

**Part 1            General**

**1.1               RELATED SECTIONS**

- .1       Section 31 23 10 - Excavation, Trenching and Backfilling.
- .2       Section 32 11 23 - Aggregate Base Course.

**1.2               REFERENCES**

- .1       American Society for Testing and Materials (ASTM International)
  - .1       ASTM A48/A48M-03(2016), Standard Specification for Gray Iron Castings.
  - .2       ASTM C478-15A, Specification for Precast Reinforced Concrete Manhole Sections.
  - .3       ASTM D698-16, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup>(600 kN-m/m<sup>3</sup>)).
- .2       Ontario Provincial Standard Drawings (OPSD)
  - .1       OPSD 701.010 – November 2014, Precast Concrete Maintenance Hole 1200mm Diameter
- .3       Ontario Provincial Standard Specifications (OPSS)
  - .1       OPSS 404 –November 2010, Construction Specification for Maintenance Hole, Catch Basin, Ditch Inlet, and Valve Chamber Installation.
  - .2       OPSS 1351-November 2014, Material Specification For Precast Reinforced Concrete Components for Maintenance Holes, Catch Basin, Ditch Inlet And Valve Chambers.
  - .3       OPSS 1853-November 2007, Material Specification For Rubber Adjustment Units for Maintenance Holes, Catch Basin, Ditch Inlet And Valve Chambers.
  - .4       OPSS 1854-November 2014, Material Specification For High Density Polyethylene Adjustment Units for Maintenance Holes, Catch Basin, Ditch Inlet And Valve Chambers.

**Part 2            Products**

**2.1               MATERIALS**

- .1       Precast manhole units:
  - .1       1200mm diameter maintenance holes:
    - .1       Circular to ASTM C478 and OPSD 701.010,
      - .1       Storm Manholes: complete with 300mm sump as per OPSD 701.010.
      - .2       Sanitary Manholes: Benching as per OPSD 701.021.
    - .2       Top section: flat slab top type with opening offset for vertical ladder installation to OPSD 701.030.
    - .3       Components: to OPSD 701.031, ASTM C478 and OPSS 1351.

- .2 Joints: to be made watertight using rubber rings.
- .3 Ladder rungs: to OPSD 405.020.
- .4 Adjusting rings: to ASTM C478, OPSD 704.010 or OPSD 704.011, OPSS 1853 and OPSS 1854.
- .5 Frames, gratings, covers to dimensions as indicated and following requirements:
  - .1 Metal gratings and covers to bear evenly on frames. A frame with grating or cover to constitute one unit. Assemble and mark unit components before shipment.
  - .2 Gray iron castings: to ASTM A48/A48M, strength class 30B.
  - .3 Castings: coated with two applications of asphalt varnish.
  - .4 Manhole frames and covers:
    - .1 Storm Sewer:
      - .1 In lawn and paved areas: Type B open cover cast with perforations and complete with two 25 mm square lifting holes to OPSD 401.010.
- .2 Granular bedding: Granular base material in accordance with Section 32 11 23 - Aggregate Base Course

### **Part 3 Execution**

#### **3.1 EXCAVATION AND BACKFILL**

- .1 Excavate and backfill in accordance with Section 31 23 10 - Excavating Trenching and Backfilling and as indicated.
- .2 Obtain approval of Departmental Representative before installing, manholes.

#### **3.2 INSTALLATION**

- .1 Construct units in accordance with details indicated, plumb and true to alignment and grade, in accordance with OPSS 407. Maximum relative difference between specified invert elevations not to exceed 10mm.
- .2 Complete units as pipe laying progresses.
- .3 Set precast concrete base on 150 mm minimum of granular bedding material compacted to 100% maximum density to ASTM D698.
- .4 Precast units:
  - .1 Make each successive joint watertight with Departmental Representative approved rubber ring gaskets.
  - .2 Plug lifting holes with precast concrete plugs set in cement mortar or mastic compound.
  - .3 Compact granular backfill to 95% maximum density to ASTM D698.
  - .4 Place frame and cover on top section to elevation as indicated. If adjustment required use concrete ring.

- .5 Clean units of debris and foreign materials. Remove fins and sharp projections.  
Prevent debris from entering system.
- .6 Refer to OPSD 708.020.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED SECTIONS**

- .1 Section 31 23 10 - Excavating, Trenching and Backfilling.
- .2 Section 32 11 23 - Aggregate Base Course.

**1.2 REFERENCES**

- .1 American Society for Testing and Materials International, (ASTM)
  - .1 ASTM D698-16, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft<sup>4</sup>-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)).
- .2 Canadian Standards Association (CSA International)
  - .1 CSA B1800-15, Plastic Non-pressure Pipe Compendium - B1800 Series (Consists of B181.1, B181.2, B181.3, B181.5, B182.1, B182.2, B182.4, B182.6, B182.7, B182.8 and B182.11).
    - .1 CSA B182.1-11, Plastic Drain and Sewer Pipe and Pipe Fittings.
    - .2 CSA B182.2-11, PVC Sewer Pipe and Fittings (PSM Type).
    - .3 CSA B182.11-02, Recommended Practice for the Installation of Thermoplastic Drain, Storm, and Sewer Pipe and Fittings.
- .3 Ontario Provincial Standard Drawings (OPSD)
  - .1 OPSD 708.010 (November 2016) – Catch Basin Connection for Rigid Main Pipe Sewer.
  - .2 OPSD 708.030 (November 2016) – Catch Basin Connection for Flexible Main Pipe Sewer.

**1.3 SUBMITTALS**

- .1 Submit product literature for storm sewer pipe and culverts in accordance with Section 01 00 10 – General Instructions.
- .2 Certification to be marked on pipe.

**Part 2 Products**

**2.1 STORM SEWER PIPE**

- .1 Plastic Pipe:
  - .1 Type PSM Polyvinyl Chloride (PVC): to CSA-B182.2.
  - .2 Standard Dimensional Ratio (SDR): 35.
  - .3 Locked-in gasket and integral bell system.
  - .4 Nominal lengths: 4 m.

**2.2 PIPE BEDDING AND SURROUND MATERIAL OPEN CUT**

- .1 Granular base material: refer to Section 32 11 23 – Aggregate Base Course.

**2.3 BACKFILL MATERIAL OPEN CUT**

- .1 Type 1 Fill: in accordance with Section 31 23 10 - Excavating, Trenching and Backfilling.

**Part 3 Execution**

**3.1 PREPARATION**

- .1 Clean pipes and fittings of debris and water before installation, and remove defective materials from site to approval of Departmental Representative.

**3.2 OPEN CUT TRENCH INSTALLATION**

- .1 Trenching
  - .1 Do trenching Work in accordance with Section 31 23 10 - Excavating, Trenching and Backfilling.
  - .2 Do not allow contents of sewer or sewer connection to flow into trench.
  - .3 Trench alignment and depth to approval of Departmental Representative prior to placing bedding material and pipe.
- .2 Granular Bedding
  - .1 Place bedding in unfrozen condition.
  - .2 Place granular bedding material in uniform layers not exceeding 150 mm compacted thickness to depth as indicated up to spring line of pipe.
  - .3 Shape bed true to grade and to provide continuous, uniform bearing surface for pipe.
    - .1 Do not use blocks when bedding pipes.
  - .4 Shape transverse depressions as required suiting joints.
  - .5 Compact each layer full width of bed to at least 95 % maximum density to ASTM D698.
  - .6 Fill excavation below bottom of specified bedding adjacent to manholes or structures with compacted bedding material.
  - .7 Fill authorized or unauthorized excavation below design elevation of bottom of specified bedding in accordance with Section 31 23 10 - Excavating Trenching and Backfilling.
- .3 Pipe Installation
  - .1 Lay and join pipe in accordance with manufacturer's recommendations and to approval of Departmental Representative.
  - .2 Handle pipe-using methods approved by pipe manufacture.
    - .1 Do not use chains or cables passed through rigid pipe bore so that weight of pipe bears upon pipe ends.
  - .3 Lay pipes on prepared bed, true to line and grade with pipe inverts smooth and free of sags or high points.

- .1 Maximum allowable variation from indicated pipe invert elevations as measured at the manholes and catch basins not to exceed 10mm.
- .2 Ensure barrel of each pipe is in contact with shaped bed throughout its full length.
- .4 Begin laying at outlet and proceed in upstream direction with socket ends of pipe facing upgrade.
- .5 Do not exceed maximum joint deflection recommended by pipe manufacturer.
- .6 Do not allow water to flow through pipes during construction except as may be permitted by Departmental Representative.
- .7 Whenever Work is suspended, install removable watertight bulkhead at open end of last pipe laid to prevent entry of foreign materials.
- .8 Install plastic pipe and fittings in accordance with CSA B182.11.
- .9 Joints:
  - .1 Plastic pipe:
    - .1 Gaskets integral with pipe.
    - .2 Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.
    - .3 Align pipes before joining.
    - .4 Maintain pipe joints free from mud, silt, gravel and other foreign material. Lubricate gaskets before jointing is attempted.
    - .5 Avoid displacing gasket or contaminating with dirt or other foreign material. Do not install pipes with damaged or disturbed gaskets.
    - .6 Complete each joint before laying next length of pipe.
    - .7 Minimize joint deflection after joint has been made to avoid joint damage.
    - .8 Apply sufficient pressure in making joints to ensure that joint is complete as outlined in manufacturer's recommendations.
- .10 When any stoppage of Work occurs, restrain pipes, to prevent "creep" during down time.
- .11 Cut pipes as required for special inserts, fittings or closure pieces, as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.
- .12 Make watertight connections to manholes and catch basins.
- .13 Use prefabricated saddles for connecting pipes to sewer pipes.
  - .1 Joints to be structurally sound and watertight.
    - .1 Catch basin connection to plastic pipe: to OPSD 708.030.
    - .2 Catch basin connection to concrete pipe: to OPSD 708.010.
- .14 Temporarily plug open upstream ends of pipes with removable watertight concrete, steel or plastic bulkheads.
- .4 Pipe Surround
  - .1 Place surround material in unfrozen condition.

- .2 Upon completion of pipe laying, and after Departmental Representative has inspected pipe joints, surround and cover pipes as indicated.
- .3 Hand place surround material in uniform layers not exceeding 150 mm compacted thicknesses as indicated.
  - .1 Do not dump material within 1 m of pipe.
- .4 Place layers uniformly and simultaneously on each side of pipe.
- .5 Compact each layer from pipe invert to mid height of pipe to at least 95 % maximum density to ASTM D698.
- .6 Compact each layer from mid height of pipe to underside of backfill to at least 90 % maximum density to ASTM D698.
- .5 Backfill
  - .1 Place backfill material in unfrozen condition.
  - .2 Place backfill material, above pipe surround, in accordance with Section 31 23 10 Excavating, Trenching and Backfilling, up to grades as indicated.

### **3.3 TESTING**

- .1 Repair or replace pipe, pipe joint or bedding found defective.
- .2 When directed by Departmental Representative, draw tapered wooden plug with diameter of 50 mm less than nominal pipe diameter through sewer to ensure that pipe is free of obstruction.
- .3 Remove foreign material from sewers and related appurtenances by flushing with water.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 03 30 05 - Cast-in-Place Concrete Short Form
- .2 Section 31 23 10 - Excavating Trenching and Backfilling.
- .3 Section 32 11 23 – Aggregate Base Course
- .4 Section 33 41 00 – Storm Utility Drains.

**1.2 REFERENCES**

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM D698-07e1, Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup>) (600kN/m<sup>3</sup>).
- .2 Ontario Provincial Standard Drawings (OPSD).
  - .1 OPSD 401.030 - November 2013: Cast Iron, Square Frame with Circular Watertight Cover for Maintenance Holes
  - .2 OPSD 704.010 – November 2014: Precast Concrete Adjustment Units for Maintenance Holes, Catch Basins, and Valve Chambers
- .3 Ontario Provincial Standard Specifications (OPSS)
  - .1 OPSS.MUNI 1004 – November 2013: Material Specification For Aggregates Miscellaneous

**1.3 WASTE MANAGEMENT AND DISPOSAL:**

- .1 Separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

**Part 2 Products**

**2.1 REINFORCING STEEL**

- .1 Reinforcing steel: refer to Sections 03 30 05 - Cast-in-Place Concrete Short Form, size of bars as indicated.

**2.2 CONCRETE ENCASEMENT**

- .1 Concrete mixes and materials: to Section 03 30 05 – Cast-in-Place Concrete Short Form.

**2.3 CONDUIT SAND BASE AND SAND SURROUND MATERIAL**

- .1 Mortar sand to OPSS.MUNI 1004.

**2.4 SPACERS**

- .1 Manufactured from High Density Polyethylene and suitable as base support.



## **2.5 DRAINAGE**

- .1 Drain fittings in each manhole consisting of back flow preventer, trap and pipe connection to drainage system, in accordance with U.G. 3-2.
- .1 Back flow preventer: In-line swing check backflow preventer

## **2.6 MANHOLE DRAIN STRAINER**

- .1 Precast Manhole Drain Strainer
- .1 in accordance with U.G. 3-8.

## **2.7 MANHOLE NECKS**

- .1 Precast concrete adjustment units as per OPSD 404.010.

## **Part 3 Execution**

### **3.1 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

### **3.2 ENCASEMENT OF EXISTING CONDUIT**

- .1 Excavating, Trenching and Backfilling: refer to Section 31 23 10 - Excavating Trenching and Backfilling.
- .1 Daylight and hand excavate to exposed existing conduit to permit encasement in concrete as detailed on drawings.
- .2 Remove all loose material from bottom of excavation.
- .3 Open trench completely where indicated.
- .4 For portion of conduit(s) to be encased install base spacers at maximum intervals of 1.5 m to support conduit from bottom of excavation.
  - .1 Encase duct bank with indicated concrete cover.
  - .2 Install concrete forming for duct bank sides.
  - .3 Install steel reinforcing bars as indicated and in accordance with Section 03 30 05 – Cast-in-Place Concrete Short Form.
  - .4 Dowel duct bank using 10M reinforcing rods at bottom corners of duct bank when connecting duct to maintenance holes.
  - .5 Place concrete down sides of duct bank filling space under and around ducts.
  - .6 Use anchors, ties and trench jacks as required to secure ducts and prevent moving during placing of concrete.
  - .7 Rod concrete with flat bar between vertical rows filling voids.
  - .8 Place concrete in accordance with Section 03 30 05 - Cast-in-Place Concrete Short Form.

- .9 Tie ducts to spacers with twine or other non-metallic material.
- .10 Allow concrete to attain 50% of its specified strength before backfilling, stripping formwork and backfilling.
- .11 Backfill sides of duct bank with granular base material compacted to 95% of maximum proctor dry density in accordance with ASTM D698.
- .12 For duct bank surround material use granular base material from top of duct bank to 300mm above, compacted to 90% of the maximum proctor dry density in accordance with ASTM D698.

### **3.3 BACKFILL OF DIRECT BURIED CONDUIT**

- .1 Where existing conduit has been over exposed to accommodate installation of concrete encasement
  - .1 Place sand bedding of not less than 150 mm thick, compacted to 95% of maximum proctor dry density in accordance with ASTM D698. Extend sand surround material horizontally 150mm from each side of conduit and extend vertically to 300mm above top of conduit.

### **3.4 EXISTING MAINTENANCE HOLES**

- .1 Where indicated bench bottom of existing maintenance holes to drain floor towards sump with 1 to 48 slope minimum
- .2 Install drainage fittings in accordance with Ottawa Hydro drawing U.G. 3-2. Install strainer.
  - .1 Install storm drain as indicated, refer to Section 33 41 00 – Storm Utility Drains.

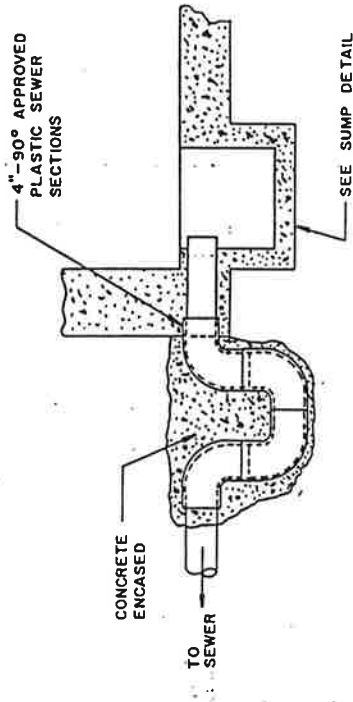
### **3.5 FIELD QUALITY CONTROL**

- .1 Site Tests/Inspections:
  - .1 Inspection of duct will be carried out by Departmental Representative prior to placing concrete.

### **3.6 CLEANING**

- .1 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**



FLOOR TRAP

CONCRETE  
ENCASED

TO  
SEWER

TO BE GLUED  
TO 4" PVC

BACK WATER  
VALVE

CLEAN OUT

ANCHOR  
WITH STRAP  
SUITABLE  
SUPPORT

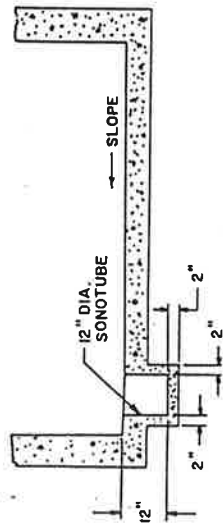
SEE SUMP  
DETAIL

4"-90° APPROVED  
PLASTIC SEWER  
SECTIONS

CONCRETE  
ENCASED

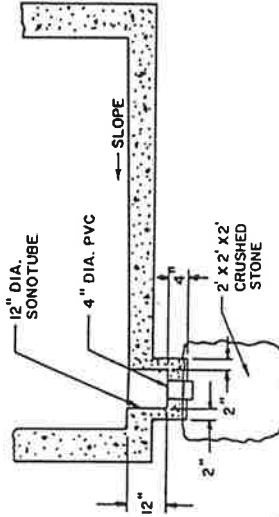
TO  
SEWER

4" APPROVED  
PLASTIC SEWER  
PIPE



DETAIL OF SUMP

(REQUIRED IF WALL TRAP SEWER CONNECTION)



DETAIL OF SUMP & DRY WELL

(REQUIRED IF NO SEWER CONNECTION)  
DEPENDENT ON TYPE OF SOIL

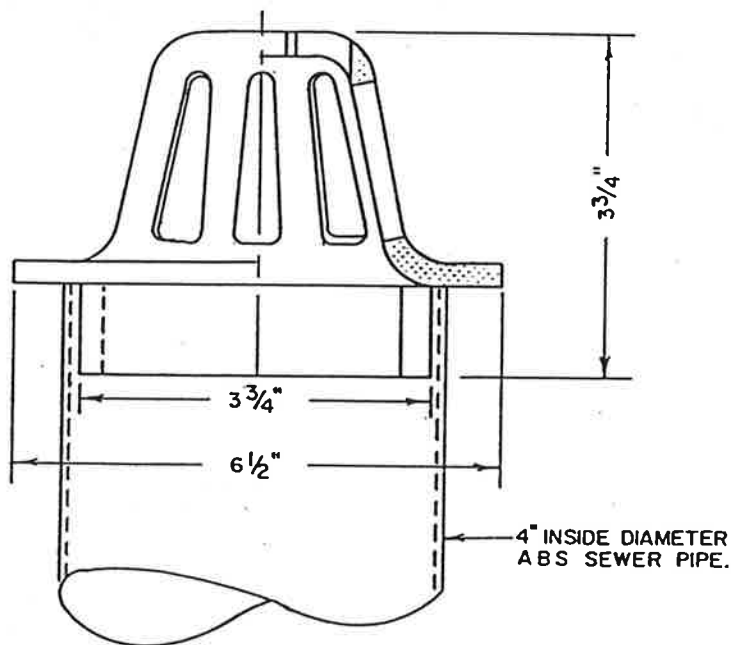
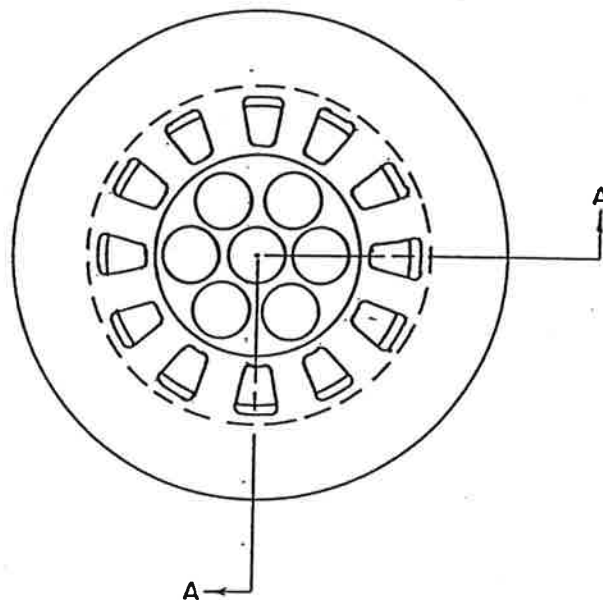
NOTE: ALL MANHOLES TO HAVE SUMPS

REFERENCE: OLD DWG. NO. U.G.-14  
OTTAWA HYDRO

TYPICAL MANHOLE  
DRAINAGE DETAIL

DRAWN - K.G.	APPROVED
DATE - DEC. 20/83	
SCALE: N.T.S.	DWG. NO. U.G. 3-2

REVISED MAR./21/89/D.L.



SECTION A-A

SUPPLIED BY OTTAWA HYDRO

OTTAWA HYDRO	
MANHOLE DRAIN STRAINER	
DRAWN - K.G. <i>K.G.</i>	APPROVED <i>[Signature]</i>
DATE - JAN. 9/83	
SCALE: N. T. S.	DWG. NO. U.G. 3-8