FINAL GRADE

17'
STD. 27" DIA. M.H. FRAME(S) AND COVER(S)
FOR ACCESS AND CLEANOUT ON THREE
COURSES OF BRICK LAID RADIAILY

8'
STD. REMOVABLE PRECAST R.C. SLAB
(AS SHOWN IN M.H. STANDARD) SET IN
MORTAR

0.5" MORTAR JOINT

AS SHOWN

LEGAL GRADE

TAR PAPER JOINT

STD. M.H.
STEPS @12" O.C.

STANDARD SQUARE MANHOLE CHIMNEY

8/14/18

THOMAS WYNE
P.E.
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DATE

8/14/18

SANDIP SAHAI
P.E.
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION
DATE
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR 27" DIAMETER CAST IRON MANHOLE FRAME AND COVER
(FOR ACCESS OR CLEANOUT)

PLAN VIEW OF FRAME AND COVER

NOTES:
(1) FRAME MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B.
MINIMUM WEIGHT OF FRAME IS 340 LBS.
(2) COVER MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B.
MINIMUM WEIGHT OF COVER IS 195 LBS.
(3) DESIGN LOADING: HS20-44 HIGHWAY LOADING.
(4) ALL MANHOLE FRAMES & COVERS SHALL HAVE THE MANUFACTURER’S IDENTIFICATION, CAST DATE OR
HEAT NUMBER AND COUNTRY OF ORIGIN INTEGRALLY CAST ON INDIVIDUAL PIECES AT THE TIME OF
MANUFACTURE IN ACCORDANCE WITH THE DEP SPECIFICATION.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18
8/14/18
STANDARD FOR 27" DIAMETER CAST IRON EXTENSION RING
FOR 27" DIAMETER MANHOLE FRAME AND COVER

NOTES:
(1) MATERIAL: GRAY CAST IRON ASTM A-48, CLASS 35B. MINIMUM WEIGHT OF EXTENSION RINGS:
2" = 120 LBS; 3" = 150 LBS; 4" = 170 LBS.
(2) DESIGN LOADING: HS20-44 HIGHWAY LOADING.
(3) ALL MANHOLE FRAMES & COVERS SHALL HAVE THE MANUFACTURER'S IDENTIFICATION, CAST DATE
OR HEAT NUMBER AND COUNTRY OF ORIGIN INTEGRIALLY CAST ON INDIVIDUAL PIECES AT THE TIME
OF MANUFACTURE IN ACCORDANCE WITH THE DEP SPECIFICATION.

E = 2" for 2" raise
E = 3" for 3" raise
E = 4" for 4" raise
Minimum Raise: 2"
Maximum Raise: 4"

PLAN

SECTION

8/14/18
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR 36" DIAMETER CAST IRON MANHOLE FRAME AND COVER FOR CLEANOUT

NOTES:
(1) FRAME MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B. MINIMUM WEIGHT OF FRAME IS 480 LBS.
(2) COVER MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B. MINIMUM WEIGHT OF COVER IS 400 LBS.
(3) DESIGN LOADING: HS20-44 HIGHWAY LOADING.
(4) ALL MANHOLE FRAMES & COVERS SHALL HAVE THE MANUFACTURER'S IDENTIFICATION, CAST DATE OR HEAT NUMBER AND COUNTRY OF ORIGIN INTEGRALLY CAST ON INDIVIDUAL PIECES AT THE TIME OF MANUFACTURE IN ACCORDANCE WITH THE DEP SPECIFICATION.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR 24" DIAMETER CAST IRON MANHOLE COVER

NOTES:
(1) COVER MATERIAL: GRAY CAST IRON ASTM A-350 CLASS 35B.
   MINIMUM WEIGHT OF COVER IS 130 LBS.
(2) DESIGN LOADING: HS20-44 HIGHWAY LOADING.
(3) ALL MANHOLE COVERS SHALL HAVE THE MANUFACTURER’S IDENTIFICATION, CAST DATE
    OR HEAT NUMBER AND COUNTRY OF ORIGIN INTEGRALLY CAST ON INDIVIDUAL PIECES AT
    THE TIME OF MANUFACTURE IN ACCORDANCE WITH THE DEP SPECIFICATION.
(4) TO BE USED ONLY TO REPLACE BROKEN OR DAMAGED EXISTING 24" DIAMETER
    SEWER MANHOLE COVER.

[Signatures and dates]
NOTES:

(1) MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B. MINIMUM WEIGHT OF STEP IS 11 LBS.

(2) ALL MANHOLE STEPS SHALL HAVE THE MANUFACTURER’S IDENTIFICATION, CAST DATE OR HEAT NUMBER AND COUNTRY OF ORIGIN INTEGRALLY CAST ON INDIVIDUAL PIECES AT THE TIME OF MANUFACTURE IN ACCORDANCE WITH THE DEP SPECIFICATION.
STANDARD FOR CAST IRON MANHOLE STEP
(BOLT-ON TYPE)

NOTES:

(1) MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B. MINIMUM WEIGHT OF BOLT-ON STEP IS 13 LBS.

(2) THERMOPLASTIC INSERT AS MANUFACTURED BY PENNSYLVANIA INSERT CORP., OR EQUAL, WITH 5/8"-11 X 2 1/2" STAINLESS STEEL BOLT AND WASHER.

OR

1 1/8" X 2" CORED HOLE FOR 5/8"-11 X 2 1/2" STAINLESS STEEL BOLT AND WASHER,
WITH ACKERMAN-JOHNSON EXPANSIVE SCREW ANCHOR WITH NONCORROSION BRASS CONES,
CATALOG NO. 701-62.

(3) ALL MANHOLE STEPS SHALL HAVE THE MANUFACTURER'S IDENTIFICATION, CAST DATE
OF HEAT NUMBER AND COUNTRY OF ORIGIN INTEGRALLY CAST ON INDIVIDUAL PIECES
AT THE TIME OF MANUFACTURE IN ACCORDANCE WITH THE DEP SPECIFICATION.
STANDARD FOR CIRCULAR CAST IRON MANHOLE STEP (BOLT-ON TYPE)

NOTES:
(1) MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B. MINIMUM WEIGHT OF CIRCULAR BOLT-ON STEP IS 13 LBS.
(2) THERMOPLASTIC INSERT AS MANUFACTURED BY PENNSYLVANIA INSERT CORP., OR EQUAL, WITH 5/8"-11 X 2 1/2" STAINLESS STEEL BOLT AND WASHER. OR 1 1/8" X 2" CORED HOLE FOR 5/8"-11 X 2 1/2" STAINLESS STEEL BOLT AND WASHER, WITH ANCHOR JOHNSON EXPANSIVE SCREW ANCHOR WITH NONCORROSI V BRASS CONES, CATALOG NO. 701-62.
(3) ALL MANHOLE STEPS SHALL HAVE THE MANUFACTURER'S IDENTIFICATION, CAST DATE OR HEAT NUMBER AND COUNTRY OF ORIGIN INTEGRALLY CAST ON INDIVIDUAL PIECES AT THE TIME OF MANUFACTURE IN ACCORDANCE WITH THE DEP SPECIFICATION.
STANDARD FOR PLASTIC MANHOLE STEP

(COPOLYMER POLYPROPYLENE PLASTIC MANHOLE STEP)

NOTE:
PLASTIC MANHOLE STEP MAY BE SUBSTITUTED FOR CAST IRON MANHOLE STEP, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

1/2" GRADE 60 STEEL REINFORCEMENT

PLAN

SIDE ELEVATION

ANCHORAGE DETAIL

FRONT ELEVATION
STANDARD FOR TYPE 1 CATCH BASIN
(WITH CURB PIECE)

NOTES:
(1) LOCATION AND ANGLE OF BASIN CONNECTION MAY BE VARIED TO SUIT FIELD CONDITIONS.
(2) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
(3) THE MINIMUM DROP FROM BASIN TO SEWER SHALL BE 6".
(4) EXPANSION JOINTS ARE REQUIRED IN THE CONCRETE SIDEWALK AREA AT A DISTANCE OF 1' 0" AROUND THE PERIMETER OF THE BASIN.
(5) CONCRETE IS TO BE CLASS 40, REBAR-GRADE 60.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
STANDARD FOR TYPE 2 CATCH BASIN
(WITHOUT CURB PIECE)

NOTES:
(1) LOCATION OF CURB SHALL BE AS SHOWN UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
(2) LOCATION AND ANGLE OF BASIN CONNECTION MAY BE VARIED TO SUIT FIELD CONDITIONS.
(3) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
(4) THE MINIMUM DROP FROM BASIN TO SEWER SHALL BE 6".
(5) EXPANSION JOINTS ARE REQUIRED IN THE CONCRETE SIDEWALK AREA AT A DISTANCE OF 1'-0" AROUND THE PERIMETER OF THE BASIN.
(6) CONCRETE IS TO BE CLASS 40, REBAR - GRADE 60.
(7) COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.

8/14/18
DATE

THOMAS WAYNE
P.E.
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18
DATE

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION
STANDARD FOR DOUBLE CATCH BASIN
(WITHOUT CURB PIECE)

NOTES:
(1) LOCATION OF CURB SHALL BE AS SHOWN UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
(2) LOCATION AND ANGLE OF BASIN CONNECTION MAY BE VARIED TO SUIT FIELD CONDITIONS.
(3) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
(4) THE MINIMUM DROP FROM BASIN TO SEWER SHALL BE 6".
(5) EXPANSION JOINTS ARE REQUIRED IN THE CONCRETE SIDEWALK AREA AT A DISTANCE OF 1'-0" AROUND THE PERIMETER OF THE BASIN.
(6) CONCRETE IS TO BE CLASS 40, REBARS-GRADE 60.
(7) COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.

8/14/18

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR DOUBLE CATCH BASIN
(WITH CURB PIECE)

NOTES:
(1) LOCATION OF CURB SHALL BE AS SHOWN UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
(2) LOCATION AND ANGLE OF BASIN CONNECTION MAY BE VARIED TO SUIT FIELD CONDITIONS.
(3) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
(4) THE MINIMUM DROP FROM BASIN TO SEWER SHALL BE 6".
(5) EXPANSION JOINTS ARE REQUIRED IN THE CONCRETE SIDEWALK AREA AT A DISTANCE
OF 1'-0" AROUND THE PERIMETER OF THE BASIN.
(6) CONCRETE IS TO BE CLASS 40, REBARS-GRADE 60.
(7) COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.

ASSOCIATE COMMISSIONER, DESIGN
P.E.
DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING
P.E.
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18
DATE

8/14/18
DATE
STANDARD FOR PRECAST TYPE 1 CATCH BASIN

NOTES:

(1) LOCATION OF OPENING SHALL BE DETERMINED PRIOR TO MANUFACTURE OF BASIN BY LOCATION AND ANGLE OF BASIN CONNECTION REQUIRED DUE TO FIELD CONDITIONS AND OPENING SHALL BE PLACED IN THE PROPER WALL AT THE TIME OF MANUFACTURE.

(2) LIFTING HOOKS SHALL BE LOCATED IN THE SECTION AS PER MANUFACTURERS RECOMMENDATIONS AND GROUTED PRIOR TO BACKFILLING. (FOUR (4) LIFTING HOOKS SHALL BE PROVIDED FOR EACH SECTION AND SHALL BE PLACED SYMMETRICALY AND IN SUCH A MANNER AS TO PROVIDE FOR THE EVEN LIFTING OF THE SECTION.)

(3) CONCRETE IS TO BE CLASS 40 AND 5% AIR ENTRAINED. REBARS-GRADE 60. WWM-Fₚ=65,000 PSI.

(4) COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.
NOTES:

(1) LOCATION OF OPENING SHALL BE DETERMINED PRIOR TO MANUFACTURE OF BASIN BY LOCATION AND ANGLE OF BASIN CONNECTION REQUIRED DUE TO FIELD CONDITIONS AND OPENING SHALL BE PLACED IN THE PROPER WALL AT THE TIME OF MANUFACTURE.

(2) LIFTING HOOKS SHALL BE LOCATED IN THE SECTION AS PER MANUFACTURERS RECOMMENDATIONS AND GROUTED PRIOR TO BACKFILLING. (FOUR (4) LIFTING HOOKS SHALL BE PROVIDED FOR EACH SECTION AND SHALL BE PLACED SYMMETRICALLY AND IN SUCH A MANNER AS TO PROVIDE FOR THE EVEN LIFTING OF THE SECTION.)

(3) SPLIT BASINS WILL ONLY BE PERMITTED WHERE STANDARD BASINS CAN NOT BE INSTALLED DUE TO VERTICAL HEIGHT RESTRICTIONS.

(4) CONCRETE IS TO BE CLASS 40 AND 5% AIR ENTRAINMENT. REBARS GRADE 60. WWM = 20,000 PSI.

(5) COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
CITY OF NEW YORK  
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR PRECAST TYPE 2 CATCH BASIN

SECTION A-A

LIFTING HOOK DETAIL

NOTES:

(1) LOCATION OF OPENING SHALL BE DETERMINED PRIOR TO MANUFACTURE OF BASIN BY LOCATION AND ANGLE OF BASIN CONNECTION REQUIRED DUE TO FIELD CONDITIONS AND OPENING SHALL BE PLACED IN THE PROPER WALL AT THE TIME OF MANUFACTURE.

(2) LIFTING HOSES SHALL BE LOCATED IN THE SECTION AS PER MANUFACTURERS RECOMMENDATIONS AND GRouted PRIOR TO BACKFILLING. (FOUR (4) LIFTING HOSES SHALL BE PROVIDED FOR EACH SECTION AND SHALL BE PLACED SYMMETRICALLY AND IN SUCH A MANNER AS TO PROVIDE FOR THE EVEN LIFTING OF THE SECTION.)

(3) CONCRETE IS TO BE CLASS 40 AND 2% AIR ENTRAINED, REBAR-GRADE 60, WWM-A=65,000 PSI.

(4) COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.

ASSOCIATE COMMISSIONER, DESIGN  
DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING  
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18

8/14/18
NOTES:
(1) LOCATION OF OPENING SHALL BE DETERMINED PRIOR TO MANUFACTURE OF BASIN BY LOCATION AND ANGLE OF BASIN CONNECTION REQUIRED DUE TO FIELD CONDITIONS AND OPENING SHALL BE PLACED IN THE PROPER WALL AT THE TIME OF MANUFACTURE.
(2) LIFTING HOOKS SHALL BE LOCATED IN THE SECTION AS PER MANUFACTURERS RECOMMENDATIONS AND GROUTED PRIOR TO BACKFILLING. FOUR LIFTING HOOKS SHALL BE PROVIDED FOR EACH SECTION AND SHALL BE PLACED SYMMETRICALLY AND IN SUCH A MANNER AS TO PROVIDE FOR THE EVEN LIFTING OF THE SECTION.
(3) SPLIT BASINS WILL ONLY BE PERMITTED WHERE STANDARD BASINS CAN NOT BE INSTALLED DUE TO VERTICAL HEIGHT RESTRICTIONS.
(4) CONCRETE IS TO BE CLASS 40 AND 9% AIR ENTRAINMENT. REBAR-S GRADE 60. WWM- f'c=65,000 PSI.
(5) COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.
STANDARD FOR PRECAST TYPE 3 CATCH BASIN (WITHOUT CURB PIECE)

NOTES:

1. LOCATION OF OPENING SHALL BE DETERMINED PRIOR TO MANUFACTURE OF BASIN BY LOCATION & ANGLE OF BASIN CONNECTION REQUIRED DUE TO FIELD CONDITIONS & OPENING SHALL BE PLACED IN THE PROPER WALL AT THE TIME OF MANUFACTURE. IF LOCATION OF OPENING IS NOT IN THE FRONT WALL AS SHOWN, THE OPENING SHALL BE 24" X 24" WITH 2½" HOOKS - 6" LONG PLACED ABOVE OPENING; IN ADDITION, THE FRONT WALL SHALL BE MANUFACTURED SOLID & ADDITIONAL 2-4½" CHUTE REINFORCEMENT SHALL BE PLACED AT THE TIME OF MANUFACTURE.

2. LIFTING HOOPS SHALL BE LOCATED IN THE SECTION AS PER MANUFACTURERS RECOMMENDATIONS & GRouted PRIOR TO BACKFILLING. (FOUR (4) LIFTING HOOPS SHALL BE PROVIDED & PLACED SYMMETRICALLY & IN SUCH A MANNER AS TO PROVIDE FOR THE EVEN LIFTING OF THE SECTION.)

3. CONCRETE IS TO BE CLASS 40 AND 5% AIR ENTRAINED. REBAR GRADE 60, WWM-A=65,000 PSI.

4. ALL REINFORCEMENT SHOWN AND SPECIFIED SHALL BE INTEGRALLY PLACED AT TIME OF MANUFACTURE.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E.

DATE

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E.

DATE
STANDARD FOR PRECAST TYPE 3 CATCH BASIN (WITH CURB PIECE)

NOTES:

1. LOCATION OF OPENING SHALL BE DETERMINED PRIOR TO MANUFACTURE OF BASIN BY LOCATION & ANGLE OF BASIN CONNECTION REQUIRED DUE TO FIELD CONDITIONS & OPENING SHALL BE PLACED IN THE PROPER WALL AT THE TIME OF MANUFACTURE. IF LOCATION OF OPENING IS NOT IN THE FRONT WALL AS SHOWN, THE OPENING SHALL BE 24" X 24" WITH 2-4#8@4'-0" LONG PLACED ABOVE OPENING; IN ADDITION, THE FRONT WALL SHALL BE MANUFACTURED SOLID & ADDITIONAL 2-4#8@12" FOR CHUTE REINFORCEMENT SHALL BE PLACED AT THE TIME OF MANUFACTURE.

2. LIFTING HOOKS SHALL BE LOCATED IN THE SECTION AS PER MANUFACTURER'S RECOMMENDATIONS & GROUTED PRIOR TO BACKFILLING. FOUR (4) LIFTING HOOKS SHALL BE PROVIDED & PLACED SYMMETRICALLY & IN SUCH A MANNER AS TO PROVIDE FOR THE EVEN LIFTING OF THE SECTION.

3. CONCRETE IS TO BE CLASS 40 & 9% AIR ENTRAINMENT. REBAR-GRADE 60, WWM-Fy=65,000 PSI.

4. ALL REINFORCEMENT SHOWN AND SPECIFIED SHALL BE INTEGRALLY PLACED AT TIME OF MANUFACTURE.
NOTES:
(1) LOCATION OF OPENING SHALL BE DETERMINED PRIOR TO MANUFACTURE OF BASIN BY LOCATION AND ANGLE OF BASIN CONNECTION REQUIRED DUE TO FIELD CONDITIONS AND OPENING SHALL BE PLACED IN THE PROPER WALL AT THE TIME OF MANUFACTURE.

(2) LIFTING HOOKS SHALL BE LOCATED IN THE SECTION AS PER MANUFACTURER'S RECOMMENDATIONS AND DROUGHTED PRIOR TO BACKFILLING. (FOUR 4) LIFTING HOOKS SHALL BE PROVIDED FOR EACH SECTION AND SHALL BE PLACED SYMMETRICALLY AND IN SUCH A MANNER AS TO PROVIDE FOR THE EVEN LIFTING OF THE SECTIONS.

(3) CONCRETE IS TO BE CLASS 40 AND 5% AIR ENTRAINEED. REBARS-GRADE 60.
WWM-Fs=55,000 PSI.
STANDARD FOR PRECAST DOUBLE CATCH BASIN (DWG. 2 OF 2)

(FOR DOUBLE CATCH BASIN WITHOUT CURB PIECE)
(REMOVABLE PRECAST DOUBLE CATCH BASIN SLAB)

NOTES:
(1) ALL STEEL REINFORCEMENT ARE #6 BARS.
(2) CONCRETE IS TO BE CLASS 40, REBARS-GRADE 60.

8/14/18
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR PRECAST DOUBLE CATCH BASIN
(For Double Catch Basin With Curb Piece)

NOTES:
(1) LOCATION OF OPENING SHALL BE DETERMINED PRIOR TO MANUFACTURE OF BASIN BY LOCATION AND ANGLE OF BASIN CONNECTION REQUIRED DUE TO FIELD CONDITIONS AND OPENING SHALL BE PLACED IN THE PROPER WALL AT THE TIME OF MANUFACTURE.

(2) LIFTING HOOKS SHALL BE LOCATED IN THE SECTION AS PER MANUFACTURER'S RECOMMENDATIONS AND GRouted PRIOR TO BACKFILLING. FOUR (4) LIFTING HOOKS SHALL BE PROVIDED FOR EACH SECTION AND SHALL BE PLACED SYMMETRICALLY AND IN SUCH A MANNER AS TO PROVIDE FOR THE EVEN LIFTING OF THE SECTIONS.

(3) CONCRETE IS TO BE CLASS 40 AND 5% AIR ENTRAINED. REBAR-GRaDE 60. WWM-A>P=45,000 PSI.

8/14/18
S. Kaini
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18
Thomas Wyman
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
STANDARD FOR PRECAST SEEPAGE BASIN (DWG. 1 OF 4)
(SEEPAGE BASIN INSTALLATION)

D
<table>
<thead>
<tr>
<th>OUTSIDE DIAMETER</th>
<th>C</th>
<th>A</th>
<th>T</th>
<th>H4</th>
</tr>
</thead>
<tbody>
<tr>
<td>4'-0&quot;</td>
<td>27&quot;</td>
<td>STD. REMOVABLE R.C. CIRCULAR SLAB</td>
<td>2'-0&quot; MIN.</td>
<td>7'-0&quot;</td>
</tr>
<tr>
<td>6'-0&quot;, 8'-0&quot;,10'-0&quot; AND 12'-0&quot;</td>
<td>36&quot;</td>
<td>STD. REMOVABLE R.C. CIRCULAR SLAB</td>
<td>3'-0&quot; MIN.</td>
<td>6'-0&quot;</td>
</tr>
</tbody>
</table>

NOTES:

(A) UNLESS OTHERWISE SPECIFIED, THE TOTAL DEPTH OF A SEEPAGE BASIN SHALL BE APPROXIMATELY SEVENTEEN (17) FEET, WITH H4 AS SPECIFIED IN CHART ABOVE.

(B) THE LOCATION OF ALL SEEPAGE BASINS SHALL BE SUCH THAT THE OPENING IN THE TOP SLAB TOGETHER WITH FRAME AND COVER SHALL BE TOTALLY IN THE ROADWAY AREA OR TOTALLY IN THE SIDEWALK AREA.

(C) ALL SLABS AND RINGS SHALL BE PLACED ON A ONE-HALF (1/2) INCH THICK FULL BED OF FRESH MORTAR.

(D) WHEN IMPERMEABLE STRATUM IS ENCOUNTERED, SEEPAGE BASIN INSTALLATION SHALL BE JUSTIFIED BEFORE CONSTRUCTION.
STANDARD FOR PRECAST SEEPAGE BASIN (DWG. 2 OF 4)
(PRECAST SOLID RING)

NOTES:
(1) SEEPAGE BASIN SOLID RING AND DRAINAGE RING REINFORCING COMPLIES WITH AREA REQUIREMENTS OF ASTM C476, EXCEPT THAT ALL WALL SECTIONS SHALL BE REINFORCED WITH WWM. A S = (SEE CHARTS), PLACED IN CENTER OF WALL. IN SOLID RING 1-1/4 HOOP SHALL BE PLACED AROUND ALL CAST PIPE OPENINGS. (THE 1-1/4 HOOP WILL NOT BE REQUIRED AT CORED OPENINGS FOR BASIN CONNECTIONS IN SOLID RING.) ALL VALUES OF AREA OF STEEL (A S) ARE IN SQUARE INCHES AND ARE A MINIMUM.

(2) CAST PIPE OPENINGS AND CORED OPENINGS WILL BE PLACED IN SOLID RING ONLY. NO CAST PIPE OPENING OR CORED OPENING WILL BE ALLOWED IN DRAINAGE RING AND NO BASIN CONNECTION SHALL BE MADE INTO A DRAINAGE RING.

(3) CORED OPENINGS IN SOLID RING WILL BE PERMITTED FOR 12" DIA. BASIN CONNECTIONS ONLY. THE MAXIMUM CORED OPENING SHALL BE 16" FOR THESE BASIN CONNECTIONS.

(4) PIPE OPENINGS WILL NOT BE PERMITTED THROUGH JOINTS. DISTANCE FROM TOP OR BOTTOM OF ANY SOLID RING SECTION SHALL BE A MINIMUM OF 3" FOR CAST PIPE OPENINGS AND A MINIMUM OF 6" FOR CORED OPENINGS FOR BASIN CONNECTIONS.

(5) CONCRETE DESIGN MIX = 0,000 PSI (MIN. 28 DAY STRENGTH) = 4,000 PSI, MAX. W/C = 0.47. REBAR = F Y = 60,000 PSI. WWM - F Y = 65,000 PSI.

(6) OPENINGS FOR SPACING AND HANDLING WILL BE ALLOWED IN UPPER PORTION OF SOLID RING. HOWEVER, THE CONTRACTOR SHALL FILL ALL SUCH OPENINGS WITH NONSHRINK GROUT IMMEDIATELY AFTER INSTALLATION.

(7) IN NO CASE SHALL THE AREA OF THE DRAIN OPENING BE LESS THAN 3.0 SQ. IN.

ELEVATION

SECTION

<table>
<thead>
<tr>
<th>B S</th>
<th>D = 4'-0&quot; O.D.</th>
<th>D = 6'-0&quot; O.D.</th>
<th>D = 8'-0&quot; O.D.</th>
<th>D = 10'-0&quot; O.D.</th>
<th>D = 12'-0&quot; O.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2'-0&quot;</td>
<td>0.058 CIR.</td>
<td>0.066 CIR.</td>
<td>0.080 CIR.</td>
<td>0.093 CIR.</td>
<td>0.108 CIR.</td>
</tr>
<tr>
<td>3'-0&quot;</td>
<td>BY</td>
<td>0.080 CIR.</td>
<td>0.093 CIR.</td>
<td>0.108 CIR.</td>
<td>0.123 CIR.</td>
</tr>
<tr>
<td>5'-0&quot;</td>
<td>0.029 LONG.</td>
<td>0.034 LONG.</td>
<td>0.040 LONG.</td>
<td>0.047 LONG.</td>
<td>0.054 LONG.</td>
</tr>
</tbody>
</table>
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR PRECAST SEEPAGE BASIN (DWG. 3 OF 4)
(PRECAST DRAINAGE RING)

ELEVATION

SECTION

<table>
<thead>
<tr>
<th>L</th>
<th>B_d</th>
<th>A_d</th>
<th>D</th>
<th>6&quot; MIN.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(WELDED WIRE MESH 6&quot;X12&quot;)</td>
<td>(OUTSIDE DIAMETER)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B_d MIN.</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2'-0&quot;</td>
<td>17.4</td>
<td>130</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>3'-0&quot;</td>
<td>26.1</td>
<td>195</td>
<td>30</td>
<td>10</td>
</tr>
<tr>
<td>4'-0&quot;</td>
<td>34.8</td>
<td>261</td>
<td>40</td>
<td>10</td>
</tr>
<tr>
<td>5'-0&quot;</td>
<td>43.6</td>
<td>326</td>
<td>50</td>
<td>10</td>
</tr>
<tr>
<td>6'-0&quot;</td>
<td>52.3</td>
<td>391</td>
<td>60</td>
<td>10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>D = 4'-0&quot; O.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2'-0&quot;</td>
</tr>
<tr>
<td>3'-0&quot;</td>
</tr>
<tr>
<td>4'-0&quot;</td>
</tr>
<tr>
<td>5'-0&quot;</td>
</tr>
<tr>
<td>6'-0&quot;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>D = 6'-0&quot; O.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2'-0&quot;</td>
</tr>
<tr>
<td>3'-0&quot;</td>
</tr>
<tr>
<td>4'-0&quot;</td>
</tr>
<tr>
<td>5'-0&quot;</td>
</tr>
<tr>
<td>6'-0&quot;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>D = 8'-0&quot; O.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2'-0&quot;</td>
</tr>
<tr>
<td>3'-0&quot;</td>
</tr>
<tr>
<td>4'-0&quot;</td>
</tr>
<tr>
<td>5'-0&quot;</td>
</tr>
<tr>
<td>6'-0&quot;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>D = 10'-0&quot; O.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2'-0&quot;</td>
</tr>
<tr>
<td>3'-0&quot;</td>
</tr>
<tr>
<td>4'-0&quot;</td>
</tr>
<tr>
<td>5'-0&quot;</td>
</tr>
<tr>
<td>6'-0&quot;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>D = 12'-0&quot; O.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2'-0&quot;</td>
</tr>
<tr>
<td>3'-0&quot;</td>
</tr>
<tr>
<td>4'-0&quot;</td>
</tr>
<tr>
<td>5'-0&quot;</td>
</tr>
<tr>
<td>6'-0&quot;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MIN. INTERNAL VOL.</th>
<th>MIN. DRAIN OPENINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIN. DRAIN OPENINGS</td>
<td>TOTAL</td>
</tr>
<tr>
<td>PER ROW</td>
<td>PER SECTION</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>L</th>
<th>A_d</th>
<th>D = 4'-0&quot; O.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2'-0&quot;</td>
<td>0.006 CIR.</td>
<td>0.020 LONG.</td>
</tr>
<tr>
<td>3'-0&quot;</td>
<td>0.006 CIR.</td>
<td>0.034 LONG.</td>
</tr>
<tr>
<td>4'-0&quot;</td>
<td>0.006 CIR.</td>
<td>0.040 LONG.</td>
</tr>
<tr>
<td>5'-0&quot;</td>
<td>0.006 CIR.</td>
<td>0.047 LONG.</td>
</tr>
<tr>
<td>6'-0&quot;</td>
<td>0.006 CIR.</td>
<td>0.054 LONG.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>L</th>
<th>A_d</th>
<th>D = 6'-0&quot; O.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2'-0&quot;</td>
<td>0.006 CIR.</td>
<td>0.020 LONG.</td>
</tr>
<tr>
<td>3'-0&quot;</td>
<td>0.006 CIR.</td>
<td>0.034 LONG.</td>
</tr>
<tr>
<td>4'-0&quot;</td>
<td>0.006 CIR.</td>
<td>0.040 LONG.</td>
</tr>
<tr>
<td>5'-0&quot;</td>
<td>0.006 CIR.</td>
<td>0.047 LONG.</td>
</tr>
<tr>
<td>6'-0&quot;</td>
<td>0.006 CIR.</td>
<td>0.054 LONG.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>L</th>
<th>A_d</th>
<th>D = 8'-0&quot; O.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2'-0&quot;</td>
<td>0.006 CIR.</td>
<td>0.020 LONG.</td>
</tr>
<tr>
<td>3'-0&quot;</td>
<td>0.006 CIR.</td>
<td>0.034 LONG.</td>
</tr>
<tr>
<td>4'-0&quot;</td>
<td>0.006 CIR.</td>
<td>0.040 LONG.</td>
</tr>
<tr>
<td>5'-0&quot;</td>
<td>0.006 CIR.</td>
<td>0.047 LONG.</td>
</tr>
<tr>
<td>6'-0&quot;</td>
<td>0.006 CIR.</td>
<td>0.054 LONG.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>L</th>
<th>A_d</th>
<th>D = 10'-0&quot; O.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2'-0&quot;</td>
<td>0.003 CIR.</td>
<td>0.047 LONG.</td>
</tr>
<tr>
<td>3'-0&quot;</td>
<td>0.003 CIR.</td>
<td>0.047 LONG.</td>
</tr>
<tr>
<td>4'-0&quot;</td>
<td>0.003 CIR.</td>
<td>0.047 LONG.</td>
</tr>
<tr>
<td>5'-0&quot;</td>
<td>0.003 CIR.</td>
<td>0.047 LONG.</td>
</tr>
<tr>
<td>6'-0&quot;</td>
<td>0.003 CIR.</td>
<td>0.047 LONG.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>L</th>
<th>A_d</th>
<th>D = 12'-0&quot; O.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2'-0&quot;</td>
<td>0.108 CIR.</td>
<td>0.054 LONG.</td>
</tr>
<tr>
<td>3'-0&quot;</td>
<td>0.108 CIR.</td>
<td>0.054 LONG.</td>
</tr>
<tr>
<td>4'-0&quot;</td>
<td>0.108 CIR.</td>
<td>0.054 LONG.</td>
</tr>
<tr>
<td>5'-0&quot;</td>
<td>0.108 CIR.</td>
<td>0.054 LONG.</td>
</tr>
<tr>
<td>6'-0&quot;</td>
<td>0.108 CIR.</td>
<td>0.054 LONG.</td>
</tr>
</tbody>
</table>

P.E. 8/14/18
ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E. 8/14/18
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
STANDARD FOR CAST IRON FRAME FOR CATCH BASINS
(WITH CURB PIECE)

NOTES:

(1) MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B. MINIMUM WEIGHT OF FRAME IS 360 LBS.

(2) DESIGN Loads: HS20-44 HIGHWAY LOADING.

(3) TWO (2) - 3/4" DIA. CARBON STEEL BOLTS ASTM 307 GRADE - 3 1/2" LONG WITH HEXAGONAL HEAD AND NUT WITH TWO (2) FLAT WASHERS PER BOLT TO BE FURNISHED WITH EACH FRAME TOGETHER WITH 6" CURB PIECE OR 8" CURB PIECE. LONGER BOLTS TO BE FURNISHED FOR CURB HEIGHTS GREATER THAN 6" WHERE FILLER PIECES ARE USED.

(4) ALL CATCH BASIN FRAMES SHALL HAVE THE MANUFACTURER'S IDENTIFICATION, CAST DATE OR HEAT NUMBER AND COUNTRY OF ORIGIN INTEGRALLY CAST INDIVIDUAL PIECES AT THE TIME OF MANUFACTURE IN ACCORDANCE WITH THE DEP SPECIFICATION.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18

S. Sauini
P.E.

Thomas Lucane
P.E.

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION
STANDARD FOR CAST IRON FRAME FOR CATCH BASINS
(WITHOUT CURB PIECE)

NOTES:
(1) MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B. MINIMUM WEIGHT OF FRAME IS 275 LBS.
(2) DESIGN LOADING: HS20-44 HIGHWAY LOADING.
(3) ALL FRAMES SHALL HAVE THE MANUFACTURER'S IDENTIFICATION, CAST DATE OR HEAT NUMBER AND COUNTRY OF ORIGIN INTEGRALEY CAST ON INDIVIDUAL PIECES AT THE TIME OF MANUFACTURE IN ACCORDANCE WITH THE DEP SPECIFICATION.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION
8/14/18

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
8/14/18
STANDARD FOR CAST IRON FRAME FOR TYPE 3 CATCH BASINS
(WITH CURB PIECE)

NOTES:

(1) MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B. MINIMUM WEIGHT OF FRAME IS 360 LBS.

(2) DESIGN LOADING: HS20-44 HIGHWAY LOAD.

(3) TWO (2) 3/4" DIA. CARBON STEEL BOLTS ASTM 307 GRADE - 3 1/2" LONG WITH HEXAGONAL HEAD AND NUT WITH TWO (2) FLAT WASHERS PER BOLT TO BE FURNISHED WITH EACH FRAME TOGETHER WITH 6" CURB PIECE OR 8" CURB PIECE. LONGER BOLTS TO BE FURNISHED FOR CURB HEIGHTS GREATER THAN 6" WHERE FILLER PIECE ARE USED.

(4) ALL CATCH BASIN FRAMES SHALL HAVE THE MANUFACTURER'S IDENTIFICATION, CAST DATE OR HEAT NUMBER AND COUNTRY OF ORIGIN INTEGRALLY CAST INDIVIDUAL PIECES AT THE TIME OF MANUFACTURE IN ACCORDANCE WITH THE DEP SPECIFICATION.
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR CAST IRON GRATING, BACK PLATE, AND CURB PIECE FOR CATCH BASINS (WITH H=6")

SECTION A-A

SECTION B-B

SECTION C-C

SECTION D-D

NOTES:

1. GRATING MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B, MINIMUM WEIGHT OF TYPE R GRATING IS 425 LBS.

2. CURB PIECE MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B, MINIMUM WEIGHT OF 6" IS 172 LBS, MINIMUM WEIGHT OF 8" IS 219 LBS.

3. BACK PLATE MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B, MINIMUM WEIGHT IS 176 LBS.

4. DESIGN LOADING: HS20-44 HIGHWAY LOADING.

5. ALL CATCH BASIN FRAMES AND GRATES SHALL HAVE THE MANUFACTURER'S IDENTIFICATION, CAST DATE OR HEAT NUMBER AND COUNTRY OF ORIGIN INTEGRALLY CAST ON INDIVIDUAL PIECES AT THE TIME OF MANUFACTURE IN ACCORDANCE WITH THE DEP SPECIFICATION.

6. TWO (2) - 3 1/4" DIA. CARBON STEEL BOLTS ASTM A307 GRADE A - 3 1/2" LONG WITH HEXAGONAL HEAD AND NUT WITH TWO (2) FLAT WASHERS PER BOLT TO BE FURNISHED WITH EACH FRAME TOGETHER WITH 6" CURB PIECE OR 8" CURB PIECE. LONGER BOLTS TO BE FURNISHED FOR CURB HEIGHTS GREATER THAN 6" WHERE FILLER PIECES ARE USED.

THE FOLLOWING INFORMATION SHALL BE INCLUDED ON THE TOP SIDE OF THE CURB PIECE:
* NAME OF PRODUCING FOUNDRY
* DATE OF MANUFACTURE
* PRODUCT NUMBER
* CAST IRON ASTM A-48

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18

8/14/18
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR CAST IRON GRATING, BACK PLATE, AND CURB PIECE FOR CATCH BASINS (H=8"")

PLANT OF GRATING (TYPE R)

PLAN OF CURB PIECE

NOTES:
(1) GRATING MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B.
MINIMUM WEIGHT OF TYPE R GRATING IS 425 LBS.
(2) CURB PIECE MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B.
MINIMUM WEIGHT OF 6" IS 172 LBS.
MINIMUM WEIGHT OF 8" IS 219 LBS.
(3) BACK PLATE MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B.
MINIMUM WEIGHT IS 179 LBS.
(4) DESIGN LOADING: HS20-44 HIGHWAY LOADING.
(5) ALL CATCH BASIN FRAMES AND GRATES SHALL HAVE THE MANUFACTURER’S
IDENTIFICATION, CAST DATE OR HEAT NUMBER AND COUNTRY OF ORIGIN
INTEGRALLY CAST ON INDIVIDUALS AT THE TIME OF MANUFACTURE
IN ACCORDANCE WITH THE DEP SPECIFICATION.
(6) TWO (2) - 3/4" DIA. CARBON STEEL BOLTS ASTM 307 GRADE - 3 1/2" LONG WITH
HEXAGONAL HEAD AND NUT WITH TWO (2) FLAT WASHERS PER BOLT TO BE
FURNISHED WITH EACH FRAME TOGETHER WITH 6" CURB PIECE OR 8" CURB PIECE.
LONGER BOLTS TO BE FURNISHED FOR CURB HEIGHTS GREATER THAN 6" WHERE
FILLER PIECES ARE USED.

THE FOLLOWING INFORMATION SHALL BE INCLUDED ON
THE TOP SIDE OF THE BACK PLATE:
* NAME OF PRODUCING FOUNDRY
* DATE OF MANUFACTURE
* PRODUCT NUMBER
* CAST IRON ASTM A-48

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E.
DATE

P.E.
DATE
STANDARD FOR CAST IRON

HOOD AND HOOKS FOR CATCH BASINS

NOTES:

1. MATERIAL FOR HOOD: GRAY CAST IRON ASTM A-48 CLASS 35B. MINIMUM WEIGHT OF HOOD IS 140 LBS.

2. MATERIAL FOR HOOK: 18-8 STAINLESS STEEL 1/2" SQUARE BAR STOCK TYPE 303 ASTM A-583.

3. ALL CATCH BASIN HOODS SHALL HAVE THE MANUFACTURER’S IDENTIFICATION, CAST DATE OR HEAT NUMBER AND COUNTRY OF ORIGIN INTEGRALLY CAST ON INDIVIDUAL PIECES AT THE TIME OF MANUFACTURE IN ACCORDANCE WITH THE DEP SPECIFICATION.

SE60

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18

8/14/18
STANDARD FOR HOUSE CONNECTIONS

(FOR 6" AND 8" DIA. CAST IRON SOIL PIPE OR VITRIFIED CLAY PIPE ON CONCRETE CRADLE OR ENCASED IN CONCRETE ON EARTH OR ON ROCK)

NOTES:

(1) CRADLE AND ENCASEMENT ARE CLASS 40 CONCRETE FOR ALL HOUSE CONNECTIONS.

(2) ENTIRE CRADLE OR ENCASEMENT IS TO BE PLACED MONOLITHICALLY.

(3) ENCASEMENT REQUIRED ON H.C. PIPE WHICH HAS A COVER, FROM FINAL GRADE TO THE OUTER TOP OF THE PIPE, OF LESS THAN THREE (3) FEET OR WHEN THE UPPER LIMIT OF COVER IS EXCEEDED.

(4) UNLESS OTHERWISE APPROVED BY THE ENGINEER, THE MAXIMUM WIDTH OF TRENCH BETWEEN INNER FACES OF THE LOWEST STAGE OF SHEETING OR ROCK CUT LINES, FROM SUBGRADE OF TRENCH TO A MINIMUM HEIGHT OF TWO (2) FEET ABOVE THE OUTER TOP OF THE PIPE, SHALL NOT EXCEED THE WIDTH OF THE CRADLE BY MORE THAN THREE (3) FEET (1'-6" MAXIMUM EACH SIDE OF CRADLE).

(5) SIX (6) INCH MINIMUM SHALL BE MAINTAINED AT ALL TIMES, EXCEPT WHERE SHEETING IS TO BE USED AS FORMWORK.

D  A  MAX. COVER W/O ENCASEMT.  CONC. CRADLE CU. YD./L.F.  CONC. ENCASEMT. CU. YD./L.F.

6" 1'-4"  20'  0.0282  0.0523
8" 1'-6"  22'  0.0315  0.0630

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
STANDARD FOR RISER ON 10" DIA. TO 18" DIA.
VITRIFIED CLAY PIPE SEWERS ON CONCRETE CRADLE

NOTES:
(1) ALL PIPES AND FITTINGS SHALL BE EXTRA STRENGTH FULL DIAMETER VITRIFIED CLAY.
(2) THE COST OF ADDITIONAL CONCRETE, STEEL REINFORCEMENT BARS AND VITRIFIED CLAY RISER PIPE AND FITTINGS REQUIRED SHALL BE INCLUDED IN THE PRICE BID FOR RISERS.
(3) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURES.
(4) USE STANDARD "Y" OR "DOUBLE Y" FITTING AS REQUIRED.
(5) CONCRETE IS TO BE CLASS 40, REBARS-GRADE 60.
STANDARD FOR RISER ON PRECAST REINFORCED CONCRETE PIPE SEWERS ON CONCRETE CRADLE

A RISER MUST BE PLACED WITHIN THE MAXIMUM DISTANCE BETWEEN THE BEGINNING AND ENDING ROUGH CONCRETE WORK OF 30' FOR EACH RISER.

IN GENERAL, 1/2" IS REQUIRED. HOWEVER, IF GROUND WATER OR ROCK IS PRESENT, THE RISER MAY BE BUILT TO A HIGHER ELEVATION OR AS REQUIRED.

USE APPROVED VITRIFIED CLAY STOPPERS WHERE REQUIRED.

8" DONELLS - 2'-0" LONG ONE AT EACH CORNER

STD. CONC. CRADLE ON EARTH, ROCK OR PILES FOR CIRCULAR OR ELLIPTICAL PIPE

STD. CONC. CRADLE ON EARTH, ROCK OR PILES FOR CIRCULAR OR ELLIPTICAL PIPE

NOTES:
(1) ALL PIPES AND FITTINGS SHALL BE EXTRA STRENGTH FULL DIAMETER VITRIFIED CLAY.

(2) THE COST OF ADDITIONAL CONCRETE, STEEL REINFORCEMENT BARS AND VITRIFIED CLAY RISER PIPE AND FITTINGS REQUIRED SHALL BE INCLUDED IN THE PRICE BID FOR RISERS.

(3) KEYS CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.

(4) USE STANDARD "Y" OR "DOUBLE "Y" FITTING AS REQUIRED.

(5) CONCRETE IS TO BE CLASS 46. REBARS GRADE 60.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E.  8/14/18

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E.  8/14/18
STANDARD FOR 27" DIAMETER ALUMINUM FLOOR GRATING

PLAN

SECTION

NOTE:

(1) THE FRAME IS TO HAVE A HEAVY COAT OF BITUMINOUS PAINT, OR OTHER
APPROVED INSULATING MATERIAL.

(2) TYPE "A" OR TYPE "B" ALUMINUM GRATINGS MAY BE USED. HOWEVER, ONE TYPE
OF GRATING SHALL BE USED EXCLUSIVELY THROUGHOUT ANY PROJECT.
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR 36" DIAMETER ALUMINUM FLOOR GRATING

NOTE:
1. THE FRAME IS TO HAVE A HEAVY COAT OF BITUMINOUS PAINT, OR OTHER APPROVED INSULATING MATERIAL.
2. TYPE "A" OR TYPE "B" ALUMINUM GRATTINGS MAY BE USED, HOWEVER, ONE TYPE OF GRATING SHALL BE USED EXCLUSIVELY THROUGHOUT ANY PROJECT.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/4/18
8/4/18
STANDARD FOR RECONSTRUCTION OF EXISTING MANHOLE
AND REPLACEMENT OF EXISTING M.H. FRAME AND COVER

NOTES:

1. At all locations shown on the plans, specified in the contract documents or ordered by
the engineer requiring the reconstruction of existing manholes, the following
work shall be performed:

(A) On Gunited Sewers:
From the inner top of the largest sewer to the bottom of the casting, all loose and
missing brick, masonry or concrete shall be repaired and/or removed as directed by
the engineer and all debris, excess mortar, etc. shall be removed so that the faces
of the manhole walls are left smooth and clean. If any step(s) is damaged or unsafe,
all the steps in the manhole chimney shall be removed and not replaced. Finally, the
whole area shall be parged or flashed (receive a one half (1/2) inch minimum finishing
coat of mortar with a float finish).

(B) On Lined Sewers:
From the invert of the manhole to the bottom of the casting, all loose and missing brick,
masonry or concrete shall be repaired and/or removed as directed by the engineer and
all debris, excess mortar, etc. shall be removed so that the faces of the manhole walls
and the invert are left smooth and clean. If any step(s) is damaged or unsafe, all steps in
the manhole chimney shall be removed and not replaced. Finally, the whole area shall be
parge or flashed (receive a one half (1/2) inch minimum finishing coat of mortar with a float
finish). (The invert dish shall receive a proportionately thicker finish coat so as to provide
a smooth transition from existing sewer to the inside surface of the liner.)

2. At all locations shown on the plans, specified in the contract documents or ordered by
the engineer requiring the replacement of existing manhole frames and covers, the
contractor shall remove existing manhole frames and covers which are twenty-four (24)
inches in diameter or otherwise damaged, defective or nonstandard and replace them with
new standard twenty-seven (27) inch cast iron manhole frames and covers.
STANDARD FOR ROADWAY RESURFACING
(PAVEMENT KEY - TYPE B)

NOTES:

(1) CONTRACTOR MAY AT HIS OPTION EITHER STRIP OR GRIND THE AREA TO THE REQUIRED DEPTH.

(2) ALL CITY OWNED CASTINGS TO BE ADJUSTED TO MATCH NEW ROADWAY.

(3) PAVEMENT KEY IS TYPE B.

(4) (A.O.B.E.) - AS ORDERED BY ENGINEER.

(5) * - REFER TO DEPARTMENT OF TRANSPORTATION STANDARD HIGHWAY SPECIFICATIONS.

(6) ALL ASSOCIATED COSTS TO BE INCLUDED IN UNIT PRICES BID FOR THE APPROPRIATE ROADWAY RESTORATION ITEMS.
STANDARD FOR MINIMUM LOAD DIAGRAM FOR NON-WATERTIGHT SHEETING DESIGN

DESIGN CRITERIA:

\[ \gamma \] = Unit weight of soil
\[ \gamma_w \] = Unit weight of water
\[ \gamma_s \] = Unit weight of submerged soil
\[ \phi \] = Angle of internal friction of soil
\[ K_a \] = \( \frac{(1+\sin\theta)}{(1-\sin\theta)} \) for active earth pressure
\[ K_p \] = \( \frac{(1+\sin\theta)}{(1-\sin\theta)} \) for passive earth pressure

\[ H \] = 3 Feet minimum
\[ P_0 = \gamma \times H \] = Surcharge-min. 300 PSF
\[ P_1 = K_a \times P_0 \]
\[ P_1 = (0.8K_a) \times \gamma \times H \]
\[ P_2 = P_1 + P_1 \]
\[ D = \sqrt{\frac{2R_{so}}{1(K_p - K_a)}} \]

NOTES:

1. This criteria is for braced sheeting only.
2. For all design criteria such as factor of safety and toe penetration limits, see the latest NYC DEP Standard Sewer and Water Main Specifications Under Section "Sheeting and Bracing".
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR MINIMUM LOAD DIAGRAM FOR WATERTIGHT SHEETING DESIGN

DESIGN CRITERIA:

\[ \gamma = \text{UNIT WEIGHT OF SOIL} \]
\[ \gamma_w = \text{UNIT WEIGHT OF WATER} \]
\[ \gamma_s = \text{UNIT WEIGHT OF SUBMERGED SOIL} \]
\[ \varphi = \text{ANGLE OF INTERNAL FRICTION OF SOIL} \]
\[ K_a = \frac{1+\varphi}{1-\varphi} \text{ FOR ACTIVE EARTH PRESSURE} \]
\[ K_p = \frac{1-\varphi}{1+\varphi} \text{ FOR PASSIVE EARTH PRESSURE} \]
\[ H^f = 3 \text{ FEET MINIMUM} \]
\[ P_b = \gamma \times H^f = \text{SURCHARGE-MIN. 300 PSF} \]
\[ P_1 = K_a \times P_b \]
\[ P_2 = P_1 + (0.8K_a) \times (\gamma \gamma_H + \gamma_s H_s) \]
\[ P_3 = \gamma_w \times H_2 \]
\[ D_1 = \frac{P_3}{\gamma_s (K_p - K_a)} \]
\[ D_b = \frac{2R_{bh}}{\gamma_s (K_p - K_a)} \]
\[ D = D_1 + D_b \]

NOTES:

(1) THIS CRITERIA IS FOR BRACED SHEETING ONLY.

(2) FOR ALL DESIGN CRITERIA SUCH AS FACTOR OF SAFETY AND TOE PENETRATION LIMITS, SEE THE LATEST NYC DEP STANDARD SEWER AND WATER MAIN SPECIFICATIONS UNDER SECTION "SHEETING AND BRACING".

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION