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

<p>| SEWER DESIGN CRITERIA - MANHOLE SPACING AND LOCATION ON PIPE SEWERS | A |
| VITRIFIED CLAY PIPE ON CONCRETE CRADLE ON EARTH OR ON ROCK | SE1 |
| VITRIFIED CLAY PIPE ON CONCRETE CRADLE ON PILSES | SE2 |
| CIRCULAR REINFORCED CONCRETE PIPE ON CONCRETE CRADLE ON EARTH OR ON ROCK | SE3 |
| 24” DIAMETER TO 48” DIAMETER CIRCULAR REINFORCED CONCRETE PIPE ON CONCRETE CRADLE ON PILSES - 2 PILE BENTS (20’ AND 25’ COVER) | SE4 |
| 54” DIAMETER TO 96” DIAMETER CIRCULAR REINFORCED CONCRETE PIPE ON CONCRETE CRADLE ON PILSES - 3 PILE BENTS (20’ AND 25’ COVER) | SE5 |
| 24” DIAMETER TO 60” DIAMETER CIRCULAR REINFORCED CONCRETE PIPE ON CONCRETE CRADLE ON PILSES - 2 PILE BENTS (6’, 10’ AND 15’ COVER) | SE6 |
| 60” DIAMETER TO 96” DIAMETER CIRCULAR REINFORCED CONCRETE PIPE ON CONCRETE CRADLE ON PILSES - 3 PILE BENTS (6’, 10’ AND 15’ COVER) | SE7 |
| HORIZONTAL ELLIPTICAL REINFORCED CONCRETE PIPE ON CONCRETE CRADLE ON EARTH OR ON ROCK | SE8 |
| 23” x 14”H TO 76” x 48” HORIZONTAL ELLIPTICAL REINFORCED CONCRETE PIPE ON CONCRETE CRADLE ON PILSES - 2 PILE BENTS (5’, 10’ AND 15’ COVER) | SE9 |
| 83” x 53”H TO 121”W x 77”H HORIZONTAL ELLIPTICAL REINFORCED CONCRETE PIPE ON CONCRETE CRADLE ON PILSES - 3 PILE BENTS (6’, 10’, AND 15’ COVER) | SE10 |
| TYPE A-1 AND TYPE A-2 MANHOLES ON 8” DIAMETER TO 30” DIAMETER PIPE SEWERS IN DRY LOCATION | SE11 |
| TYPE A-1 AND TYPE A-2 MANHOLES ON 8” DIAMETER TO 30” DIAMETER PIPE SEWERS ON PILSES IN DRY LOCATION | SE12 |
| TYPE A-3 SHALLOW MANHOLE ON 8” DIAMETER TO 30” DIAMETER PIPE SEWERS | SE13 |
| TYPE B-1 AND TYPE B-2 MANHOLES ON 8” DIAMETER TO 30” DIAMETER PIPE SEWERS IN WET LOCATION | SE14 |
| TYPE B-1 AND TYPE B-2 MANHOLES ON 8” DIAMETER TO 30” DIAMETER PIPE SEWERS ON PILSES IN WET LOCATION | SE15 |
| TYPE C-1 AND TYPE C-2 MANHOLES ON 36” DIAMETER TO 60” DIAMETER REINFORCED CONCRETE PIPE SEWERS | SE16 |
| TYPE C-1 AND TYPE C-2 MANHOLES ON 36” DIAMETER TO 60” DIAMETER REINFORCED CONCRETE PIPE SEWERS ON PILSES | SE17 |
| TYPE D-1 AND TYPE D-2 MANHOLES ON 60” DIAMETER TO 96” DIAMETER REINFORCED CONCRETE PIPE SEWERS | SE18 |
| TYPE D-1 AND TYPE D-2 MANHOLES ON 60” DIAMETER TO 96” DIAMETER REINFORCED CONCRETE PIPE SEWERS ON PILSES | SE19 |
| TYPE E-1 MANHOLE ON 23” x 14”H TO 60”W x 38”H HORIZONTAL ELLIPTICAL REINFORCED CONCRETE PIPE SEWERS | SE20 |
| TYPE E-1 MANHOLE ON 23” x 14”H TO 60”W x 38”H HORIZONTAL ELLIPTICAL REINFORCED CONCRETE PIPE SEWERS ON PILSES | SE21 |
| TYPE E-2 MANHOLE ON 68”W x 43”H TO 121”W x 77”H HORIZONTAL ELLIPTICAL REINFORCED CONCRETE PIPE SEWERS | SE22 |
| TYPE E-2 MANHOLE ON 68”W x 43”H TO 121”W x 77”H HORIZONTAL ELLIPTICAL REINFORCED CONCRETE PIPE SEWERS ON PILSES | SE23 |
| DROP PIPE MANHOLE (TYPE I) ON 10” DIAMETER TO 24” DIAMETER PIPE SEWERS | SE24 |
| DROP PIPE MANHOLE (TYPE I) ON 10” DIAMETER TO 24” DIAMETER PIPE SEWERS ON PILSES | SE25 |
| DROP PIPE MANHOLE (TYPE II) (FOR 10” DIAMETER TO 24” DIAMETER INCOMING DROP PIPE SEWERS) | SE26 |</p>
<table>
<thead>
<tr>
<th>CONTENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>DROP PIPE MANHOLE (TYPE II) ON PILES (FOR 10&quot; DIAMETER TO 24&quot; DIAMETER</td>
</tr>
<tr>
<td>INCOMING DROP PIPE SEWERS)</td>
</tr>
<tr>
<td>4'-0&quot; DIAMETER PRECAST MANHOLE (4 DRAWINGS)</td>
</tr>
<tr>
<td>5'-0&quot; DIAMETER PRECAST MANHOLE (4 DRAWINGS)</td>
</tr>
<tr>
<td>6'-0&quot;, 7'-0&quot;, 8'-0&quot; AND 10'-0&quot; DIAMETER PRECAST MANHOLE (4 DRAWINGS)</td>
</tr>
<tr>
<td>PRECAST MANHOLE DETAILS (3 DRAWINGS)</td>
</tr>
<tr>
<td>ALTERNATE MONOLITHIC BASE SECTION FOR PRECAST MANHOLES (POURED IN</td>
</tr>
<tr>
<td>PLACE)</td>
</tr>
<tr>
<td>PRECAST DROP PIPE MANHOLE (TYPE I)</td>
</tr>
<tr>
<td>PRECAST DROP PIPE MANHOLE (TYPE II)</td>
</tr>
<tr>
<td>REMOVABLE PRECAST REINFORCED CONCRETE SLAB</td>
</tr>
<tr>
<td>REMOVABLE PRECAST REINFORCED CONCRETE SLAB FOR DROP PIPE MANHOLE</td>
</tr>
<tr>
<td>(TYPE I)</td>
</tr>
<tr>
<td>REMOVABLE PRECAST REINFORCED CONCRETE SLAB FOR DROP PIPE MANHOLE</td>
</tr>
<tr>
<td>(TYPE II)</td>
</tr>
<tr>
<td>MANHOLE CHIMNEY DETAIL (WHEN LEGAL GRADE IS BELOW FINAL GRADE)</td>
</tr>
<tr>
<td>27&quot; DIAMETER CAST IRON MANHOLE FRAME AND COVER (FOR ACCESS OR CLEANOUT)</td>
</tr>
<tr>
<td>27&quot; DIAMETER CAST IRON EXTENSION RING FOR 27&quot; DIAMETER MANHOLE FRAME</td>
</tr>
<tr>
<td>36&quot; DIAMETER CAST IRON MANHOLE FRAME AND COVER FOR CLEANOUT</td>
</tr>
<tr>
<td>24&quot; DIAMETER CAST IRON MANHOLE COVER</td>
</tr>
<tr>
<td>CAST IRON MANHOLE STEP</td>
</tr>
<tr>
<td>CAST IRON MANHOLE STEP (BOLT-ON TYPE)</td>
</tr>
<tr>
<td>CIRCULAR CAST IRON MANHOLE STEP (BOLT-ON TYPE)</td>
</tr>
<tr>
<td>PLASTIC MANHOLE STEP</td>
</tr>
<tr>
<td>TYPE 1 CATCH BASIN (WITH CURB PIECE)</td>
</tr>
<tr>
<td>TYPE 2 CATCH BASIN (WITHOUT CURB PIECE)</td>
</tr>
<tr>
<td>TYPE 3 CATCH BASIN (WITHOUT CURB PIECE)</td>
</tr>
<tr>
<td>TYPE 3 CATCH BASIN (WITH CURB PIECE)</td>
</tr>
<tr>
<td>DOUBLE CATCH BASIN (WITHOUT CURB PIECE)</td>
</tr>
<tr>
<td>DOUBLE CATCH BASIN (WITH CURB PIECE)</td>
</tr>
<tr>
<td>MODIFICATION OF EXISTING TYPE 2 CATCH BASIN</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>SE27, SE28A, SE28B, SE28C &amp; SE28D</td>
</tr>
<tr>
<td>SE29A, SE29B, SE29C &amp; SE29D</td>
</tr>
<tr>
<td>SE30A, SE30B, SE30C &amp; SE30D</td>
</tr>
<tr>
<td>SE31A, SE31B &amp; SE31C</td>
</tr>
<tr>
<td>SE32, SE33, SE34, SE35, SE36, SE37, SE38, SE39, SE40, SE41, SE42,</td>
</tr>
<tr>
<td>SE51</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
CONTENTS

PRECAST TYPE 1 CATCH BASIN  

SPLIT PRECAST TYPE 1 CATCH BASIN  

PRECAST TYPE 2 CATCH BASIN  

SPLIT PRECAST TYPE 2 CATCH BASIN  

PRECAST TYPE 3 CATCH BASIN (WITHOUT CURB PIECE)  

PRECAST TYPE 3 CATCH BASIN (WITH CURB PIECE)  

PRECAST DOUBLE CATCH BASIN (WITHOUT CURB PIECE) (2 DRAWINGS)  

PRECAST DOUBLE CATCH BASIN (WITH CURB PIECE)  

PRECAST SEEPEAGE BASIN (4 DRAWINGS)  

CAST IRON FRAME FOR CATCH BASINS (WITH CURB PIECE)  

CAST IRON FRAME FOR CATCH BASINS (WITHOUT CURB PIECE)  

CAST IRON FRAME FOR TYPE 3 CATCH BASINS (WITH CURB PIECE)  

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

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

CAST IRON HOOD AND HOOKS FOR CATCH BASINS  

DUCTILE IRON PIPE ALTERNATE  

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

RISER ON 10" DIAMETER TO 18" DIAMETER VITRIFIED CLAY PIPE SEWERS ON CONCRETE CRADLE  

RISER ON PRECAST REINFORCED CONCRETE PIPE SEWERS ON CONCRETE CRADLE  

27" DIAMETER ALUMINUM FLOOR GRATING  

36" DIAMETER ALUMINUM FLOOR GRATING  

CONSTRUCTION OF CATCH BASIN (NO EXISTING CURB)  

RECONSTRUCTION OF EXISTING MANHOLE AND REPLACEMENT OF EXISTING MANHOLE FRAME AND COVER  

ROADWAY RESURFACING (PAVEMENT KEY - TYPE B)  

MINIMUM LOAD DIAGRAM FOR NON-WATERTIGHT SHEETING DESIGN  

MINIMUM LOAD DIAGRAM FOR WATERTIGHT SHEETING DESIGN
# 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>400'</td>
<td>500'</td>
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<tr>
<td>23&quot;H x 14&quot;W to 45&quot;H x 29&quot;W Vertical Elliptical Pipe</td>
<td></td>
<td></td>
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<tr>
<td>42&quot; Dia. to 72&quot; Dia. Circular Pipe</td>
<td></td>
<td></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>53&quot;H x 34&quot;W to 91&quot;H x 58&quot;W Vertical Elliptical Pipe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>78&quot; Dia. and Larger Circular Pipe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>63&quot;H x 98&quot;W and Larger Horizontal Elliptical Pipe</td>
<td>600'</td>
<td>800'</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.

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**Associate Commissioner, Design Department of Design and Construction**: Samir Sinha P.E. 
**Date**: 8/14/18

**Executive Director of Engineering Department of Environmental Protection**: Thomas Wyncoll P.E. 
**Date**: 8/14/18
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.

D A MAX. COVER CONC. CRADLE CONC. ENCSMT.
8" 1'-6" 22' 0.0408 0.0815
10" 2'-0" 20' 0.0596 0.1191
12" 2'-3" 18' 0.0708 0.1415
15" 2'-6" 15' 0.0831 0.1661
18" 2'-10" 15' 0.0998 0.1996
ADDITIONAL STEEL REINF.

LONGITUDINAL BARS
3-#6 OVER PILES FOR ALL SIDES OF PIPES
1-#6 ON EACH SIDE FOR 15" AND 16" PIPES

TRANSVERSE BARS
3-#6 OVER PILES @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.

MAXIMUM 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.

The table below provides the additional items per linear foot and the stone ballast cubic yards per linear foot for different sizes of pipes.

<table>
<thead>
<tr>
<th>D</th>
<th>A</th>
<th>10' COVER</th>
<th>15' COVER</th>
<th>20' COVER</th>
<th>25' COVER</th>
<th>ADD. CONC. CU. YD.</th>
<th>ADDITIONAL STL. REINF. (LBS.)</th>
<th>STONE BALLAST CU. YD. PER L.F.</th>
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<tr>
<td>8&quot;</td>
<td>1'-6&quot;</td>
<td>6'-0&quot;</td>
<td>6'-0&quot;</td>
<td>6'-0&quot;</td>
<td>6'-0&quot;</td>
<td>0.0232</td>
<td>6.65</td>
<td>6.65</td>
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<tr>
<td>10&quot;</td>
<td>2'-0&quot;</td>
<td>6'-0&quot;</td>
<td>6'-0&quot;</td>
<td>6'-0&quot;</td>
<td>6'-0&quot;</td>
<td>0.0309</td>
<td>7.85</td>
<td>7.85</td>
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<tr>
<td>12&quot;</td>
<td>2'-3&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>
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<td>15&quot;</td>
<td>2'-4&quot;</td>
<td>6'-0&quot;</td>
<td>6'-0&quot;</td>
<td>5'-0&quot;</td>
<td>4'-0&quot;</td>
<td>0.0396</td>
<td>11.65</td>
<td>11.65</td>
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<tr>
<td>18&quot;</td>
<td>2'-10&quot;</td>
<td>6'-0&quot;</td>
<td>6'-0&quot;</td>
<td>4'-0&quot;</td>
<td>3'-0&quot;</td>
<td>0.0438</td>
<td>12.52</td>
<td>12.77</td>
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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 III, IV & V-RC.P.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING
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)

**Diagram:**
- **Maximum Width of Trench:**
  - 1'-6" max.
- **Inner Face of Sheeting:**
  - 6" min.
- **Encasement Where Required:**
  - See Note 3
- **Stone Ballast:**
  - 6" min. or as required
- **2" Clearance:**
  - G - Depth of additional concrete
  - F - Clearance over piles

## Notes:
1. (1) Cradle and encasement are Class 40 concrete, rebar 8-grade 60.
2. (2) Entire cradle or encasement is to be placed monolithically above the construction joint.
3. (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 V pipe is exceeded.
4. (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. (5) Six (6) inch minimum shall be maintained at all times, except where sheeting is to be used as formwork.
6. (6) Cradle width "A" is based on minimum wall thickness per ASTM C76 for "Wall B" for Class III, IV & V R.C.P.
7. (7) Construction joint to be utilized whenever ground conditions prevent proper support of pipe.

## Table:

<table>
<thead>
<tr>
<th>Pipe Diameter (in.)</th>
<th>Cradle Width</th>
<th>Encasement Width</th>
<th>Stone Ballast Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>24&quot;</td>
<td>3'-6&quot;</td>
<td>1'-5&quot;</td>
<td>6&quot; min.</td>
</tr>
<tr>
<td>30&quot;</td>
<td>4'-1&quot;</td>
<td>1'-9&quot;</td>
<td>6&quot; min.</td>
</tr>
<tr>
<td>36&quot;</td>
<td>4'-6&quot;</td>
<td>1'-12&quot;</td>
<td>6&quot; min.</td>
</tr>
<tr>
<td>42&quot;</td>
<td>5'-3&quot;</td>
<td>2'-12&quot;</td>
<td>6&quot; min.</td>
</tr>
<tr>
<td>48&quot;</td>
<td>6'-10&quot;</td>
<td>2'-3&quot;</td>
<td>6&quot; min.</td>
</tr>
</tbody>
</table>

## Specification:
- **Add. Steel Reinforcement:**
  - 20 ft. timbers for 20' and 25' cover.
- **Concrete:**
  - 24" diameter to 48" diameter circular reinforced concrete pipe.
- **Sheeting:**
  - 3'-6" (minimum) 1'-6" (maximum) for 20' and 25' cover.
- **Crane Spread:**
  - 2'-6" max. on 20' cover.
  - 4'-9" max. on 25' cover.
- **Dowel Bars:**
  - 3'-6" to 6'-0" pipe (4) 6" @ 12" centers.
  - 6'-0" to 6'-12" pipe (8) 6" @ 12" centers.
- **Concrete Mix:**
  - Class 40 concrete, rebar 8-grade 60.

**Signatures:**
- **Associate Commissioner, Design Department of Design and Construction:**
  - Sm批复 S. Sciani
  - P.E.
  - 8/14/18
- **Executive Director of Engineering Department of Environmental Protection:**
  - Thomas Wyman
  - P.E.
  - 8/19/18
SE5
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR 54" DIA. TO 96" DIA. CIRCULAR REINFORCED CONCRETE PIPE ON CONCRETE CRADLE ON PILES - 3 PILE BENTS
(20' AND 25' COVER)

NOTES:
(1) CRADLE AND ENCASEMENT ARE CLASS 40 CONCRETE, REBARS-GRADE 60.
(2) ENTER 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 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 III, IV & V - R.C.P.
(7) CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PRESENT PROPER SUPPORT OF PIPE.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18

P.E.

DATE

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

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 WIDTH OF TRENCH
SEE NOTE 4

ENCASMENT WHERE REQUIRED
SEE NOTE 3

1'-0" MIN.
INNER FACE OF SHEETING

2'-0" CLEARANCE

G - DEPTH OF ADDITIONAL CONC.

STONE BALLAST
CU. YD. PER L.F.

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 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 FACED OF THE LOWEST STAGE OF SHEETING OR ROCK CUT LINES, FROM SUBGRADE OF TRENCH TO A MIN. HEIGHT OF TWO (2) FEET FROM 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 III, IV & V - R.C.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 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 ENCASEMENT ARE CLASS 40 CONCRETE, REBAR-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 V 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 C76 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.
STANDARD FOR HORIZONTAL ELLIPTICAL REINFORCED CONCRETE PIPE ON CONCRETE CRADLE ON EARTH OR ON ROCK

### Table: Maximum Width of Trench

<table>
<thead>
<tr>
<th>W</th>
<th>H</th>
<th>EQUIV. DIA.</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>CONC. CRADLE</th>
<th>CONC. ENCSMT.</th>
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### 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 HEAVY - 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)

ENCASMENT WHERE REQD. (SEE NOTE 3)

W  H  EQUIV.  A  B  C  E  F  G  MAXIMUM  ADD. STK.  ADD. CONC.  STONE BALLAST
     5'   COVER  10'   COVER  15'   COVER  ADD.  BENTS  OVER PILES  CU. YD. PER L.F.

23" 14"  10"  9"  7"  6"  8"  20"  18.88 18.88 18.88 0.0965 0.1204
20" 19"  10"  9"  7"  6"  8"  20"  18.88 18.88 18.88 0.0965 0.1204
24" 24"  9"  12"  11"  10"  8"  26"  21.03 21.03 21.03 0.1194
28" 24"  9"  12"  11"  10"  8"  26"  21.03 21.03 21.03 0.1194
30" 24"  9"  12"  11"  10"  8"  26"  21.03 21.03 21.03 0.1194
32" 24"  9"  12"  11"  10"  8"  26"  21.03 21.03 21.03 0.1194
34" 24"  9"  12"  11"  10"  8"  26"  21.03 21.03 21.03 0.1194
36" 24"  9"  12"  11"  10"  8"  26"  21.03 21.03 21.03 0.1194
38" 24"  9"  12"  11"  10"  8"  26"  21.03 21.03 21.03 0.1194
40" 24"  9"  12"  11"  10"  8"  26"  21.03 21.03 21.03 0.1194
42" 24"  9"  12"  11"  10"  8"  26"  21.03 21.03 21.03 0.1194
44" 24"  9"  12"  11"  10"  8"  26"  21.03 21.03 21.03 0.1194
46" 24"  9"  12"  11"  10"  8"  26"  21.03 21.03 21.03 0.1194
48" 24"  9"  12"  11"  10"  8"  26"  21.03 21.03 21.03 0.1194
50" 24"  9"  12"  11"  10"  8"  26"  21.03 21.03 21.03 0.1194
52" 24"  9"  12"  11"  10"  8"  26"  21.03 21.03 21.03 0.1194
54" 24"  9"  12"  11"  10"  8"  26"  21.03 21.03 21.03 0.1194
56" 24"  9"  12"  11"  10"  8"  26"  21.03 21.03 21.03 0.1194
58" 24"  9"  12"  11"  10"  8"  26"  21.03 21.03 21.03 0.1194
60" 24"  9"  12"  11"  10"  8"  26"  21.03 21.03 21.03 0.1194
62" 24"  9"  12"  11"  10"  8"  26"  21.03 21.03 21.03 0.1194
64" 24"  9"  12"  11"  10"  8"  26"  21.03 21.03 21.03 0.1194
66" 24"  9"  12"  11"  10"  8"  26"  21.03 21.03 21.03 0.1194
68" 24"  9"  12"  11"  10"  8"  26"  21.03 21.03 21.03 0.1194
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72" 24"  9"  12"  11"  10"  8"  26"  21.03 21.03 21.03 0.1194
74" 24"  9"  12"  11"  10"  8"  26"  21.03 21.03 21.03 0.1194
76" 24"  9"  12"  11"  10"  8"  26"  21.03 21.03 21.03 0.1194

STONE BALLAST

CU. YD. PER L.F.

0.0865 0.1204
0.1009 0.1312
0.1194 0.1451
0.1174 0.1574
0.1158 0.1713
0.1708 0.1858
0.1657 0.1975
0.3079 0.2114

NOTES:

(1) CRADLE AND ENCASEMENT ARE CLASS 40 CONCRETE. REBAR$-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 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 - RCP.
(7) CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PREVENT PROPER SUPPORT OF PIPE.

P.I.E.
THOMAS WYMAN
EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
8/14/18

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

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<th>COVER</th>
<th>5'</th>
<th>10'</th>
<th>15'</th>
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<td>0.2238</td>
<td>0.2377</td>
<td>0.2500</td>
<td>0.2639</td>
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</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.
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5. SIX (6) INCH MINIMUM SHALL BE MAINTAINED AT ALL TIMES, EXCEPT WHERE SHEETING IS TO BE USED AS FORMWORK.
6. CRADLE WIDTH "W" IS BASED ON MINIMUM WALL THICKNESS PER ASTM C657 FOR "WALL B" FOR CLASS HE-III AND HE-IV - R.C.P.
7. CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PREVENT PROPER SUPPORT OF PIPE.
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-#6@3' ABOVE AND BELOW THE PIPE.
STANDARD FOR MANHOLE ON 8" DIA. TO 30" DIA. PIPE SEWERS ON PILE 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. 30.
(2) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
(3) CONCRETE IS TO BE CLASS 40, RENARS-GRADE 60.
(4) FOR ALL PIPE SEWERS EIGHTEEN (18) INCHES IN DIAMETER AND GREATER, ADD 3-#6@3' ABOVE AND BELOW THE PIPE.
(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
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.

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

8/14/18
8/14/18
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. 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-#6@12" ABOVE AND BELOW THE PIPE.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
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)
CITY OF NEW YORK
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.
   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
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. 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 #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.

EXECUTIVE DIRECTOR OF ENGINEERING
ASSOCIATE COMMISSIONER, DESIGN

8/14/18  8/14/18
DATE  DATE
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. 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. COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.

Sarbip 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 #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.

**SECTION A-A**

- (SEE SECTION a-a)
- CONCRETE IS TO BE CLASS 40. REBARS GRADE 60.
- STEEL REINFORCEMENT IS #6@12" UNLESS OTHERWISE SPECIFIED.
- CLEARANCE OVER PILES 15'.

**SECTION B-B**

- #6 DOWELS @12" 4'-0" LONG (TYP.)
- 3-4#6@12" (TYP.)
- STONE BALLAST 6" MIN. OR AS REQ'd.
- 15' CLEARANCE OVER PILES

**SECTION C-C/SECTION D-D**

- 3-4#6@7" (TYP.)
- 2-4#6@7" (TYP.)
- 2" CLEARANCE
- 10' ADD. CONC.

**PILE PLAN**

- USE FOUR PILes PER BENT FOR COVER OVER 10'.

**EXECUTIVE DIRECTOR OF ENGINEERING**

THOMAS WAGNER
P.E.

DATE 7/1/18

**ASSOCIATE COMMISSIONER, DESIGN**

GARDEO S. SEJIN
P.E.

DATE 2/1/18
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. 38.
(2) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE PURS.
(3) CONCRETE IS TO BE CLASS 40, REBAR-Grade 60.
(4) STEEL REINFORCEMENT IS #6@12" UNLESS OTHERWISE SPECIFIED. COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.

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DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18
DATE

8/9/18
DATE
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)

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 IS 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.

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SE21
FINAL GRADE
STD. 23" DIA. M.H. FRAME AND COVER FOR ACCESS ON THREE COURSES OF BRICK LAYD RADICALLY

SECTION a-a
6" ADD. CONC.

SECTION B-B
SECTION C-C/SECTION D-D

PILE PLAN
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) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
(3) CONCRETE IS TO BE CLASS 40, REBAR GRADE 60.
(4) STEEL REINFORCEMENT IS #6@12" UNLESS OTHERWISE SPECIFIED.
COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.

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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)

SE23

ASSOCIATE COMMISSIONER, DESIGN
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DEPARTMENT OF ENVIRONMENTAL PROTECTION

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.
5. CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PREVENT SUPPORT OF PIPE.

NOTES:

SECTION A-A

SECTION B-B

SECTION C-C/SECTION D-D

PILE PLAN
STANDARD FOR DROP PIPE MANHOLE (TYPE I) ON 10" DIA. TO 24" DIA. PIPE SEWERS (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-GRAGE 60.
4. STEEL REINFORCEMENT IS #6@12" UNLESS OTHERWISE SPECIFIED. COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.

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STANDARD FOR DROP PIPE MANHOLE (TYPE I)
ON 10" DIA. TO 24" DIA. PIPE SEWERS ON PILES
(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, REBAR GRADE 50.
(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.

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DEPARTMENT OF ENVIRONMENTAL PROTECTION
STANDARD FOR DROP PIPE MANHOLE (TYPE II)
(FOR 10" TO 24" INCOMING DROP PIPE SEwers)

NOTES:
1. WHEN LEGAL GRADE IS BELOW FINAL GRADE SEE SEWER STANDARD NO. 36.
2. KEYED CONSTRUCTION JOINTS ARE REQUIRED BET. ANY SUCCESSIVE POURS.
3. CONCRETE IS TO BE CLASS 40, REBAR-GRADE 60.
4. STEEL REINFORCEMENT IS #6@12" UNLESS OTHERWISE SPECIFIED. COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.
5. FOR PIPE SEWERS 10" TO 30" IN DIAMETER 'H' SHALL BE 10/2." FOR PIPE SEWERS 36" TO 60" IN DIAMETER 'H' SHALL BE ZERO.

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8/11/18

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/1/18
CITY OF NEW YORK
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 GRADE IS BELOW FINAL GRADE SEE SEWER STANDARD NO. 38.
(2) KEYED CONSTRUCTION JOINTS ARE REQUIRED BET. ANY SUCCESSIVE POURS.
(3) CONCRETE IS TO BE CLASS 40. REBAR & GRADE 60.
(4) STEEL REINFORCEMENT IS #5@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.

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8/14/18
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DEPARTMENT OF ENVIRONMENTAL PROTECTION

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

DETAIL "A"
(BELL-UP TYPE JOINT)
(SEE SE28D - NOTE 12)
(DWG. 4 OF 4)

PLAN OF LOOSE TOP SLAB

PLAN OF BOTTOM REINFORCING

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18

8/14/18
STANDARD FOR 4'-0" DIAMETER PRECAST MANHOLE (DWG. 2 OF 4)
(MONOLITHIC TOP SECTION AND MONOLITHIC BASE SECTION)
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

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

PLAN OF MONOLITHIC TOP SECTION
PLAN OF BOTTOM REINFORCING

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
8/14/18

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

(1) THE 4'-0" DIA. PRECAST MANHOLE MAY BE SUBSTITUTED FOR STANDARD MANHOLE TYPES A-1, A-2, B-1 AND B-2 ON SEwers 34' IN DIAMETER AND LESS ONLY.

(2) MANHOLE RISER REINFORCEMENT COMPLIES WITH AREA REQUIREMENTS OF ASTM C65, EXCEPT THAT ALL WALL SECTIONS SHALL BE REINFORCED WITH WWM, A = 0.12 CIR, X = 0.06 LONG. - E. F. WITH 2-H HOOPS AROUND ALL CAST PIPE OPENINGS (1½") (THE 2-H HOOPS WILL NOT BE REQUIRED AT CORED OPENINGS FOR BASIN 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. BASIN CONNECTIONS ONLY. THE MAXIMUM CORED OPENING SHALL BE 16" FOR THESE BASIN CONNECTIONS. CORED OPENING WILL NOT BE PERMITTED FOR SHALLOW MANHOLES.

(4) FOR DETAILS OF STEPS, JOINTS, GASKETS, PRECAST COLLARS, PIPE TO MANHOLE CONNECTIONS, PIPE CAP AND PLUGGED IN PLACE ALTERNATE MONOLITHIC BASE SECTION 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 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. 28 DAY STRENGTH = 4,000 PSI; MAX. W/C = 0.47, REBARS = F = 60,000 PSI, WWM = P = 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" TO 24" DIA. PIPES = 0.0-1.5.

(12) BELL-UP TYPE JOINTS SHALL BE ALLOWED FOR 4'-0" DIA. PRECAST MANHOLE, WITH THE FOLLOWING MODIFICATION TO THE LOOSE TOP SLAB.

(4) THE MINIMUM SLAB THICKNESS SHALL BE 0.0" (SHRINKAGE), THE JOINT DEPTH, BUT IN NO CASE SHALL IT BE LESS THAN 0.0" THICK AND (B) THE EMBEDMENT LENGTH SHALL BE 1/12 OF 'Y' (WHERE 'Y' IS THE THICKNESS OF RISER WALL); SEE DETAIL "a" ON DWG. 1 OF 4.
STANDARD FOR 5'-0" DIAMETER PRECAST MANHOLE (DWG. 1 OF 4)

(LOOSE TOP SLAB AND MONOLITHIC BASE SECTION)

SECTION A-A

ASSOCIATE COMMISSIONER, DESIGN
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8/14/18

PLAN OF LOOSE TOP SLAB

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18
STANDARD FOR 5'-0" DIAMETER PRECAST MANHOLE (DWG. 3 OF 4)
(MONOLITHIC TOP SECTION AND ALTERNATE LOOSE BOTTOM SLAB)

27" DIA. M.H. FRAME AND COVER FOR ACCESS

MANHOLE STEPS TO BE LOCATED AS DIRECTED BY THE ENGINEER

INVERT SHELF CAST IN PLACE 2" ABOVE TOP OF PIPE (SEE SE29D - NOTE 10) (DWG. 4 OF 4)

WWM As=0.15 X 0.07 AROUND OPENING

WWM As=0.15 X 0.07 ALL AROUND

3" MIN. (SEE SE29D - NOTE C') (DWG. 4 OF 4)

3" MIN. (SEE SE29D - NOTE 9) (DWG. 4 OF 4)

#4 HOOPS (T&B)

10-85 DOWELS @18" O.C. (LAID RADIALY)

3@21" V X 28" H

2@21" V X 12" H

#4@12" B.W. (TOP)

#4@12" B.W. (BOT.)

10-85 DOWELS @18" O.C. (LAID RADIALY)

3@21" V X 28" H

2@21" V X 12" H

#4@12" B.W. (TOP)

#4@12" B.W. (BOT.)

PLAN OF BOTTOM REINFORCING
(SEE SE29D - NOTE 'B', DWG. 4 OF 4)

SECTION B-B

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

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E. 8/14/18

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CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

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 RADIALY, 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.
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:
PIE OPENINGS WILL NOT BE PERMITTED THROUGH JOINTS, DISTANCE FROM TOP OR BOTTOM OF ANY SECTION SHALL BE A MINIMUM OF 2" PLUS THE JOINT DEPTH FOR CAST PIPE OPENINGS AND A MINIMUM OF 12" PLUS THE JOINT DEPTH FOR CORED OPENINGS FOR BASIN 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.

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 C658 EXCEPT THAT ALL WALL SECTIONS SHALL BE REINFORCED WITH WMM, A4=0.15 CI, C=0.045 LONG. (E,F) WITH 2/4 HOOPS AROUND ALL CAST PIPE OPENINGS (E,F,G). THE 2/4 HOOPS WILL NOT BE REQUIRED AT CORED OPENINGS FOR BASIN CONNECTIONS. ALL VALUES OF AREA OF STEEL (Aj) ARE IN SQUARE INCHES AND ARE A MINIMUM.

(3) CORED OPENINGS WILL BE PERMITTED FOR 5" DIA. BASIN CONNECTIONS ONLY. THE MAXIMUM CORED OPENING SHALL BE 16" FOR THESE BASIN CONNECTIONS. CORED OPENING WILL NOT BE PERMITTED FOR SHALLOW MANHOLES.

(4) FOR DETAILS OF STEPS, JOINTS, GASKETS, PRECAST COLLARS, PIPE TO MANHOLE CONNECTIONS, PILE CAP AND POURED IN PLACE ALTERNATE MONOLITHIC BASE SECTION 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 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 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) = 6,000 PSI; MAX. W/C = 0.47; REINFORCEMENT = 60,000 PSF. WMM = 60,000 PSF.

(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.

(12) SELL-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 2X THE MINIMUM INSERTION DEPTH, (B) THE EMBEDMENT LENGTH SHALL BE 5'-Y WHERE Y IS THE THICKNESS OF RISER WALL.) SEE DETAIL "A" ON DWG. 1 OF 4.

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* See Note 11

SCHEDULE

A = DEFLECTION ANGLE

SEE SCHEDULE THIS PAGE

PLAN OF BASE SECTION

A,B,C
STANDARD FOR PRECAST MANHOLE (DWG. 1 OF 4)

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

(LOOSE TOP SLAB AND MONOLITHIC BASE SECTION)

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Associate Commissioner, Design
Department of Design and Construction

Executive Director of Engineering
Department of Environmental Protection

PLAN OF BOTTOM REINFORCING
STANDARD FOR PRECAST MANHOLE (DWG. 2 OF 4)

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

(MONOLITHIC TOP SECTION AND MONOLITHIC BASE SECTION)
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

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

NOTE B:
USE OF ALTERNATE LOWEST BOTTOM SLAB WILL NOT BE PERMITTED FOR THE 6'-0", 7'-0", 8'-0" AND 10'-0" DIA. PRECAST MANHOLE.

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".

NOTE C:
PIPE OPENINGS SHALL 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 OPENINGS.

NOTE D:
THE MANUFACTURER SHALL ENSURE THAT ALL PRECAST MANHOLE SECTIONS ARE ADDITIONALLY REINFORCED WHERE REQUIRED TO RESIST DAMAGE FROM HANDLING, SHIPING AND INSTALLATION STRESSES.

NOTE E:
9'-0" MIN. TO 20'-0" MAX.; 9'-0" BRICK MIN. LAID RADICALLY, USE 1 1/2 " PRECAST COLLARS OR BRICK AS REQUIRED. (4" BRICK MIN. ONLY FOR SHALLOW MANHOLE CONSTRUCTION.)

NOTE F:
THE MANUFACTURER SHALL ENSURE THAT ALL PRECAST MANHOLE SECTIONS ARE ADDITIONALLY REINFORCED WHERE REQUIRED TO RESIST DAMAGE FROM HANDLING, SHIPING AND INSTALLATION STRESSES.

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, C-3 AND D-2 ON SEWERS 84" IN DIAMETER AND LESS ONLY (AS SHOWN IN SCHEDULES).

(2) MANHOLE RISER REINFORCING COMPLIES WITH AREA REQUIREMENTS OF ASTM C65, EXCEPT THAT ALL WALL SECTIONS SHALL BE REINFORCED WITH 2#-4 HOOPS AROUND ALL CAST PIPE OPENINGS (1-E.F.). THE 2'-0" HOOPS WILL NOT BE REQUIRED AT CORED OPENINGS FOR BASE OPENINGS. ALL VALUES OF AREA OF STEEL (A_d) 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 10" FOR THESE BASIN 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, POURING IN PLACE, ALTERNATE MONOLITHIC BASE SECTIONS AND 4'-0" DIA., PRECAST MANHOLE UNITS SEE STANDARD FOR PRECAST MANHOLE DETAILS, STD. FOR M.H., STEPS, STD. FOR ALTERNATE MONOLITHIC BASE SECTIONS FOR PRECAST MANHOLES (POURED IN PLACE) AND STD. FOR 4'-0" DIA., PRECAST MANHOLE, TYPICAL 4'-0" DIA., PRECAST RISER SECTION WILL NOT BE REQUIRED FOR SHALLOW MANHOLE CONSTRUCTION.

(5) THE MAXIMUM DEPTH OF COVER OF THE 6'-0", 7'-0", 8'-0" AND 10'-0" DIA. PRECAST MANHOLES, 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 GROUNDED 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 = 0.67, REBAR - F_y = 60,000 PSI, WWM - F_y = 65,000 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" TO 24" DIA.; PIPES = 0.03; 32" TO 48" DIA.; PIPES = 0.055. 4'-0", 10'-0", 11'-0" DIA. PIPES = 0.05.".

(12) SELL-BUY TYPE JOINTS SHALL BE ALLOWED FOR 6'-0", 7'-0", 8'-0" AND 10'-0" DIA. PRECAST MANHOLE, WITH THE FOLLOWING MODIFICATION TO THE LOOSE TOP SLAB. (A) THE MINIMUM SLAB THICKNESS SHALL BE 3/4" (WHERE X IS JOINT DEPTH), BUT IN NO CASE SHALL IT BE LESS THAN 1 1/2" THICK AND (B) THE EMBEDMENT LENGTH SHALL BE 1" (WHERE X IS THE THICKNESS OF RISER 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>
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<td>6'-0&quot;</td>
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<td>15&quot; TO 16&quot;</td>
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<td>9&quot;</td>
<td>11'-6&quot; max.; 4'-1&quot; min.</td>
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<td>15&quot; TO 20&quot;</td>
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<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>
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<tr>
<td>6'-0&quot;</td>
<td>19-#5 DOWELS @12&quot; O.C. (17@23&quot;x 32&quot;H) (2@23&quot;x 10&quot;H)</td>
<td>15-#5 DOWELS @12&quot; O.C. (3@23&quot;x 25&quot;H) (4@23&quot;x 23&quot;H) (2@23&quot;x 20&quot;H) (2@23&quot;x 17&quot;H) (2@23&quot;x 9&quot;H)</td>
</tr>
<tr>
<td>7'-0&quot;</td>
<td>23-#5 DOWELS @12&quot; O.C. (21@23&quot;x 38&quot;H) (2@23&quot;x 10&quot;H)</td>
<td>19-#5 DOWELS @12&quot; O.C. (5@23&quot;x 38&quot;H) (4@23&quot;x 35&quot;H) (2@23&quot;x 31&quot;H) (2@23&quot;x 28&quot;H) (2@23&quot;x 23&quot;H) (2@23&quot;x 17&quot;H) (2@23&quot;x 12&quot;H)</td>
</tr>
<tr>
<td>8'-0&quot;</td>
<td>27-#6 DOWELS @12&quot; O.C. (25@23&quot;x 40&quot;H) (2@23&quot;x 10&quot;H)</td>
<td>23-#6 DOWELS @12&quot; O.C. (15@23&quot;x 40&quot;H) (2@23&quot;x 28&quot;H) (2@23&quot;x 23&quot;H) (2@23&quot;x 14&quot;H)</td>
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<tr>
<td>10'-0&quot;</td>
<td>33-#7 DOWELS @12&quot; O.C. (33@23&quot;x 48&quot;H)</td>
<td>31-#7 DOWELS @12&quot; O.C. (25@23&quot;x 48&quot;H) (2@23&quot;x 25&quot;H) (2@23&quot;x 16&quot;H)</td>
</tr>
</tbody>
</table>

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**Sandeep S. Santra**

P.E.

DATE: **8/14/18**

**lodash K. Wayne**

P.E.

DATE: **8/14/18**

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
STANDARD FOR PRECAST MANHOLE DETAILS (DWG. 1 OF 3)
(PIPE TO MANHOLE CONNECTION DETAILS)

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 SIKA CO. OR EQUAL.
(3) THERMOPLASTIC INSERT AS MANUFACTURED BY PENNSYLVANIA INSERT CORP. OR EQUAL.

LIMITS OF EPOXY BONDING AGENT ON PIPE (ALL AROUND) (TYP.)
CONCRETE ENCASEMENT (TYP.)
NON-SHRINK GROUT (TYP.) (SEE NOTE 2)
CONCRETE CRADLE
SECTIONAL PROFILE
NOTE 'A':
LEVELING PAD AND/OR PILE CAP - FOR MHS ON GRADE, USE 9" WELL COMPACTION STONE BALLAST, FOR MHS ON PILES, USE A CLASS 40 REINFORCED CONCRETE PILE CAP AS SHOWN ON THE STANDARD FOR PRECAST MANHOLE DETAILS DWG. 3 OF 3.
IN EACH CASE, THE SHAPE SHALL BE SQUARE AND 3" LARGER THAN THE O.D. OF THE STRUCTURE, UNLESS OTHERWISE SPECIFIED.

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STANDARD FOR PRECAST MANHOLE DETAILS (DWG. 2 OF 3)
(JOINTS, GASKETS AND PRECAST COLLAR DETAILS)

BUTYL JOINT

7/8" X 7/8" OR 1" DIA. SELF SEALING BUTYL GASKET. QUALITY EQUAL TO FEDERAL SPEC. #SS-S-00210.

'O' RING JOINT

JOINT DETAILS

<table>
<thead>
<tr>
<th>M.H. I.D.</th>
<th>'X'</th>
<th>'D'</th>
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<tbody>
<tr>
<td>4'-0&quot;</td>
<td>3&quot; T0 5&quot;</td>
<td>5/8&quot; DIA.</td>
</tr>
<tr>
<td>5'-0&quot;</td>
<td>3&quot; T0 5&quot;</td>
<td>3/4&quot; DIA.</td>
</tr>
<tr>
<td>6'-0&quot; AND 7'-0&quot;</td>
<td>3&quot; TO 6&quot;</td>
<td>3/4&quot; DIA.</td>
</tr>
<tr>
<td>8'-0&quot; AND 10'-0&quot;</td>
<td>3&quot; TO 8&quot;</td>
<td>3/4&quot; DIA.</td>
</tr>
</tbody>
</table>

PLAN OF 6"H X 8"W PRECAST COLLAR

#2 HOOPS

SECTION A-A

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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

M.H. DIA. | L | A | N/B | P/S
--- | --- | --- | --- | ---
4'-0" | 5'-4" | 10" | 2 | 2'-10"
5'-0" | 6'-4" | 10" | 2 | 3'-10"
6'-0" | 7'-4" | 17" | 3 | 2'-5"
7'-0" | 8'-10" | 20" | 3 | 2'-9"
8'-0" | 10'-5" | 21" | 3 | 3'-3"
10'-0" | 12'-4" | 23" | 4 | 2'-10"

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

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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

NOTES:

(1) ALL STEEL REINFORCEMENT SHALL BE ALLOWED TO FILL THE SPACE BETWEEN THE OUTER WALL AND THE ALTERNATE MONOLITHIC BASE SECTION.

(2) FOR ALTERNATE MONOLITHIC BASE SECTION ON PILES SEE PRECAST MANHOLE PILE CAP DETAILS. ALL STEEL CAP DETAILS SHALL BE SHOWN ON THE PLAN.

(3) CONCRETE SHALL BE CLASS 40. STEEL REINFORCEMENT BARS SHALL BE GRADE 60.

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

(5) TRANSITIONAL RISER SECTION SHALL CONFORM TO ALL REQUIREMENTS OF THE STANDARDS FOR PRECAST MANHOLES.

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STANDARD FOR PRECAST DROP PIPE MANHOLE (TYPE I)

(ON 10" DIA. TO 24" DIA. SEWERS)

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'-0" TO 10'-0" DIA. PRECAST MANHOLES.
(3) INVERT SHELVES 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 #5@12" EACH WAY IN THE MIDDLE OF DROP PIPE WALL.
(6) COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.
STANDARD FOR PRECAST DROP PIPE MANHOLE (TYPE II)

(FOR 10" DIA. TO 24" DIA. INCOMING DROP PIPE SEWERS)

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'-0" TO 10'-0" DIA. PRECAST MANHOLES.

(3) INVERT SHELVES 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.
STANDARD FOR REMOVABLE PRECAST REINFORCED CONCRETE SLAB

PLAN

SECTION A-A

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 #5 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

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

LEGAL GRADE

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

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STANDARD FOR 27" DIAMETER CAST IRON MANHOLE FRAME AND COVER

(For Access or Cleanout)

**NOTES:**

1. **Frame Material:** Gray Cast Iron ASTM A-48 Class 35B. Minimum weight of frame is 345 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.
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 INTEGRALLY CAST ON INDIVIDUAL PIECES AT THE TIME
   OF MANUFACTURE IN ACCORDANCE WITH THE DEP SPECIFICATION.
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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: H20-44 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.

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STANDARD FOR 24" DIAMETER CAST IRON MANHOLE COVER

NOTES:
(1) COVER MATERIAL: GRAY CAST IRON ASTM A-48 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.

PLANT VIEW OF COVER
BOTTOM VIEW OF COVER
SECTION OF COVER

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STANDARD FOR CAST IRON MANHOLE STEP

NOTES:
(1) MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 358. 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.
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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 NONCORROSIVE 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.
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STANDARD FOR CIRCULAR CAST IRON MANHOLE STEP
(BOLT-ON TYPE)

NOTES:

1/2" THERMOPLASTIC INSERT (SEE NOTE 2)

1/4" THICK NEOPRENE GASKET($) WITH 5/8" HOLE (IF REQUIRED)

1/2" THERMOPLASTIC INSERT (SEE NOTE 2)

1/2" THERMOPLASTIC INSERT (SEE NOTE 2)

THERMOPLASTIC INSERT (SEE NOTE 2)

NEOPRENE GASKET($) (IF REQUIRED)

DIAMOND "NON-SKID" DESIGN

INSIDE FACE OF MANHOLE

SECTION A-A

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 NONCORROSIVE 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.

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8/14/18
8/14/18

DATE
DATE
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.

ANCHORAGE DETAIL

SECTION A-A

1/2" GRADE 60 STEEL REINFORCEMENT

PLAN

FRONT ELEVATION

SIDE 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. REBARS-GRADE 60.

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DATE

DATE
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. REBARs-GRADE 60.
(7) COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.

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STANDARD FOR TYPE 3 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) THE MINIMUM DROP FROM BASIN TO SEWER SHALL BE 6".
(4) KEVED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
(5) EXPANSION JOINTS ARE REQUIRED IN THE CONC. SIDEWALK AREA AT A DISTANCE OF 1'-6" AROUND THE PERIMETER OF THE BASIN.
(6) ALL REINFORCEMENT FOR ROOF SLAB IS #6 REINFORCING BARS UNLESS OTHERWISE ShOWN.
(7) CONCRETE IS TO BE CLASS 40, REBAR-SGRADE 60.
(8) COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.
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.
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, REBAR-GRADE 60.
7. COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.

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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 SYMMETRICALLY 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-Ap=65,000 PSI.
(4) COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.
STANDARD FOR SPLIT 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 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 ENTRAINED, REBARS-Grade 60, WWM-F=65,000 PSI.

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

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STANDARD FOR PRECAST TYPE 2 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 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) CONCRETE IS TO BE CLASS 40 AND 5% AIR ENTRAINED, REBARS-GRADE 60, WWM-F = 65,000 PSI.
(4) COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.

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8/14/18
STANDARD FOR SPLIT PRECAST TYPE 2 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 SYMMETRICALLY AND IN SUCH A MANNER AS TO PROVIDE FOR THE EASY 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. REBAR - GRADE 60. WWM - Fy = 65,000 PSI.
(5) COVER FOR ALL REINFORCEMENT IS 2" CLEARANCE UNLESS OTHERWISE SPECIFIED.

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

EXECUTIVE DIRECTOR OF ENGINEERING DEPARTMENT OF ENVIRONMENTAL PROTECTION
P.E.
8/14/18
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 & A 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-#6@8" - 4'-6" LONG PLACED ABOVE OPENING. IN ADDITION, THE FRONT WALL SHALL BE MANUFACTURED SOLID & ADDITIONAL 2-#6@12" FOR CHUTE REINFORCEMENT SHALL BE PLACED AT THE TIME OF MANUFACTURE.

(2) LIFTING HOOKS SHALL BE LOCATED IN THE SECTION AS PER MANUFACTURERS 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 AND 5% AIR ENTRAINMENT. REBARS-GRADE 60, WWM-F=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

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EXECUTIVE DIRECTOR OF ENGINEERING DEPARTMENT OF ENVIRONMENTAL PROTECTION

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8/14/18

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

SE548
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

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

NOTE:
(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-#6@4" - 4'-9" LONG PLACED ABOVE OPENING; IN ADDITION, THE FRONT WALL SHALL BE MANUFACTURED SOLID & ADDITIONAL 2-#6@12" FOR CHUTE REINFORCEMENT SHALL BE PLACED AT THE TIME OF MANUFACTURE.

(2) LIFTING HOOKS SHALL BE LOCATED IN THE SECTION AS PER MANUFACTURERS 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 & 5% AIR ENTRAINED. REBARS-GRADE 60. WWM-F=65,000 PSI.

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

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DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/11/18
P.E.

8/11/18
P.E.
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 #6 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. REBARS- GRADE 60. WWM-A_s=0.12 B.W.
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.
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 ENTRAINER. REBAR: GRADE 60, WWM-F = 45,000 PSI.
STANDARD FOR PRECAST SEEPAGE BASIN (DWG. 1 OF 4)
(SEEPAGE BASIN INSTALLATION)

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.
NOTE:

1. SEEPAGE BASIN SOLID RING AND DRAINAGE RING REINFORCING COMPLIES WITH AREA REQUIREMENTS OF ASTM C478, 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 ALLOWED 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 ALLOWED FOR 12'' DIA. BSEN CONNECTIONS ONLY. THE MAXIMUM CORED OPENING SHALL BE 10'' FOR THESE BSEN 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 BSEN CONNECTIONS.

5. CONCRETE DESIGN MIX = 5,000 PSI (MIN. 28 DAY STRENGTH = 4,000 PSI; MAX. W/C = 0.47). REBARS - \( f_y = 60,000 \, \text{PSI} \). WWM - \( f_y = 65,000 \, \text{PSI} \).

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.
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

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

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P.E. 8/14/18

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
P.E. 8/14/18

Bd MIN.

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

DRAIN OPENING 5/8" X 6"
(SEE SE56B - DWG. 2 OF 4) (SEE NOTE 7)

ELEVATION

SECTION

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STANDARD FOR PRECAST SEEPAVE BASIN (DWG. 4 OF 4)
(CIRCULAR REINFORCED CONCRETE SLAB AND FOOTING)

NOTES:
(1) FOR 4'-0" DIA. CIRCULAR SLAB, THE REINFORCEMENT SHALL BE 3-#4 HOOPS @3" PLACED 2" CLEAR FROM THE BOTTOM. IN ADDITION #4 HOOPS TOP AND BOTTOM SHALL BE PLACED AROUND 27" OPENING.

(2) OPENING FOR 4'-0" DIA. CIRCULAR SLAB SHALL BE 27" DIAMETER.

(3) THREE (3) LIFTING BARS IN THE 4'-0" DIA. CIRCULAR SLAB SHALL BE PLACED IN THE MANNER SHOWN ON THE PLAN AND SECTION VIEWS OF CIRCULAR FOOTING.

(4) LIFTING BARS IN THE 6'-0" DIA. CIRCULAR SLAB SHALL BE PLACED AT A DISTANCE OF 10" FROM THE EDGE OF THE CIRCULAR SLAB.

CIRCULAR SLAB

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CIRCULAR FOOTING

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<tr>
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* IN NO CASE SHALL "D" \_\_{MAX} BE LESS THAN THE OUTSIDE DIAMETER OF THE DRAINAGE RING.

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 350 LBS.

(2) DESIGN LOADING: 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.
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR CAST IRON FRAME FOR CATCH BASINS
(WITHOUT CURB PIECE)

SECTION

SECTION A-A

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 INTEGRALLY CAST ON INDIVIDUAL PIECES AT THE TIME OF MANUFACTURE IN ACCORDANCE WITH THE DEP SPECIFICATION.

ASSOCIATE COMMISSIONER, DESIGN
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DEPARTMENT OF ENVIRONMENTAL PROTECTION
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

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 300 LBS.

(2) DESIGN LOADING: 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

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

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

NOTES:

(1) GRATING MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B.
MINIMUM WEIGHT OF TYPE R GRATING IS 435 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 178 LBS.

(4) DESIGN LOADING: HSD2-44 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) 3/4" 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 CURB PIECE:
* NAME OF PRODUCING FOUNDRY
* DATE OF MANUFACTURE
* PRODUCT NUMBER
* CAST IRON ASTM A-48

THE FOLLOWING INFORMATION SHALL BE INCLUDED ON THE CATCH BASIN FRAMES:
* NAME OF PRODUCING FOUNDRY
* DATE OF MANUFACTURE
* PRODUCT NUMBER
* CAST IRON ASTM A-48

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8/14/18

8/14/18
STANDARD FOR CAST IRON GRATING, BACK PLATE, AND CURB PIECE FOR CATCH BASINS (H=8")

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

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 178 LBS.
4. DESIGN LOADING: HS20-44 HIGHWAY LOADING.
5. ALL CATCH BASIN FRAMES AND GRATINGS 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) - 3/4" 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 8" WHERE FILLER PIECES ARE USED.

ASSOCIATE COMMISSIONER, DESIGN DEPARTMENT OF ENVIRONMENTAL PROTECTION

EXECUTIVE DIRECTOR OF ENGINEERING DEPARTMENT OF ENVIRONMENTAL PROTECTION
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION
STANDARD FOR CAST IRON
HOOD AND HOOKS FOR CATCH BASINS

PLAN OF HOOD IN PLACE

REAR ELEVATION OF HOOD IN PLACE

SECTION OF HOOD IN PLACE

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-582.

(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.

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
STANDARD FOR DUCTILE IRON PIPE ALTERNATE

PLAN
TYPICAL HOUSE CONNECTION (D.I.P.) OFF D.I.P. SEWER

TYPICAL D.I.P. RISER FOR HOUSE CONNECTION OFF D.I.P. SEWER

NOTES:
(1) THIS ALTERNATE WILL BE PERMITTED ONLY WHEN SO STATED IN THE SPECIFICATIONS.
(2) MATERIAL: THE DUCTILE IRON PIPE SHALL BE 80-42-10 GRADE AND CLASS 56, UNLESS OTHERWISE SPECIFIED. THE DUCTILE IRON PIPE SHALL BE LINED WITH CERAMIC EPOXY.
(3) JOINTS: (A) ALL JOINTS FOR DUCTILE IRON PIPE SEWERS SHALL BE "PUSH-ON" JOINT TYPE, EXCEPT AS NOTED ABOVE FOR SPUR AND RISER PIPE WHICH SHALL BE MECHANICAL JOINT TYPE, MEETING THE REQUIREMENTS OF ANSI STANDARD A.21.11, LATEST REVISION.
(B) JOINTS SHALL BE MADE IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS FOR ASSEMBLING THE TYPE OF JOINT FURNISHED.
(C) FITTINGS SHALL BE DUCTILE IRON OR GRAY IRON (250 PSI) MECHANICAL JOINTS IN ACCORDANCE WITH THE LATEST REVISIONS OF ANSI/AWWA C110/A21.10 AND ANSI/AWWA C111/A21.11.

(4) LEVELING BLOCKS ARE NOT PERMITTED.
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)

MAXIMUM WIDTH OF TRENCH

SECTION ON ROCK

SECTION ON EARTH

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.

<table>
<thead>
<tr>
<th>D</th>
<th>A</th>
<th>MAX. COVER</th>
<th>CONC. CRADLE C.U. YD./F.</th>
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CITY OF NEW YORK
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 POURS.
(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

IN GENERAL 10'-6" 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.
- A RISER MUST BE USED WHEN THE MAX. LENGTH OF RISER IS 6'-0" OR GREATER.
- STD. CONC. CRADLE ON EARTH, ROCK OR PILES FOR CIRCULAR OR ELLIPTICAL PIPE.
- 2" CLEARANCE REQUIRED.
- SQUARE SHAPE OF ENCASMENT TO BE OPTIONAL.

SECTION A-A

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 POURS.
4. USE STANDARD "Y" OR "DOUBLE Y" FITTING AS REQUIRED.
5. CONCRETE IS TO BE CLASS 40, REBARS-GRADE 60.
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR 27" 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 GRATINGS MAY BE USED. HOWEVER, ONE TYPE OF GRATING SHALL BE USED EXCLUSIVELY THROUGHOUT ANY PROJECT.

SE65

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/14/18
DATE

8/14/18
DATE
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 GRATINGS MAY BE USED. HOWEVER, ONE TYPE OF GRATING SHALL BE USED EXCLUSIVELY THROUGHOUT ANY PROJECT.
STANDARD FOR CONSTRUCTION OF CATCH BASIN
(NO EXISTING CURB)

**PLAN**

- **Conc. Curb as per Highway Standards**
- **Temporary Asphalt Curb**
- **Graded Soil Area**
- **Slope Pavement to Casting**
- **Expansion Joint (Typ.)**
- **Standard Catch Basin Type 2**

**SECTION**

**SETBACK**

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**DATE**

- **8/14/18**
  - Executive Director of Engineering
  - Department of Environmental Protection
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 PARGED OR FLASHED (RECEIVE A ONE HALF (1/2) INCH MINIMUM FINISHING COAT OF MORTAR WITH A FLOAT FINISH). (THE INVERT DISH SHALL RECEIVE A PROPORIONATELY 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.
CONTRACTOR MUST PROVIDE
POSITIVE GUTTER DRAINAGE
TO BASINS THROUGHOUT
RESURFACING AREA.

4" DESIRABLE 2"
ABSOLUTE MIN. IF
THERE IS NO
CURB THEN MEET
EXISTING GROUND

EXISTING CURB LINE

4'-0" TO 5'-0" MIN.
VARIES (A.O.B.E.)

TOP OF EXISTING ROADWAY

NEW ROADWAY RESURFACING

GRINDING LINE

STRIPPING LINE

TACK COAT

BINDER IN KEYS

BASE MATERIAL

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.

Signature: [Signature]
P.E.: [P.E.]
Date: 8/14/18

Signature: [Signature]
P.E.: [P.E.]
Date: 8/14/18

ASSOCIATE COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

EXECUTIVE DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
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
- $K_a$ = $\frac{(1-S\sin\phi)}{(1+S\sin\phi)}$ FOR ACTIVE EARTH PRESSURE
- $K_p$ = $\frac{(1-S\sin\phi)}{(1+S\sin\phi)}$ FOR PASSIVE EARTH PRESSURE

$H_1$ = 3 FEET MINIMUM

- $P_s = \gamma x H_1$ = SURCHARGE-MIN. 300 PSF
- $P_1 = K_a x P_s$
- $P_2 = K_p x P_s$
- $P_2 = P_1 + P_1$

$D = \sqrt{\frac{2R_{eg}}{\gamma (P_2 - K_a)}}$

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".
STANDARD FOR MINIMUM LOAD DIAGRAM FOR 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
- $K_a$ = (1 - $\sin\phi$) FOR ACTIVE EARTH PRESSURE
- $K_p$ = (1 + $\sin\phi$) FOR PASSIVE EARTH PRESSURE

- $H^f$ = 3 FEET MINIMUM
- $P_0 = \gamma \times H^f$ = SURCHARGE-MIN. 300 PSF
- $P^f = K_a \times P_0$
- $P_1 = P^f + (0.8 K_a) \times (\gamma H_1 - \gamma_s H_2)$
- $P_2 = P_1 + \gamma_w (H_2 - 0.2H_1)$
- $P_3 = \gamma_w H_2$

- $D_1 = \frac{P_3}{\gamma_s (K_p - K_a)}$
- $D_2 = \sqrt{\frac{2R_{soil}}{\gamma_s (K_p - K_a)}}$
- $D = D_1 + D_2$

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".