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A. MAXIMUM SPACING OF MANHOLES ON PIPE SEWERS

PIPE SIZE:                             RECOMMENDED MAXIMUM SPACING   ABSOLUTE MAXIMUM SPACING
10" DIA. TO 36" DIA. CIRCULAR PIPE     250'                           300'
14"H x 23"W TO 20"H x 45"W HORIZONTAL ELLIPTICAL PIPE
23"H x 14"W TO 45"H x 29"W VERTICAL ELLIPTICAL PIPE
42" DIA. TO 72" DIA. CIRCULAR PIPE     400'                           500'
34"H x 53"W TO 58"H x 91"W HORIZONTAL ELLIPTICAL PIPE
53"H x 34"W TO 91"H x 58"W VERTICAL ELLIPTICAL PIPE
78" DIA. AND LARGER CIRCULAR PIPE      500'                           800'
63"H x 98"W AND LARGER HORIZONTAL ELLIPTICAL PIPE
98"H x 63"W AND LARGER VERTICAL ELLIPTICAL PIPE

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.
STANDARD FOR VITRIFIED CLAY PIPE
ON CONCRETE CRADLE ON EARTH OR ON ROCK

SECTION ON ROCK

SECTION ON EARTH

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

SECTION A-A
BREAK JOINTS TO CONCRETE BEDDING
MAXIMUM WIDTH OF TRENCH

1'-6"

NOTE 4

CRADLE AND ENCASEMENT ARE CLASS 40 CONCRETE. REBARS-GRADE 60.

ENTIRE CRADLE OR ENCASEMENT IS TO BE PLACED MONOLITHICALLY.

ENCASEMENT REQUIRED ON PIPE WHICH HAS A COVER, FROM FINAL GRADE TO THE INNER TOP OF THE PIPE, OF LESS THAN FOUR (4) FEET OR WHEN THE UPPER LIMIT OF COVER IS EXCEEDED.

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.

SIX (6) INCH MINIMUM SHALL BE MAINTAINED AT ALL TIMES, EXCEPT WHERE SHEETING IS TO BE USED AS FORMWORK.
# STANDARD FOR CIRCULAR PRECAST 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 inner top of the pipe, or 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 wall "B" for class III, IV & V P.R.C.P.

---

### Table: Cradle and Encasement Specifications

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<td>1'-4&quot;</td>
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<td>0.5279</td>
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**Diagram: Section on Rock**

**Diagram: Section on Earth**
STANDARD FOR 24" DIA. TO 48" DIA. CIRCULAR PRECAST REINFORCED CONCRETE PIPE ON CONCRETE CRADLE ON PILES - 2 PILE BENTS
(20' AND 25' COVER)

### Maximum Width of Trench

**Inner Face of Sheeting**

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<th>D</th>
<th>A</th>
<th>h</th>
<th>C</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>MAXIMUM PILE BENT SPACING</th>
<th>ADD. STL. REINF. (LBS.)</th>
<th>ADD. CONC. ADD.</th>
<th>STONE BALLAST CU. YD. PER L.F.</th>
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<td>1</td>
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<td>0.1192</td>
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<tr>
<td>30'</td>
<td>4'-0&quot;</td>
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<td>2</td>
<td>1</td>
<td>1</td>
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<td>36&quot;</td>
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<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>18'-0&quot;</td>
<td>19.63</td>
<td>0.0865</td>
<td>0.1420</td>
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<td>5'-6&quot;</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>18'-0&quot;</td>
<td>22.45</td>
<td>0.0972</td>
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<td>48&quot;</td>
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<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>18'-0&quot;</td>
<td>26.34</td>
<td>0.1061</td>
<td>0.1636</td>
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**Stone Ballast**

- Minimum 6" or as required

**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 inner 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 wall "B" for class III, IV & V P.R.C.P.
7. Construction joint to be utilized whenever ground conditions prevent proper support of pipe.

---

**Diagram:**

- Inner Face of Sheeting
- 2" Clearance
- Depth of Additional Conc.
- 1" Clearance over Piles
- Stone Ballast
- 6" Minimum or as Required

**Addition Steel Reinf.:**

**Longitudinal Bars:**
- 3 #6 over piles
- #6 @ 12" O.C. between piles

**Transverse Bars:**
- 3 #6 over piles
- #6 @ 12" O.C. between piles

**Construction Joint:**
- See Table for the Total Number of Long. Bars

**Dates:**

- Assistant Commissioner, Design: 7/9/07
- P.E.
- Department of Design and Construction
- Director of Engineering: 8/10/07
- P.E.
- Department of Environmental Protection

---
CITY OF NEW YORK  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  

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

MAXIMUM WIDTH OF TRENCH  
(SEE NOTE 4)  

ENCASEMENT WHERE REQUIRED  
(SEE NOTE 3)  

MAXIMUM PILE BENT SPACING  
ADD. STL. REINF. (LBS.)  
ADD. CONC. CU. YD., PER LF.  
STONE BALLAST CU. YD., PER LF.  

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 INNER 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 WALL "B" FOR CLASS IV & V P.R.C.P.  
(7) CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PREVENT PROPER SUPPORT OF PIPE.
## Standard for 24" Dia. to 60" Dia. Circular Precast Reinforced Concrete Pipe on Concrete Cradle on Piles - 2 Pile Bents (5', 10' and 15' Cover)

### Additional Steel Reinforcement

<table>
<thead>
<tr>
<th>Longitudinal Bars</th>
<th>Transverse Bars</th>
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</thead>
<tbody>
<tr>
<td>3-#6 over Piles</td>
<td>3-#6 over Piles</td>
</tr>
<tr>
<td>#6 bars between Piles</td>
<td>1/2&quot; O.C. between piles</td>
</tr>
</tbody>
</table>

### Notes:

1. CRADLE AND ENCASEMENT ARE CLASS 40 CONCRETE. REBARS-GRADE 60.
2. ENTIRE CRADLE OR ENCASEMENT IS TO BE PLACED MONOLITHICALLY ABOVE THE CONSTRUCTION JOINT.
3. ENCASEMENT REQUIRED ON PIPE WHICH HAS A COVER, FROM FINAL GRADE TO INNER 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 WALL "B" FOR CLASS III, IV & V P.R.C.P.
7. CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PREVENT PROPER SUPPORT OF PIPE.

### Table

<table>
<thead>
<tr>
<th>D</th>
<th>A</th>
<th>h</th>
<th>C</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>MAXIMUM PILE BENT SPACING</th>
<th>ADJ. STL. REINF. (LBS.)</th>
<th>ADD. COND. CLL. YD.</th>
<th>STONE BALLAST CL. YD. PER L.F.</th>
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</thead>
<tbody>
<tr>
<td>24&quot;</td>
<td>3'-6&quot;</td>
<td>9&quot;</td>
<td>1'-8&quot;</td>
<td>9&quot;</td>
<td>2'-0&quot;</td>
<td>0&quot;</td>
<td>0'-0&quot; 6'-0&quot; 6'-0&quot;</td>
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<td>0.0973 0.1204</td>
<td></td>
</tr>
<tr>
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<td>8&quot;</td>
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<td>9&quot;</td>
<td>2'-7&quot;</td>
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<td>12&quot;</td>
<td>2'-8&quot;</td>
<td>6&quot;</td>
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<td>2'-0&quot;</td>
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<td>3'-3&quot;</td>
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<td>6'-0&quot; 6'-0&quot; 4'-0&quot;</td>
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<td>5'-10&quot;</td>
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<td>4'-5&quot;</td>
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</tbody>
</table>

---

**Assistant Commissioner, Design**
**Director of Engineering**

**Date:** 7/19/07 8/10/07
STANDARD FOR 66" DIA. TO 96" DIA. CIRCULAR PRECAST REINFORCED CONCRETE PIPE ON CONCRETE CRADLE ON PILES - 3 PILE BENTS
(5', 10' AND 15' COVER)

MAXIMUM WIDTH OF TRENCH
(SEE NOTE 4)

ENCASMENT WHERE REQUIRED
(SEE NOTE 3)

STONE BALLAST
CU. YD.
PER L.F.

ADD. STL.
REINF. (LBS.)
ADD.
CONC.
COVER
CU. YD.
PER L.F.

NOTES:
1. CRADLE AND ENCASMENT ARE CLASS 40 CONCRETE. REBARS-GRADE 60.
2. ENTIRE CRADLE OR ENCASMENT IS TO BE PLACED MONOLITHICALLY ABOVE THE CONSTRUCTION JOINT.
3. ENCASMENT REQUIRED ON PIPE WHICH HAS A COVER, FROM FINAL GRADE TO INNER 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.
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 WALL "B" FOR CLASS III, IV & V P.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 HORIZONTAL ELLIPTICAL PRECAST REINFORCED
CONCRETE PIPE ON CONCRETE CRADLE ON EARTH OR ON ROCK

<table>
<thead>
<tr>
<th>W</th>
<th>H</th>
<th>EQUIV. DIA.</th>
<th>A</th>
<th>h</th>
<th>C</th>
<th>CONC. CRADLE CU./YD./L.F.</th>
<th>CONC. ENCASEMENT CU./YD./L.F.</th>
<th>MAXIMUM COVER FOR PIPE CLASS</th>
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<tr>
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<td>18&quot;</td>
<td>3'-6&quot;</td>
<td>6&quot;</td>
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<td>0.2281</td>
<td>HE-III 12'-6&quot; 16'-0&quot;</td>
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<tr>
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<td>19&quot;</td>
<td>24&quot;</td>
<td>4'-1&quot;</td>
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<tr>
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<td>11&quot;</td>
<td>2'-7&quot;</td>
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<td>1.8192</td>
<td>15'-0&quot; 21'-6&quot;</td>
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</tbody>
</table>

NOTES:

1. CRADLE AND ENCASEMENT ARE CLASS 40 CONCRETE.

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

3. ENCASEMENT REQUIRED ON PIPE WHICH HAS A COVER, FROM FINAL GRADE TO INNER 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 (ASTM C507) FOR CLASS HE-III AND HE-IV P.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 PRECAST REINFORCED CONCRETE PIPE ON CONCRETE CRADLE ON PILES - 2 PILE BENTS (5', 10' AND 15' COVER)

SECTION 1:

1. CRADLE AND ENCASMENT 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 INNER 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 (ASTM C557) FOR CLASS HE-II AND HE-IV P.R.C.P.
7. CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PROPER SUPPORT OF PIPE.

NOTE:
(1) CRADLE AND ENCASMENT 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 INNER 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 (ASTM C557) FOR CLASS HE-II AND HE-IV P.R.C.P.
(7) CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PROPER SUPPORT OF PIPE.

Sheets: 2 of 2

[Diagram and table with specific dimensions and requirements]

ASSISTANT COMMISSIONER, DESIGN P.E. 7/19/07
DEPARTMENT OF DESIGN AND CONSTRUCTION

DIRECTOR OF ENGINEERING P.E. 8/10/07
DEPARTMENT OF ENVIRONMENTAL PROTECTION
STANDARD FOR 83"W x 53"H TO 121"W x 77"H HORIZONTAL ELLIPTICAL PRECAST REINFORCED CONCRETE PIPE ON CONCRETE CRADLE ON PILES - 3 PILE BENTS
(5', 10' AND 15' COVER)

- Cradle and encasement are Class 40 concrete. Rebars-grade 60.
- Entire cradle or encasement is to be placed monolithically above the construction joint.
- Encasement required on pipe which has a cover, from final grade to inner top of the pipe, of less than four (4) feet or when the upper limit of cover for class HE-IV pipe is exceeded.
- 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.
- Six (6) inch minimum shall be maintained at all times, except where sheeting is to be used as formwork.
- Cradle width "A" is based on minimum wall thickness (ASTM C507) for Class HE-IV and HEIV P.R.C.P.
- 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. 38.
(2) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
(3) CONCRETE IS TO BE CLASS 40. REBARS-GRADE 60.
(4) FOR ALL PIPE SEWERS EIGHTEEN (18) INCHES IN DIAMETER AND GREATER,
    ADD 3-#6@3" ABOVE AND BELOW THE PIPE.

ASSISTANT COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

7/9/07

DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/10/07
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR MANHOLE ON 8" DIA. TO 30" DIA.
PIPE SEWERS ON PILES IN DRY LOCATIONS

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. 38.
(2) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
(3) CONCRETE IS TO BE CLASS 40. REBARS-GRADE 60.
(4) FOR ALL PIPE SEWERS EIGHTEEN (18) INCHES IN DIAMETER AND GREATER,
ADD 3-#6@3" ABOVE AND BELOW THE PIPE.
(5) CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PREVENT SUPPORT OF PIPE.

SE12 CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR MANHOLE ON 8" DIA. TO 30" DIA.
PIPE SEWERS ON PILES IN DRY LOCATIONS

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. 38.
(2) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
(3) CONCRETE IS TO BE CLASS 40. REBARS-GRADE 60.
(4) FOR ALL PIPE SEWERS EIGHTEEN (18) INCHES IN DIAMETER AND GREATER,
ADD 3-#6@3" ABOVE AND BELOW THE PIPE.
(5) CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PREVENT SUPPORT OF PIPE.

SE12 CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR MANHOLE ON 8" DIA. TO 30" DIA.
PIPE SEWERS ON PILES IN DRY LOCATIONS

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. 38.
(2) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
(3) CONCRETE IS TO BE CLASS 40. REBARS-GRADE 60.
(4) FOR ALL PIPE SEWERS EIGHTEEN (18) INCHES IN DIAMETER AND GREATER,
ADD 3-#6@3" ABOVE AND BELOW THE PIPE.
(5) CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PREVENT SUPPORT OF PIPE.

SE12 CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR MANHOLE ON 8" DIA. TO 30" DIA.
PIPE SEWERS ON PILES IN DRY LOCATIONS

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. 38.
(2) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
(3) CONCRETE IS TO BE CLASS 40. REBARS-GRADE 60.
(4) FOR ALL PIPE SEWERS EIGHTEEN (18) INCHES IN DIAMETER AND GREATER,
ADD 3-#6@3" ABOVE AND BELOW THE PIPE.
(5) CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PREVENT SUPPORT OF PIPE.
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.
STANDARD FOR MANHOLE ON 8" DIA. TO 30" DIA. PIPE SEWERS IN WET LOCATION
TYPE B-1 (12' MAX. COVER) AND TYPE B-2 (25' MAX. COVER)

NOTES:
(1) WHEN LEGAL GRADE IS BELOW FINAL GRADE SEE SEWER STANDARD NO. 38.
(2) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
(3) CONCRETE IS TO BE CLASS 40, REBARS-GRADE 60.
(4) FOR ALL PIPE SEWERS EIGHTEEN (18) INCHES IN DIAMETER AND GREATER,
ADD 3-#6@3' ABOVE AND BELOW THE PIPE.

DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

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

NOTES:
(1) WHEN LEGAL GRADE IS BELOW FINAL GRADE SEE SEWER STANDARD NO. 38.
(2) KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURS.
(3) CONCRETE IS TO BE CLASS 40. REBARS-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.

ASSISTANT COMMISSIONER DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
STANDARD FOR MANHOLE ON 36" DIA. TO 60" DIA. PIPE 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.

ASSISTANT COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

DATE 7/7/07

DEPUTY DIRECTOR, ENGINEERING DEPARTMENT
OF ENVIRONMENTAL PROTECTION

DATE 8/10/07
STANDARD FOR MANHOLE ON 36" DIA. TO 60" DIA. PIPE 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, 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.

ASST. COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E. 7/9/07

DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E. 8/10/07
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR MANHOLE ON 66" DIA. TO 96" DIA. PIPE 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.
STANDARD FOR MANHOLE ON 66" DIA. TO 99" DIA. PIPE 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
1" CLEARANCE OVER PILES

SECTION B-B
#6 DOWELS @12"
4'-0" LONG (TYP.)

SECTION C-C/SECTION D-D
20 TON TIMBER PILE (TYP.)

ADDITIONAL STEEL BENT PILES TO BE PROVIDED.

D T A B C E F N PILES/BENT
66" 8.125" 9.75" 9.4" 21.125" 12.125" 3.75" 8 3
72" 7" 10.25" 10.75" 23.625" 13" 4.125" 9 3
78" 7.125" 10.25" 10.75" 24.125" 13.125" 4.75" 10 3'
84" 8" 11.25" 11.75" 26.125" 14" 5.25" 11 3"
90" 8.125" 11.75" 12.25" 28.125" 14.125" 5.75" 12 3"
96" 9" 12.25" 12.75" 30.125" 15" 6.25" 13 3"

*USE FOUR PILES PER BENT FOR COVER OVER 15'.

1. 2" CLEARANCE

6" ADD. CONC.

CONST. JOINT (SEE NOTE 5)

STONE BALLAST 6" MIN. OR AS RED.

#6 BARS @6"

3-#6@3"

3-#6@7"

2 3/4@7" (SEE SECTION a-a)

2 OR 3 EQUAL SPACES

17" STD. M. H. FRAME AND COVER FOR ACCESS ON THREE COURSES OF BRICK LAID RADILALLY

FINAL GRADE

STANDARD FOR MANHOLE ON 66" DIA. TO 99" DIA. PIPE SEWERS ON PILES

ASSISTANT COMMISSIONER, DESIGN DEPARTMENT OF DESIGN AND CONSTRUCTION

DIRECTOR OF ENGINEERING DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E.

7/9/07

P.E.

8/10/07
STANDARD FOR MANHOLE ON 23"W x 14"H TO 60"W x 38"H
HORIZONTAL ELLIPTICAL PIPE SEWERS
TYPE E-1 (12' MAX. COVER)

SECTION A-A

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.
STANDARD FOR MANHOLE ON 23"W x 14"H TO 60"W x 38"H
HORIZONTAL ELLIPTICAL PIPE 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. 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.

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STANDARD FOR MANHOLE ON 68"W x 43"H TO 121"W x 77"H
HORIZONTAL ELLIPTICAL PIPE 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. REBARS-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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7/1/07
6/10/07

SE22
STANDARD FOR MANHOLE ON 68"W x 43"H TO 121"W x 77"H
HORIZONTAL ELLIPTICAL PIPE SEWERS ON PILES

TYPE E-2 (12" MAX. COVER)

SECTION A-A

NOTES:
1. WHEN LEGAL GRADE IS BELOW FINAL GRADE SEE SEWER STANDARD NO. 38.
2. KEYED CONSTRUCTION JOINTS ARE REQUIRED BETWEEN ANY SUCCESSIVE POURES.
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 C-C/SECTION D-D

SECTION B-B

W H t A B C E F N PILES/BENT
68" 36" 4" 12" 17" 12" 10.5" 6.6" 3 3
76" 48" 6.5" 10" 6.5" 17" 12.5" 6.6" 3 3
87" 53" 7" 8.5" 7.5" 18" 12.5" 6.6" 3 3
97" 56" 7.5" 9" 8.5" 19" 14" 6.6" 3 3
98" 63" 8" 12.5" 6.6" 19" 14" 6.6" 3 3
105" 68" 8.5" 13.5" 9" 21" 16" 7.5" 15 3
113" 72" 9" 13.5" 10.5" 24" 18" 8.5" 16 3
121" 77" 9.5" 14.5" 12" 26" 20" 9.5" 17 4

PILING PLATE

ASSISTANT COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

DATE

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

DATE
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. 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.

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

DATE

DIRECTOR OF ENGINEERING P.E.
DEPARTMENT OF ENVIRONMENTAL PROTECTION

DATE
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. 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.

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DIRECTOR OF ENGINEERING P.E. 8/10/07
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. 38.
(2) KEYED CONSTRUCTION JOINTS ARE REQUIRED BET. 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) FOR PIPE SEWERS 10" TO 30" IN DIAMETER 'H' SHALL BE D/2.
   FOR PIPE SEWERS 36" TO 60" IN DIAMETER 'H' SHALL BE ZERO.

David W. Severson
ASSISTANT COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

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DEPARTMENT OF DESIGN AND CONSTRUCTION

7/19/07

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8/10/07
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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 ON ANY SUCCESSIVE FOUR POURS.  
(3) CONCRETE IS TO BE CLASS 40, REBARS GRADE 60.  
(4) STEEL REINFORCEMENT IS #6@12' UNLESS OTHERWISE SPECIFIED.  
(5) FOR PIPE SEWERS 10" TO 30" IN DIAMETER 'H' SHALL BE D/2. FOR PIPE SEWERS 36" TO 60" IN DIAMETER 'H' SHALL BE ZERO.  
(6) CONSTRUCTION JOINT TO BE UTILIZED WHENEVER GROUND CONDITIONS PREVENT SUPPORT OF PIPE.
STANDARD FOR 4'-0" DIAMETER PRECAST MANHOLE (DWG. 1 OF 3)
(LOOSE TOP SLAB AND MONOLITHIC BASE SECTION)

SECTIONS:
- A-A
- PLAN OF LOOSE TOP SLAB
- PLAN OF BOTTOM REINFORCING

DIMENSIONS:
- 8'-0" MAXIMUM; 1'-0" MINIMUM, IN INCREMENTS OF 1'-0"
- 3'-0" MINIMUM

REINFORCEMENT:
- #4 HOOPS (T&B) 4'-10" O.D.
- #4 HOOPS (T&B) 4'-0" I.D.
- 4'-0" DIA. (TYP.)
- 6'-0" X 8'-0" PRECAST COLLAR (SEE STANDARD FOR PRECAST M.H. DETAILS - DWG. 2 OF 3)
- 6'-0" X 8'-0" PRECAST COLLAR (SEE STANDARD FOR PRECAST M.H. DETAILS - DWG. 2 OF 3)
- WWM-AS=0.12 X 0.06 (ALL AROUND)
- WWM-AS=0.12 X 0.06 (ALL AROUND)
- WWM-AS=0.12 X 0.06 (ALL AROUND)
- WWM-AS=0.12 X 0.06 (ALL AROUND)

NOTES:
- SEE NOTE 12
- SEE NOTE A, DWG. 3 OF 3
- SEE NOTE 12
- SEE NOTE 2
- SEE NOTE 2
- SEE NOTE 2
- SEE STANDARD FOR PRECAST MANHOLE DETAILS - DWG. 1 OF 3

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STANDARD FOR 4'-0" DIAMETER PRECAST MANHOLE (DWG. 2 OF 3)
(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

INSERT SHELF CAST IN PLACE 2' ABOVE TOP OF PIPE

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

SECTION B-B

DATE

ASSISTANT COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

DATE

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DEPARTMENT OF ENVIRONMENTAL PROTECTION
SE2BC
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DEPARTMENT OF ENVIRONMENTAL PROTECTION
STANDARD FOR 4'-0" DIAMETER PRECAST MANHOLE (DWG. 3 OF 3)
(MISCELLANEOUS DETAIL, NOTES AND SCHEDULE)

NOTE A:
6" MIN. TO 20" MAX.; 9" BRICK MIN. LAID RADIIALLY, 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'.

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

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

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

NOTE F:
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'.

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

NOTE H:
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 4'-0" DIA. PRECAST MANHOLE MAY BE SUBSTITUTED FOR STANDARD
MANHOLE TYPES A-1, A-2, B-1 AND B-2 ON SEWERS 24" IN DIAMETER
AND LESS ONLY.
(2) MANHOLE RISER REINFORCING COMPLIES WITH AREA REQUIREMENTS OF
ASTM C478, EXCEPT THAT ALL WALL SECTIONS SHALL BE REINFORCED
WITH WWM, A=0.12 CIR. X 0.06 LONG. - E.F. WITH 2-#4 HOOPS AROUNDD
ALL CAST PIPE OPENINGS (1.E.F.). THE 2-4# 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.)

SCHEDULE

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<th>PIPE DIA</th>
<th>OPENING</th>
<th>D_MAX</th>
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(3) CORED OPENINGS WILL BE PERMITTED FOR 12" DIA. BASIN CONNECTIONS
ONLY. THE MAXIMUM CORED OPENING SHALL BE 16" FOR THESE BASIN
CONNECTIONS.

(4) FOR DETAILS OF STEPS, JOINTS, GASKETS, PRECAST COLLARS, PIPE TO
MANHOLE CONNECTIONS, PIPE CLAP 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 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 MANUFACTURERS
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/M = 0.47). REBARS - FS = 60,000 PSI. WWM - FS = 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: 8" TO 24" DIA.
PIPES = O.D.+3".

(12) BELL-UP TYPE JOINTS SHALL BE ALLOWED FOR 4'-0" DIA. PRECAST
MANHOLE, WITH THE FOLLOWING MODIFICATION TO THE LOOSE TOP SLAB:
(A) THE MINIMUM SLAB THICKNESS SHALL BE X+6" (WHERE X IS JOINT
DEPTH) AND (B) THE EMBEDMENT LENGTH SHALL BE T-1" (WHERE T IS THE
THICKNESS OF RISER WALL), SEE DETAIL "A" ON DWG. 2 OF 3.
STANDARD FOR 5'-0" DIAMETER PRECAST MANHOLE (DWG. 2 OF 3)
(MONOLITHIC TOP SECTION AND ALTERNATE LOOSE BOTTOM SLAB)

SE29B
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PLAN OF BOTTOM REINFORCING
(SEE NOTE B - DWG. 3 OF 3)

PLAN OF MONOLITHIC TOP SECTION

SECTION B-B

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

OPENING (SEE SCHEDULE)
(DWG. 3 OF 3)

INVERT SHELF CAST IN PLACE 2" ABOVE TOP OF PIPE (SEE NOTE 10)
(DWG. 3 OF 3)

MIN. 3" (DWG. 3 OF 3)

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

WWM-AS = 0.15 X 0.07
(SEE NOTE 2)
(DWG. 3 OF 3)

#5 DOWELS
WWM-AS = 0.12 B.W.
(TYP.)

6" X 9" FW PRECAST COLLAR
(SEE STANDARD FOR PRECAST M.H. DETAILS - DWG. 2 OF 3)

6'-0" O.D.---------1
5'-0" I.D.---------1

10-#5 DOWELS
@ 18" O.C.
(LAID RADIALLY)
[8@21" V X 28" H]
[2@21" V X 12" H]

WWM-AS = 0.15 X 0.07
ALL AROUND

WWM-AS = 0.15 X 0.07
(SEE NOTE 2)
(DWG. 3 OF 3)

2-#4 HOOPS
(TYP.) AROUND OPENING

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

3" MINIMUM
(SEE NOTE 'C')
(DWG. 3 OF 3)

WWM-AS = 0.15 X 0.07
(SEE NOTE 2)
(DWG. 3 OF 3)

2-#4 HOOPS
(TYP.) AROUND OPENING

OPENING (SEE SCHEDULE)
(DWG. 3 OF 3)

INVERT SHELF CAST IN PLACE 2" ABOVE TOP OF PIPE (SEE NOTE 10)
(DWG. 3 OF 3)

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

WWM-AS = 0.15 X 0.07
(SEE NOTE 2)
(DWG. 3 OF 3)

#5 DOWELS
WWM-AS = 0.12 B.W.
(TYP.)

6'-0" O.D.---------1
5'-0" I.D.---------1
SE29C
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR 5'-0" DIAMETER PRECAST MANHOLE (DWG. 3 OF 3)

(MISCELLANEOUS DETAIL, NOTES AND SCHEDULE)

NOTE 'A':
IF 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".

NOTE 'C':
Pipe openings will not be permitted through joints. Distance from top or bottom of any section shall be a minimum of 3" plus the joint depth for cast pipe openings and a minimum of 12" plus the joint depth for cored openings for basin connections.

NOTE '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 C478, EXCEPT THAT ALL WALL SECTIONS SHALL BE REINFORCED WITH WMM, A=0.1S CIR. X 0.07 LONG. - E.F. WITH 2-#4 HOOPS AROUND ALL CAST PIPE OPENINGS (1-E.F.). (THE 2-#4 HOOPS WILL NOT BE REQUIRED AT CORED OPENINGS FOR BASIN CONNECTIONS.) (ALL VALUES OF AREA OF STEEL (AS) 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.

(4) FOR DETAILS OF STEPS, JOINTS, GASKETS, PRECAST COLLARS, PIPE TO MANHOLE CONNECTIONS, PIPE CAP AND MUST BE POURER 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 MANHOLIES (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 MANUFACTURERS 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 - FS = 60,000 PSI. WMM - FS = 65,000 PSI.

(10) INVERT SHELVES SHALL HAVE A 1/16" PER LINEAR FOOT PITCH TOWARDS THE SEWER.

(11) THE OPENING DIAMETERS SHOWN IN THE SCHEDULE ARE MAXIMUM VALUES. THE MINIMUM OPENING DIAMETERS SHALL BE 2" TO 24" MAX.

(12) BELL-UP TYPE JOINTS SHALL BE ALLOWED FOR 5'-0" DIA. PRECAST MANHOLE, WITH THE FOLLOWING MODIFICATION TO THE LOOSE TOP SLAB:
(A) THE MINIMUM SLAB THICKNESS SHALL BE X'-0" (WHERE 'X' IS JOINT DEPTH), BUT IN NO CASE SHALL IT BE LESS THAN 10" THICK AND (B) THE EMBEDMENT LENGTH SHALL BE 1'-0" (WHERE 1 IS THE THICKNESS OF RISER WALL); SEE DETAIL "A".

NOTE 'E':
SEE NOTE "A"

L = DEFLECTION ANGLE (SEE SCHEDULE THIS PAGE)

PLAN OF BASE SECTION

<table>
<thead>
<tr>
<th>Schedule</th>
<th>PIPE DIA</th>
<th>OPENING*</th>
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<tr>
<td>36&quot;</td>
<td>49&quot;</td>
<td>47°</td>
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* SEE NOTE "A"

ASSISTANT COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

7/9/07

DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/10/07

REVIEWED: JUNE 2004, REVISED
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)

SECTION A-A

DOWELS (LAID RADIALY) (SEE CHART B) (DWG. 4 OF 4)

(SEE NOTE 8 - DWG. 3 OF 4)

PLAN OF LOOSE TOP SLAB

E-STL. REINF. @12" B.W. (TOP) (SEE CHART A) (DWG. 4 OF 4)

PLAN OF BOTTOM REINFORCING

SE30A
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

ASSISTANT COMMISSIONER DESIGN DEPARTMENT OF DESIGN AND CONSTRUCTION
P.E. 7/19/07
DATE

DIRECTOR OF ENGINEERING DEPARTMENT OF ENVIRONMENTAL PROTECTION
P.E. 8/10/07
DATE
**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)**

---

**General Notes:**

1. **These Precast Manhole may be substitution for standard manhole types A-1, A-2, B-1, B-2, C-1, C-2, D-1 and D-2 on sewers 84" in diameter and less only (as shown in Schedules).**

2. **Manhole riser reinforcing complies with area requirements of ASTM C476, except that all wall sections shall be reinforced with Virkal Adhesive Chart A - Dwgs. 4 of 4 E.F. with 2-#4 hoops around all cast pipe openings (1-E.F.). (The 2-#4 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.**

4. **For detail of steps, joints, gaskets, precast collars, pipe to manhole connections, pile cap, poured in place alternate monolithic base sections and 4" dia. Precast Manhole units see standard for Precast Manhole details, STD. For M.H. Steps and STD. For Alternate Monolithic Base Sections for Precast Manholes (poured in place).**

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 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 = 0.43. Rebars: F.S. = 60,000 psi, W.V.M. = 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: 8" to 24" dia. Pipes = O.D. +4; 30" to 36" dia. Pipes = O.D. +4" and 54" to 8" dia. Pipes = O.D. +4".**

12. **Bell-up type joints shall be allowed for 6'-0", 7'-0", 8'-0" and 10'-0" dia. Precast Manhole, with the following modification to the loose top slab: (A) The minimum slab thickness shall be X+6" (where 'x' is joint depth), but in no case shall it be less than 10" thick and (B) The embedment length shall be T+1" (where 'T' is the thickness of riser wall). See detail 'A' on Drawing 308.**

---

**Notes:**

A. 9" min. to 20" max.; 8" brick min. laid radially, use 1 or 2 precast collars or brick as required. 4" brick min. only for shallow manhole construction.

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". Minimum headroom for shallow manhole shall be 1'-0".

C. Pipe openings will not be permitted through joints. Distance from top or bottom of any section shall be a minimum of 3" plus the joint depth for cast pipe openings and a minimum of 12" plus the joint depth for cored openings for basin connections.

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

---

**Schedule:**

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*See Note 11*

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**Schedule:**

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*See Note 11*

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</table>

*See Note 11*

---

**Plan of Base Section**
# STANDARD FOR PRECAST MANHOLE (DWG. 4 OF 4)

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

## CHART A

<table>
<thead>
<tr>
<th>d</th>
<th>D</th>
<th>t</th>
<th>MONOLITHIC BASE SECTION</th>
<th>ALTERNATE RISER SECTION</th>
<th>AS</th>
<th>E</th>
<th>F</th>
<th>h</th>
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<td>6'-0&quot;</td>
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<td>7&quot;</td>
<td>11'-6&quot; MAX.; 3'-5&quot; MIN.</td>
<td>7'-4&quot; MAX.; 3'-5&quot; MIN.</td>
<td>0.18 X 0.09</td>
<td>#4</td>
<td>#&amp;@12&quot;</td>
<td>15&quot; TO 18&quot;</td>
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<td>7'-0&quot;</td>
<td>8'-4&quot;</td>
<td>6&quot;</td>
<td>11'-6&quot; MAX.; 3'-5&quot; MIN.</td>
<td>7'-11&quot; MAX.; 3'-5&quot; MIN.</td>
<td>0.21 X 0.10</td>
<td>#4</td>
<td>#&amp;@12&quot;</td>
<td>15&quot; TO 18&quot;</td>
</tr>
<tr>
<td>8'-0&quot;</td>
<td>9'-6&quot;</td>
<td>9&quot;</td>
<td>11'-6&quot; MAX.; 4'-1&quot; MIN.</td>
<td>9'-11&quot; MAX.; 4'-1&quot; MIN.</td>
<td>0.24 X 0.12</td>
<td>#5</td>
<td>#&amp;@9&quot;</td>
<td>15&quot; TO 20&quot;</td>
</tr>
<tr>
<td>10'-0&quot;</td>
<td>11'-10&quot;</td>
<td>11&quot;</td>
<td>11'-6&quot; MAX.; 5'-4&quot; MIN.</td>
<td>10'-10&quot; MAX.; 5'-0&quot; MIN.</td>
<td>0.30 X 0.15</td>
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<td>#&amp;@8&quot;</td>
<td>15&quot; TO 20&quot;</td>
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## CHART B

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<th>DOWELS IN MONOLITHIC BASE SECTION</th>
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<td>15-#5 DOWELS @12&quot; O.C. (3@23&quot;V x 23&quot;H); (4@23&quot;V x 23&quot;H); (2@23&quot;V x 20&quot;H); (2@23&quot;V x 17&quot;H); (2@23&quot;V x 15&quot;H); (2@23&quot;V x 9&quot;H)</td>
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<td>7'-0&quot;</td>
<td>23-#5 DOWELS @12&quot; O.C. (21@23&quot;V x 38&quot;H); (2@23&quot;V x 10&quot;H)</td>
<td>19-#5 DOWELS @12&quot; O.C. (5@23&quot;V x 38&quot;H); (4@23&quot;V x 38&quot;H); (2@23&quot;V x 31&quot;H); (2@23&quot;V x 28&quot;H); (2@23&quot;V x 23&quot;H); (2@23&quot;V x 17&quot;H); (2@23&quot;V x 12&quot;H)</td>
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<tr>
<td>8'-0&quot;</td>
<td>27-#6 DOWELS @12&quot; O.C. (25@23&quot;V x 40&quot;H); (2@23&quot;V x 10&quot;H)</td>
<td>23-#6 DOWELS @12&quot; O.C. (15@23&quot;V x 40&quot;H); (2@23&quot;V x 35&quot;H); (2@23&quot;V x 29&quot;H); (2@23&quot;V x 20&quot;H); (2@23&quot;V x 14&quot;H)</td>
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<td>10'-0&quot;</td>
<td>33-#7 DOWELS @12&quot; O.C. (33@23&quot;V x 46&quot;H)</td>
<td>31-#7 DOWELS @12&quot; O.C. (25@23&quot;V x 46&quot;H); (2@23&quot;V x 40&quot;H); (2@23&quot;V x 29&quot;H); (2@23&quot;V x 18&quot;H)</td>
</tr>
</tbody>
</table>

**DIRECTOR OF ENGINEERING**

P.E. 7/19/07

**ASSISTANT COMMISSIONER, DESIGN**

DATE

P.E. 8/10/07

**DEPARTMENT OF ENVIRONMENTAL PROTECTION**

P.E. 8/10/07
STANDARD FOR PRECAST MANHOLE DETAILS (DWG. 1 OF 3)
(PIPE TO MANHOLE CONNECTION DETAILS)

LIMITS OF EPOXY BONDING AGENT ON PIPE (ALL AROUND) (TYP.)

CONCRETE ENCASMENT

SEE NOTE 'A'

CONCRETE CRADLE TRANSITION SECTION FOR CONNECTION

SECTIONAL PROFILE

NOTE 'A':
LEVELING PAD AND/OR PILE CAP - FOR MHS ON GRADE, USE 8" WELL COMPACTED 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.

SECTION OF A-A

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.

ASSISTANT COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

DATE

7/9/07

8/10/07
STANDARD FOR PRECAST MANHOLE DETAILS (DWG. 2 OF 3)

(JOINTS, GASKETS AND PRECAST COLLAR DETAILS)

PLAN OF 6"H X 8"W PRECAST COLLAR

JOINT DETAILS

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<th>&quot;X&quot;</th>
<th>&quot;D&quot;</th>
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<tr>
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<td>3&quot; TO 5&quot;</td>
<td>5/8&quot; DIA.</td>
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<td>3&quot; TO 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>
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</tbody>
</table>

BUTYL JOINT

'O' RING JOINT

7/8" X 7/8" OR 1" DIA. SELF SEALING BUTYL GASKET.
QUALITY EQUAL TO FEDERAL SPEC. #SS-S-0210 (TYP.)

SECTION A-A

ASSISTANT COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
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
(B) ADDITIONAL CONCRETE
(C) ADDITIONAL STEEL REINFORCING BARS
(D) STONE BALLAST

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<th>L</th>
<th>A</th>
<th>N/B</th>
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<td>3'-10&quot;</td>
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<td>23&quot;</td>
<td>4</td>
<td>2'-10&quot;</td>
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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)

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

SECTION B-B

SECTION C-C

NOTES:
(1) All steel reinforcement shall be as shown. Cover distances shown are clear distances.
(2) For alternate monolithic base section on piles see precast manhole pile cap details of standard for precast manhole details dwg. 3 of 3. All pile cap dimensions shall remain the same, with the exceptions of dimension "L" which shall be equal to the dimension of the alternate monolithic base section and dimension "X" which shall be adjusted accordingly.
(3) Concrete shall be class 40. Steel reinforcement bars shall be grade 60.
(4) Invert shelves shall have a 1/2" per linear foot pitch towards the sewer.
(5) Transitional riser section shall conform to all requirements of the standards for precast manholes.

NOTE:
Steel form to be utilized to make joint compatible with riser section.

AlTERNATE MONOLITHIC BASE SECTION POURED IN PLACE AT NO ADD'L. COST TO THE CITY.
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

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

NOTE:

(1) THERMOPLASTIC INSERT AS MANUFACTURED BY PENNSYLVANIA INSERT CORP. OR EQUAL.
(2) INVERT SHELVES SHALL HAVE A 1/2" PER LINEAR FOOT PITCH TOWARDS THE SEWER.
(3) 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.

SECTION A-A

PLAN OF LOOSE TOP SLAB

3/4" THREADED DOWELS @12" WITH THERMOPLASTIC INSERT (INSTALLED AT PLANT) (TYP.) (SEE NOTE 1)

3" DIA. DUCTILE IRON PIPE CLASS 52

SECT. B-B

ASSISTANT COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

7/9/07
DATE

D 10" 12" 13" 18" 24"
d 8" 10" 12" 14" 16"

NOTE:

1/2" PER LINEAR FOOT PITCH TOWARDS THE SEWER.

SEIDLE, P.E.
DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

8/10/07
DATE
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

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) INVERT SHELVES SHALL HAVE A 1/2" PER LINEAR FOOT PITCH TOWARDS THE SEWER.
(3) 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.

SECTION B-B
ASSISTANT COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

7/1/07
DATE

DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION
8/10/07
DATE
STANDARD FOR REMOVABLE PRECAST REINFORCED CONCRETE SLAB

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

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

PLAN

SECTION A-A

LIFTING BAR DETAIL

ASSISTANT COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

DATE

DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

DATE
STANDARD FOR REMOVABLE PRECAST REINFORCED CONCRETE SLAB FOR DROP PIPE MANHOLE (TYPE II)

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

FINAL GRADE

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

0.5" MORTAR JOINT

AS SHOWN

LEGAL GRADE

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

TAR PAPER JOINT

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

STANDARD SQUARE MANHOLE CHIMNEY

7/9/07

8/10/07
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.

ASSISTANT COMMISSIONER, DESIGN
P.E. 9/15/08
DEPARTMENT OF DESIGN AND CONSTRUCTION

DIRECTOR OF ENGINEERING
P.E. 9/15/08
DEPARTMENT OF ENVIRONMENTAL PROTECTION
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.

E = 2" for 2" raise
E = 3" for 3" raise
E = 4" for 4" raise
Minimum Raise: 2"
Maximum Raise: 4"
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION
STANDARD FOR 36" DIAMETER
MANHOLE FRAME AND COVER FOR CLEANOUT

PLAN VIEW OF FRAME AND COVER

NOTES:
(1) FRAME MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 358.
MINIMUM WEIGHT OF FRAME IS 480 LBS.
(2) COVER MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 358.
MINIMUM WEIGHT OF COVER IS 400 LBS.
(3) DESIGN LOADING: HS20-44 HIGHWAY LOADING.
(4) ALL MANHOLE FRAMES & COVERS SHALL HAVE THE MANUFACTURER'S IDENTIFICATION, CAST DATE
OR HEAT NUMBER AND COUNTRY OF ORIGIN INTEGRALLY CAST ON INDIVIDUAL PIECES AT THE TIME
OF MANUFACTURE IN ACCORDANCE WITH THE DEP SPECIFICATION.

ASSISTANT COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

9/15/08
DATE

DATE
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR 24" DIAMETER CAST IRON MANHOLE COVER

NOTES:

(1) COVER MATERIAL: GRAY CAST IRON ASTM A-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.
NOTES:
(1) MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B. MINIMUM WEIGHT OF STEP IS 11 LBS.
(2) ALL MANHOLE STEPS SHALL HAVE THE MANUFACTURER'S IDENTIFICATION, CAST DATE OR HEAT NUMBER AND COUNTRY OF ORIGIN INTEGRALLY CAST ON INDIVIDUAL PIECES AT THE TIME OF MANUFACTURE IN ACCORDANCE WITH THE DEP SPECIFICATION.
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" X 1 1/2" STAINLESS STEEL BOLT AND WASHER.

OR

1 1/8" X 2" CORED HOLE FOR 5/8 X 1 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.
STANDARD FOR CIRCULAR CAST IRON MANHOLE STEP
(BOLT-ON TYPE)

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

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

OR
1 1/8" X 2" CORED HOLE FOR 5/8"-11 X 2 1/2"
STAINLESS STEEL BOLT AND WASHER, WITH 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.
STANDARD FOR PLASTIC MANHOLE STEP
(COPOLYMER POLYPROPYLENE PLASTIC MANHOLE STEP)

PLAN

SIDE ELEVATION

FRONT ELEVATION

ANCHORAGE DETAIL

NOTE:
PLASTIC MANHOLE STEP MAY BE SUBSTITUTED FOR CAST IRON MANHOLE STEP, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

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 POOLS.
(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.

Assistant Commissioner, Design
Department of Design and Construction

7/9/07

Director of Engineering
Department of Environmental Protection

8/10/07
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 POOLS.
(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.

ASSISTANT COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

7/9/07 P.E.

6/10/07 P.E.
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR TYPE 3 CATCH BASIN
(WITHOUT CURB PIECE)

CABRAS AS PER HIGHWAY STD. (MODIFIED FOR DEPTH) ON A 0.5" BOND BREAKER
SLOPE PAVEMENT TO CASTING
STD. FRAME & GRATING (WITHOUT CURB PIECE)

SECTION B-B
DETAIL "A"

SECTION A-A

SECTION C-C

LIFTING BAR DETAIL

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) KEYED 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 IS #6 REINFORCING BARS UNLESS OTHERWISE SHOWN.
(7) CONCRETE IS TO BE CLASS 40, REBAR-GRADE 60.

DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E. 8/10/07

DATE

ASSISTANT COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

7/9/07

DATE
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.
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. (SEE NOTE 1)

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 ENTRAINMENT. REBARS-GRADE 60, WWM-FS=65,000 PSI.
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 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-Fs=65,000 psi.

4. Split basins will only be permitted where standard basins cannot be installed due to vertical height restrictions such as structures or aerial electrical facilities.

[Signatures and dates for approval]
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-FS=65,000 PSI.
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR SPLIT PRECAST TYPE 2 CATCH BASIN

FOR LIFTING HOOK DETAILS SEE STD. DWG. 53

PLAN

SECTION A-A

SECTION B-B

KEY DETAIL

FOR DETAILS OF PRECAST SLAB AND LIFTING HOOKS SEE STANDARD DRAWING NO. 53

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-FS=65,000 PSI.

(4) SPLIT BASINS WILL ONLY BE PERMITTED WHERE STANDARD BASINS CAN NOT BE INSTALLED DUE TO VERTICAL HEIGHT RESTRICTIONS SUCH AS STRUCTURES OR AERIAL ELECTRICAL FACILITIES.

Assistant Commissioner, Design
DEPARTMENT OF DESIGN AND CONSTRUCTION

Director of Engineering
DEPARTMENT OF ENVIRONMENTAL PROTECTION

DATE

DATE
STANDARD FOR PRECAST TYPE 3 CATCH BASIN

NOTES:

1. LOCATION OF OPENING SHALL BE DETERMINED PRIOR TO MANUFACTURE OF BASIN BY LOCATION & ANGLE OF BASIN CONNECTION REQUIRED DUE TO FIELD CONDITIONS & OPENING SHALL BE PLACED IN THE PROPER WALL AT THE TIME OF MANUFACTURE. IF LOCATION OF OPENING IS NOT IN THE FRONT WALL AS SHOWN, THE OPENING SHALL BE 24" X 24" WITH 2-#6 @ 4" - 4'9" LONG PLACED ABOVE OPENING IN ADDITION, THE FRONT WALL SHALL BE MANUFACTURED SOLID & ADDITIONAL 2-#8 @ 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 ENTRAINMENT. REBAR GRADE 60. WWM-AS=6000 PSI.

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

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

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

(3) CONCRETE IS TO BE CLASS 40 AND 5% AIR ENTRAINED. REBARS-GRADE 60, WWM-FS=65,000 PSI.
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR PRECAST DOUBLE CATCH BASIN (DWG. 2 OF 2)
(REMOVABLE PRECAST DOUBLE CATCH BASIN SLAB)

PLAN

SECTION A-A

NOTES:

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

ASSISTANT COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

DATE

DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

DATE
CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR CAST IRON FRAME FOR CATCH BASINS
(WITH CURB PIECE)

PLAN

SECTION A-A

SECTION B-B

SECTION C-C

SECTION D-D

FILLER PIECE

NOTES:

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

(2) DESIGN LOADING: HS20-44 HIGHWAY 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.

DATE

DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

DATE

ASSISTANT COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION
STANDARD FOR CAST IRON FRAME FOR CATCH BASINS
(WITHOUT CURB PIECE)

NOTES:

(1) MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B. MINIMUM WEIGHT OF FRAME IS 275 LBS.

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

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

STANDARD FOR CAST IRON GRATING, BACK PLATE, AND CURB PIECE FOR CATCH BASINS

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

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

(3) BACK PLATE MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B.
MINIMUM WEIGHT IS 179 LBS.

(4) DESIGN LOADING: HS20-44 HIGHWAY LOADING.

(5) ALL MANHOLE FRAMES AND 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.

(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.

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

BACK PLATE

CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STANDARD FOR CAST IRON GRATING, BACK PLATE, AND CURB PIECE FOR CATCH BASINS

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

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

(3) BACK PLATE MATERIAL: GRAY CAST IRON ASTM A-48 CLASS 35B.
MINIMUM WEIGHT IS 179 LBS.

(4) DESIGN LOADING: HS20-44 HIGHWAY LOADING.

(5) ALL MANHOLE FRAMES AND 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.

(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.

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

STANDARD FOR CAST IRON
HOOD AND HOOKS FOR CATCH BASINS

NOTES:

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

(2) MATERIAL FOR HOOK: 18-8 STAINLESS STEEL 1/2" SQUARE BAR STOCK TYPE 303 ASTM A-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.
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 60-42-10 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.


5. LEVELING BLOCKS ARE NOT PERMITTED.
SE62 CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION
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
(SEE NOTE 4)

1'-6" MAX.

MAXIMUM WIDTH OF TRENCH
(SEE NOTE 4)

1'-6" MAX.

PAYMENT LINES FOR ROCK EXCAVATION

ENCASEMENT WHERE REQD.

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.

DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

7/9/07
DATE

ASSISTANT COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

PAYMENT LINES FOR ROCK EXCAVATION

ENCASEMENT WHERE REQD.

MAXIMUM WIDTH OF TRENCH
(SEE NOTE 4)

1'-6" MAX.

MAXIMUM WIDTH OF TRENCH
(SEE NOTE 4)

1'-6" MAX.

INNER FACE OF SHEETING

ENCASEMENT WHERE REQD.

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.

DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

7/9/07
DATE

ASSISTANT COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION
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.

ASSISTANT COMMISSIONER, DESIGN
DEPARTMENT OF DESIGN AND CONSTRUCTION

P.E.  7/9/07

DIRECTOR OF ENGINEERING
DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.E.  8/10/07
STANDARD FOR RISER ON PRECAST REINFORCED CONCRETE PIPE SEWERS ON CONCRETE CRADLE

NOTE:

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-GRDGE 60.
STANDARD FOR 27" DIAMETER ALUMINUM FLOOR GRATING

1 1/4" X 1 1/4" X 1/4" ALUMINUM ANGLE

1" X 3/16" ALUMINUM GRATING
BEARING BARS @ 1 3/16" O.C.

3/4" X 1/8" ALUMINUM GRATING
CROSS BARS @ 4" O.C.

3/8" DIA. - 3/4" LONG
ALUM. BOLT AND NUT
ALUM. WASHER

4 ALUMINUM STRAPS
1" X 1/4" X 6" LONG

4 ALUMINUM STRAPS
1" X 1/4" X 6" LONG

85 HOOP

NOTE:

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

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

STANDARD FOR 36" DIAMETER ALUMINUM FLOOR GRATING

NOTE:

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

(2) TYPE "A" OR TYPE "B" ALUMINUM 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)

<table>
<thead>
<tr>
<th>SETBACK</th>
<th>A</th>
<th>ASPH. CONC. SQ. YDS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3'-0&quot;</td>
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<td>3.283</td>
</tr>
<tr>
<td>4'-0&quot;</td>
<td>18'-0&quot;</td>
<td>5.172</td>
</tr>
<tr>
<td>5'-0&quot;</td>
<td>20'-0&quot;</td>
<td>7.283</td>
</tr>
<tr>
<td>6'-0&quot;</td>
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<td>24'-0&quot;</td>
<td>12.172</td>
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<td>26'-0&quot;</td>
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<tr>
<td>10'-0&quot;</td>
<td>30'-0&quot;</td>
<td>21.172</td>
</tr>
</tbody>
</table>
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 RESIDENT ENGINEER REQUIRING THE RECONSTRUCTION OF EXISTING MANHOLES, THE FOLLOWING WORK SHALL BE PERFORMED:

(A) ON UNLINED 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 RESIDENT 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). (THE INVERT DISH SHALL RECEIVE A PROPORTIONATELY ThICKER FINISH COAT SO AS TO PROVIDE A SMOOTH TRANSITION FROM EXISTING SEWER TO THE INSIDE SURFACE OF THE LINER.)

(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 RESIDENT 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 PROPORTIONATELY ThICKER FINISH COAT SO AS TO PROVIDE A SMOOTH TRANSITION FROM EXISTING SEWER TO THE INSIDE SURFACE OF THE LINER.)

(2) AT ALL LOCATIONS SHOWN ON THE PLANS, SPECIFIED IN THE CONTRACT DOCUMENTS OR ORDERED BY THE RESIDENT 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.)

NEW ROADWAY RESURFACING
ITEM 4.02 AB, 4.02 AC OR 4.02 AE

TOP OF EXISTING ROADWAY

TACK COAT (ITEM 6.58)*

STRIPPING LINE

BINDER IN KEYS (ITEM 4.02 BC)*

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 (6.51)*.

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

(5) * - REFER TO DEPARTMENT OF TRANSPORTATION SPECIFICATIONS. (6) ALL COSTS REQUIRED TO PERFORM THIS WORK SHALL BE DEEMED INCLUDED IN THE PRICE BID PER TON FOR ASPHALT CONCRETE MIXTURE. NO SEPARATE OR ADDITIONAL PAYMENT WILL BE MADE FOR THIS WORK.
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
- $K_{ra}$ = \((1 + \sin 2\phi)\) FOR ACTIVE EARTH PRESSURE
- $K_{rp}$ = \((1 + \sin 2\phi)\) FOR PASSIVE EARTH PRESSURE
- $H = 3$ FEET MINIMUM
- $P_s = \gamma_s \times H = $ SURCHARGE-MIN. 300 PSF
- $P' = K_{ra} \times P_s$
- $P_1 = (0.8K_{ra}) \times \gamma \times H$
- $P_2 = P' + P_1$
- $D = \sqrt{\frac{2R_{ef}}{\gamma (K_{rp} - K_{ra})}}$

**NOTES:**

1. THIS CRITERIA IS FOR BRACED SHEETING ONLY.
2. FOR FACTOR OF SAFETY FOR TOE PENETRATION SEE SECTION 4.05.6 - "DESIGN CRITERIA".
DESIGN CRITERIA:

- \( \gamma \) = UNIT WEIGHT OF SOIL
- \( \gamma_w \) = UNIT WEIGHT OF WATER
- \( \gamma_s \) = UNIT WEIGHT OF SUBMERGED SOIL
- \( \varnothing \) = ANGLE OF INTERNAL FRICTION OF SOIL
- \( K_{ra} \) = (1 - \( \sin \varnothing \)) FOR ACTIVE EARTH PRESSURE
- \( K_{rp} \) = (1 + \( \sin \varnothing \)) FOR PASSIVE EARTH PRESSURE

\( H' = 3 \text{ FEET MINIMUM} \)

\( P_s = \gamma \times H' = \text{SURCHARGE MIN. 300 PSF} \)

\( P_1 = K_{ra} \times P_s \)

\( P_1 = P' + (0.8K_{ra}) \times (\gamma H_1 + \gamma_s H_2) \)

\( P_2 = P_s + \gamma_w (H_1 - 0.2H) \)

\( P_3 = \gamma_w \times H_2 \)

\( D_1 = \frac{P_3}{\gamma_s (K_{rp} - K_{ra})} \)

\( D_0 = \sqrt{\frac{2R_{so}}{\gamma_s (K_{rp} - K_{ra})}} \)

\( D = D_1 + D_0 \)

NOTES:

1. THIS CRITERIA IS FOR BRACED SHEETING ONLY.
2. FOR FACTOR OF SAFETY FOR TOE PENETRATION SEE SECTION 4.05.6 "DESIGN CRITERIA."