Note 1. Multiply average daily flow by peak flow factor to obtain max. flow for design purposes.
NOTE:

1. Multiply average daily sewage flow by peak flow factor to obtain max. flow for design purposes.
2. Peak flow factor is 2.5 for all flows greater than 10 MGD.
NOTES:
2. All reinforcing steel to meet current requirements of ASTM Spec. A-615.
3. Concrete to be Class A-4.
4. Tapered joint with O-ring gasket, or single offset joint with rubber gasket, to meet current requirements of ASTM Spec. C-443.
5. Pioneer 301 Mastic or approved equal shall be used in addition to the joint specified.
6. Grout inverts shall consist of a Portland Cement concrete mix to VDOT Spec. for Class B-2 or containing 1 part cement, 2 parts mortar sand and 3 1/2 parts aggregate. The surface shall be hand troweled smooth with no coarse aggregate exposed and the benches are to have a light broom finish.
7. Flexible joint required on all pipe connections to manholes. Flexible Joint pipe to manhole sleeve may be Kor-N-Seal, Interspace, Presswedge or approved equal. Installation shall be in accordance with manufacturer's instructions. Where field conditions will not permit the use of a sleeve, a maximum 24" stub may be used. (See Section 10.0102.5C.)
8. Joint configuration may be cast bell-up or spigot-up.
9. Manufacturer's name to be cast in steps or on inside face of cone and is to be clearly visible without entering the structure.

For frame anchorage detail see Plate 10-10

Galvanized steel strapping device 3" X 3/8"

Pioneer 301 Mastic or approved equal on exterior side of Joint (Typical all Precast manholes).

O-ring gasket or single offset gasket, ASTM C-443

Cast iron anchor or expansion shield (typ.) drill and grout in place.

1" X 3" lag bolt (typ.)

Ref. Sec. 10-0102.5D(7), Plate 4-10

Rev. 1-00, 2011
Reprint, 4-13

TYPICAL 4'-0" ID PRECAST CONCRETE MANHOLE

PLATE NO. 3-10
STD. NO. DPW-15
NOTES:
1. Concrete to be Class A-4.
2. Pipe connections to conform to Note 7, Plate 3-10.
3. All reinforcing steel to meet current requirements of ASTM Spec. A-615.
4. Manufacturer's name to be cast in steps or on inside face of cone and is to be clearly visible without entering the structure.
6. Compacted gravel under base sections shall conform to Plate 3-10.
7. Joint configuration may be cast bell-up or spigot-up.
8. Pioneer 301 Mastic or approved equal shall be used in addition to the joint specified. (See Plate 3-10)

Base section to provide min. 6" clearance between top of pipe opening and bottom of bell and spigot joint.
NOTES:
1. Concrete to be Class A-4.
2. All reinforcing steel to meet the current requirements of ASTM Spec. A-615.
4. Tapered joint with O-Ring Gasket, or single offset joint with rubber gasket, to meet current requirements of ASTM Spec. C-443.
5. Doghouse opening may only be used when placing a new MH over an existing line; otherwise, the opening must be cast. Size, location & angle of entry shall be as required by the plans.
6. MH section to be cast in the base a min. of 2".
7. Joint configuration may be cast bell-up or spigot-up.

<table>
<thead>
<tr>
<th>MIN. DIMENSIONS (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MH</td>
</tr>
<tr>
<td>A</td>
</tr>
<tr>
<td>B</td>
</tr>
<tr>
<td>C</td>
</tr>
<tr>
<td>D</td>
</tr>
</tbody>
</table>

Dimensions of D shall be taken from bottom of key (see drawing below)

8. Holes in precast units are to be 4" min. 8" max. larger than the outside dia. of the proposed pipe.
9. Base section to provide min. 6" clearance between top of pipe opening and bottom of bell and spigot joint.

Pioneer 301 Mastic or approved equal.

Std. precast concrete doghouse

Seal with non-shrink grout (Embecco or equal).

For size of opening see Note 8.

Notch for O-Ring or single offset gasket, ASTM C-443
NOTES:

1. Concrete to be Class A-4.
2. All reinforcing steel to meet current requirements of ASTM Spec. A-615.
4. Flat tops shall be used only when specifically required on the plans, or where there is a height or invert conflict, as determined by the contractor or the precast manufacturer, and approved by the inspector.
5. Joint configuration may be cast bell-up or spigot-up.
6. A max. adjustment of 12" on a manhole flat top is allowed.

<table>
<thead>
<tr>
<th>MANHOLE SIZE (in.)</th>
<th>4'-0&quot;</th>
<th>5'-0&quot;</th>
<th>6'-0&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>48&quot;</td>
<td>60&quot;</td>
<td>72&quot;</td>
</tr>
<tr>
<td>B</td>
<td>58&quot;</td>
<td>72&quot;</td>
<td>86&quot;</td>
</tr>
<tr>
<td>C</td>
<td>5&quot;</td>
<td>6&quot;</td>
<td>7&quot;</td>
</tr>
<tr>
<td>D</td>
<td>6&quot;</td>
<td>8&quot;</td>
<td>8&quot;</td>
</tr>
</tbody>
</table>
Slope Bench 12:1 to 6:1 per ft. to (largest) main sewer line of manhole

Steps to be staggered

Std. MH frame & cover

Adjustment ring not more than 6"

8" concrete radial block

Projection of the inside crown of incoming sewer shall intersect inside crown of main sewer

1/2" Cement parging

When top of casting to invert exceeds 12', increase thickness of barrel to 12" if brick, 8" if block

12" brick Bench

1/2" Cement parging

Concrete

Note: For detail of MH frame and cover anchorage see Plate 10–10.
Material:
Gray iron

PLAN VIEW

SECTION A-A

Ref. Sec. 10–0102.5D(7)
Ref. Plate 4–10

STANDARD ROADWAY FRAME

PLATE NO. 8–10
STD. NO. DPW–21
Material: Gray iron

Plan View

25 1/2" dia.

SECTION A-A

Ref. Sec. 10-0102.5D(7)
Ref. Plate 4-10

STANDARD ROADWAY MANHOLE COVER

PLATE NO. 9-10
STD. NO. DPW-21A
Material:
Gray iron

1 1/2" dia. hole in flange for 1" dia. anchor bolts (typ. of 4)

Tap for 5/8"
Stainless Steel bolt (typ. of 2)

PLAN VIEW

30 1/2" dia.

2 3/4" dia.

24" dia

3 1/2" dia.

1/2"

36" dia.

SECTION A-A

ANCHOR BOLT DETAIL
(SEE NOTE)

NOTE:
3/4" dia. threaded anchor bolt or 3/4" dia. variable length allthread with 2" dia. washer locked between 2 nuts at embedded end, or 3/4" dia. variable length allthread with 3" long X 1/2" (min.) dia. "T" welded on the embedded end. Anchor bolt to be embedded in nonshrink or expansive Portland Cement grout.

Ram-Nek, Pioneer 301 Mastic or approved equal, shall be used except in paved areas as noted Section 10-0104:2L et seq.

Annular space to be filled with non-shrink or expansive Portland Cement grout.

Nut/washer/nut, move down towards bottom of hole.

Ref. Sec. 10-0102.5D(7), Plates 3-10, 4-10, 6-10, 7-10

Rev. 1-00, 2011 Reprint

WATERTIGHT/LOCKING MANHOLE FRAME

PLATE NO. STD. NO.
10-10 DPW-22
Material: Gray iron

See Detail 'A' for watertight connection to frame.

PLAN VIEW

SEWER

SECTION A–A

DETAIL 'A'

Gasket

5/8” stainless steel bolt with 15/16” hex head.

WATERTIGHT MANHOLE COVER

Ref. Sec. 10-0102.5D(7), Plate 4-10
Rev. 1-00, 2011 Reprint
Material
Gray Iron

PLAN VIEW
28 3/4" dia.

SECTION A–A

Ref. Sec. 10–0102.5D(7)

BOLTED MANHOLE COVER

PLATE NO. STD. NO.
13–10

Rev. 1–00, 2011 Reprint
Approved MH step manufacturers:

M. A. Industries, Inc. — "Plastic Step" or Delta, Oliver Tire and Rubber Company Wedge-Lok Safety Step, or approved equal.

Steps must be steel with plastic or rubber coating unless otherwise specified for caustic service.

Ref. Sec. 10-0102.5D(7)
Ref. Plate 3-10, 4-10,
Rev. 1-00, 2011 Reprint
Notes:

1. Concrete to be Class A-4

2. All reinforcing steel to meet current requirements of ASTM Spec. A-615

3. Manhole sections to meet current requirements of ASTM Spec. C-478

4. Joint configuration may be cast Bell-up or Spigot-up

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>5'-4'</th>
<th>6'-4'</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>60&quot;</td>
<td>72&quot;</td>
</tr>
<tr>
<td>B</td>
<td>72&quot;</td>
<td>85&quot;</td>
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<tr>
<td>C</td>
<td>6&quot;</td>
<td>7&quot;</td>
</tr>
<tr>
<td>D</td>
<td>8&quot;</td>
<td>8&quot;</td>
</tr>
</tbody>
</table>

Section A-A

Precast Concrete Manhole Reducer

Ref. Sec. 10-0102.5D(7), Plate 4-10

Rev. 1-00, 2011 Reprint

Plate No. STD. No.

14A-10          DPW-19
Inside drop connection to be used under special circumstances such as:
- Bad soils / rock
- High water table
- Utility conflicts
- Excessive depths

TYPICAL 4' MANHOLE WITH INSIDE DROP CONNECTION

Special notes
See Section 10-0102.5E et seq.
NOTE 1: The width of the trench is to be as specified by the Engineer on the plans or as set forth in the Specs. Max. trench width and depth shall be as specified in Tables 10.4 and 10.5. Trenching methods must be in compliance with the Va. Department of Labor and Industry (VOSH) requirements.

NOTE 2: The pipe shall be bedded in carefully compacted granular material placed on a flat trench bottom. The granular material shall be crushed stone VDOT size 57, 68, or 78, in accordance with VDOT Spec. Section 203. The granular bedding shall have a min. thickness of 1/4 the outside pipe dia. (4" min.) and shall extend vertically in accordance with alternatives A or B. If the max. width of the trench at the top of the pipe exceeds those specified, granular bedding material will be brought to the top of the pipe for the full width of the trench. The remainder of the side fills and a min. depth of 12" over the top of the pipe shall be filled with carefully compacted material. Should the contractor elect to use larger stone to carry the water, the larger stone is to be placed beneath the specified amount of granular material. The larger stone is not in any way to affect the amount of granular material to be used.
For details of backfill above springline of pipe see DPW-6, Plates 18-10 and 19-10.

NOTES:

1. The compacted crushed stone is to be as described in Plates 18-10 and 19-10 of the specs.

2. Blasting overbreak to be removed and replaced with compacted crushed stone.
5" dia. laterals shall connect to 8" dia. sewer mains by way of a manufactured "T" or "Y". 6" dia. laterals shall connect to collector sewers in sizes from 8" to 15" by way of a manufactured "Y" only with prior approval from the Department of Public Works and Environmental Services. Lateral connections to sewers greater than 15" in diameter shall be made at manholes. Approved saddles may be used for 5" dia. connections for 8" dia. rigid pipe sewer mains.

*Not applicable to Planned Development Districts

**Hand mixing allowed per VDOT specifications
TO AVOID CONFLICTS WITH OTHER UNDERGROUND SERVICE UTILITIES, THE MINIMUM LATERAL EXTENSION DISTANCE \((D)\) SHALL BE:

<table>
<thead>
<tr>
<th></th>
<th>Minimum Lateral Extension Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-Family Detached</td>
<td>20 ft beyond the property line or within 5 ft of the minimum yard requirement, whichever distance is less.</td>
</tr>
<tr>
<td>Single-Family Townhouse</td>
<td>5 ft beyond the property line or sanitary sewer easement, whichever distance is greater.</td>
</tr>
</tbody>
</table>

NOTES:

1. Gravel bedding beyond the concrete cradle shall conform to Note 2 of Plate 19-10.

2. Lateral pipe material shall be as specified in Section 10-0103.8 or in the International Plumbing Code.

3. CI Saddles shall be as made by Richmond Foundry, Pioneer Foundry, or approved equal.

4. A long sweep, 90-degree bend may be used as an alternate to two 45-degree bends.

FOR PLAN VIEW, SEE PLATE 23-10

*Not applicable to Planned Development Districts

**Hand mixing allowed per VDOT specifications
Note 1:
Damage exceeding 3" shall be repaired as stated under replacement of pipe—see Section 10-0104.7C et seq.
6" – min. dimension from extremity of damaged area to end of sleeve.
HOLE IN PIPE BELOW SPRING LINE

Ref. Sec. 10-0104.7E(2)
PLATE NO. STD. NO.
Rev. 1-00
26-10 RG-2

PIPE WITH CRACK OR SHEAR

Ref. Sec. 10-0104.7E(3)
PLATE NO. STD. NO.
Rev. 1-00
27-10 RG-2
CRUSHED SECTION OR SECTIONS OF PIPE

AREA OF CUT

12" Extremity of 12" Min. distance from extremity of damaged area, which must include hairline fractures. (Applies to each end of damaged area)

Min. length of section to be cut and replaced

Note 1 – Cuts will be made on a vertical plane with an approved cutting tool. After the cut has been made, a visual inspection will be made to check for hairline fractures on the inside of pipe; additional pipe will be cut out if this condition is found.

SLIPPED OR LEAKING JOINTS

CRUSHED SECTION OF PIPE AND SLIPPED OR LEAKING JOINT

Ref. Sec. 10–0104.7E(4), 10–0104.7E(5)

Rev. 1–00

PLATE NO. 28–10
STD. NO. RG–3
Sewer test plug

3" x 1/2" reducer

Ref. Sec. 10-0105.5B

SEWER TEST PLUG

PLATE NO. STD. NO.

29-10
Grout Specifications
One part cement and four parts concrete sand to which has been added "Passolite" or fly ash in the amount of 1/2 pound per bag of cement.

Casing pipe size varies, 8 gauge galvanized asphalt, coated corrugated metal culvert pipe AASHTO STD. M36 or black seamless steel welded (AWWA C-200) pipe minimum thickness 3/8".

HIGHWAY CROSSING
JACKING AND BORING/
TUNNEL DETAILS

<table>
<thead>
<tr>
<th>SEWER MAIN PIPE SIZE (INCHES)</th>
<th>CASING PIPE SIZE (INCHES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>22</td>
</tr>
<tr>
<td>10</td>
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<tr>
<td>12</td>
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<td>14</td>
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<tr>
<td>16</td>
<td>30</td>
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<tr>
<td>18</td>
<td>36</td>
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<tr>
<td>20</td>
<td>36</td>
</tr>
<tr>
<td>24</td>
<td>36</td>
</tr>
</tbody>
</table>
Maximum clearance = 1/2".

1/4" steel channel 8" long, center at each collar size as required.

2" x 3/8" steel collars 2 per length.

Sleeve or casing pipe with a minimum thickness of 3/8".

Fill annular space with grout.

1/2" Bolts

Variable

Dolley wheels or approved skids

Ends to be closed with brick and mortar construction

CASING PIPE SIZES

<table>
<thead>
<tr>
<th>SEWER MAIN PIPE SIZE (INCHES)</th>
<th>CASING PIPE SIZE (INCHES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>22</td>
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<tr>
<td>10</td>
<td>24</td>
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<tr>
<td>12</td>
<td>24</td>
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<tr>
<td>14</td>
<td>30</td>
</tr>
<tr>
<td>16</td>
<td>30</td>
</tr>
</tbody>
</table>

Grout Specifications

One part cement and four parts concrete sand to which has been added "Passolite" or fly ash in the amount of 1/2 pound per bag of cement.
NOTES:

1. Casing pipe shall be smooth wall carbon steel pipe, joints shall be squared and continuously welded. Wall thickness: 42" ID and greater - .5" 36" ID and less - 0.375"

2. Carrier pipe shall be ductile iron.

3. Casing spacers shall be carbon steel with polyvinyl chloride coating as manufactured by PSI or stainless steel as manufactured by Cascade Waterworks Inc. or approved equal. Runner width shall be a minimum of 2".

4. End closures: Casing end seals shall be pull-on type molded from synthetic rubber or approved equal. Seals shall be attached to casing pipe by band clamps. Band clamps shall be type 304 stainless steel. Seals shall have molded seats for proper location of bands.
TYPICAL TRASH AND RECYCLING PAD

1.5' MIN. (TYP)

BOLLARDS (6) TYPICAL - 6" MIN. DIAM.- SCH. 40 STEEL PIPE CONCRETE FILLED

6" REINFORCED CONCRETE SLAB

4.9'

5.3' X 6.2'

TYPICAL TRASH DUMPSTER

TYPICAL RECYCLING DUMPSTER

1.0' MIN.

19.0' CLEAR OPENING TRUCK ACCESS (TYP.)

22.0'

1.5' MIN.

10.0'

1.5' MIN.