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This is a supplement to the *Standard Specification for Municipal Services* specific to the requirements of HRWC.

## **PART 1 - GENERAL**

### **1.1 Work Included**

- .1 This section specifies requirements for constructing precast concrete manholes, catch basins and structures. Work includes supply and installation of concrete bases, precast sections, metal castings and testing.

### **1.2 Related Sections**

- |    |                               |                       |
|----|-------------------------------|-----------------------|
| .1 | Concrete                      | SECTION 03 30 00      |
| .2 | Metal Fabrication             | SECTION 05 50 00      |
| .3 | Earthwork                     | SECTION 31 20 00      |
| .4 | CCTV Inspection               | SECTION 33 01 30      |
| .5 | Water Mains                   | SECTION 33 11 00      |
| .6 | Wastewater Mains              | SECTION 33 31 00      |
| .7 | Force Mains                   | SECTION 33 34 00      |
| .8 | Stormwater Mains and Culverts | SECTION 33 40 00      |
| .9 | Standard Details              | HRWC STANDARD DETAILS |

### **1.3 Reference Standards**

- |    |                        |   |
|----|------------------------|---|
| .1 | ASTM A48/A48M-03(2016) | Standard Specification for Gray Iron Castings.  |
| .2 | ASTM C478M-15a         | Standard Specification for Circular Precast Reinforced Concrete Manhole Sections (Metric) |

- |    |                        |   |
|----|------------------------|---|
| .3 | CAN/CSA A257 Series-14 | Standards for Concrete Pipe and Manhole Sections.         |
| .4 | ULC 701-11             | Thermal Insulation, Polystyrene Boards and Pipe Covering. |

#### **1.4 Shop Drawings**

- .1 Submit shop drawings in accordance with SECTION 01 10 00 for all pipe, fittings, valves and all other items necessary for a complete Wastewater and Stormwater System installation.

#### **1.5 Certificates**

- .1 Submit manufacturer's test data and certification that products and materials meet requirements of this SECTION and are in accordance with SECTION 01 10 00.

#### **1.6 Handling and Storage**

- .1 Handle and store pipe, valves and fittings, in such manner as to avoid shock and damage. Do not use chains or cables passing through pipe bore. Do not damage coatings or linings.
- .2 Store gaskets in cool location, out of direct sunlight, and away from petroleum products.

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## **PART 2 - PRODUCTS**

### **2.1 General**

- .1 Diameter, material and strength class of structures and fittings: as indicated.

### **2.2 Precast Bases and Sections**

- .1 Precast concrete bases and sections to ASTM C478M or CSA A257.

### **2.3 Gaskets**

- .1 O-Rings: to manufacturer's standard.
- .2 Bituminous compound: precast manufacturer's recommended compound.

### **2.4 Metal Castings**

- .1 Manhole frames and covers: to ASTM A48, gray cast iron, factory coated, HRWC logo, centered on upstream side.
  - .1 Acceptable products:
    - .1 On street, adjustable manhole frame and cover IMP R10.
    - .2 Off street, manhole frame and cover IMP R12 with locking system.
  - .2 Catch basin frame and grates: to ASTM A48, gray cast iron, factory coated:
    - .1 Acceptable products:
      - .1 Curb and gutter, IMP S361 with curb section.
      - .2 Curb and gutter, IMP S441 no curb section.
      - .3 In street, IMP S401.

### **2.5 Waterproofing**

- .1 Self-adhered waterproofing membrane on all HRWC wastewater manholes.
  - .1 Acceptable products:
    - .1 Blueskin WP200.
    - .2 MEL-ROL.

## **2.6 Insulation**

- .1 Rigid Insulation: to ULC S701, Type 4, extruded polystyrene.

## **2.7 Concrete**

- .1 Concrete: to Section 03 30 00, at 28 days, slump 80mm  $\pm$ 20 mm minimum compressive strength of 35 MPa, and maximum water cement ratio of 0.45, air entrainment, 5 - 8% total air content.
- .2 Grade Adjustment: manufactured type or cast-in-place type as indicated.

## **2.8 Grout**

- .1 Non-shrink: to SECTION 03 30 00.

## **2.9 Flexible Rubber Connectors**

- .1 Acceptable products:
  - .1 A-LOK
  - .2 Kor-N-Seal
  - .3 Inserta Tee

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## **PART 3 - EXECUTION**

### **3.1 Preparation**

- .1 Inspect products for defects and remove defective products from site.
- .2 Confirm manholes, catch basin, structures and fittings are clean before installation.

### **3.2 Excavation, Bedding and Backfilling**

- .1 Perform excavation, bedding and backfilling to SECTION 31 20 00.

### **3.3 New Installations**

- .1 Construct units as indicated.
- .2 Complete units as pipe laying progresses.
- .3 Cast or set base on 150 mm thick pipe bedding or material as indicated, compacted to 95% standard proctor density or as indicated. Top of base to be level.
- .4 Place stubs at elevations and in positions indicated. Provide flexible pipe joints within one (1) metre of outside face of poured-in-place and precast structure where there is no in-wall gasket for pipe sizes up to and including 750mm diameter.
- .5 Form manhole bases to provide smooth U-shaped channels with depth equal to diameter of pipes or as indicated. Curve channels smoothly and slope uniformly from inlet to outlet. Benching to drain towards channel, 4% maximum slope.
- .6 Install base section of precast shafting on cast-in-place base as indicated and assure watertight joint.
- .7 Install O-ring gaskets in accordance with manufacturer's instructions. In addition to O-ring gaskets, seal precast sections joints below the concrete manhole cover with 25 mm butyl resin cord in. Place cord on the upper inside ledge of the joint prior to placement of the subsequent section.

- .8 Install precast sections plumb and true with opening centered over upstream pipe.
- .9 Make all joints watertight in wastewater manholes and valve chambers.
- .10 Grout lift holes.
- .11 Wrap all HRWC wastewater manholes with self-adhered waterproofing membrane.
- .12 Set manhole frame and cover to elevation and slope indicated. Centre frame over capping ring.
  - .1 For grade adjustment use precast grade rings, maximum of 2, minimum 150 mm thickness. Secure frame in place as per manufacturer's instructions.
- .13 Set catch basin frame and grate to elevation and slope indicated. Centre frame over the opening.
  - .1 For grade adjustment use cast-in-place 35MPa concrete. Secure frame in place as per manufacturer's instructions.
- .14 Clean debris and foreign material from unit. Remove fins and sharp projections. Prevent debris from entering system.
- .15 Where two manholes or catch basins are closer together than 300 mm, fill space between with unshrinkable fill.
- .16 Utilize flexible rubber connectors for connections to the manhole. Ask HRWC for preferred product for the specific connection.
- .17 Pipe connections to manholes must not protrude more than 25 mm from interior wall.

### **3.4 Installations into Existing Systems**

- .1 Where new unit is to be installed in existing run of pipe, confirm full support of existing pipe during installation and remove that portion of existing pipe to dimensions required and install new unit as specified.
- .2 Make joints watertight between new unit and existing pipe.

- .3 Wrap all HRWC wastewater manholes with self-adhered waterproofing membrane.
- .4 Where deemed expedient to maintain service around existing pipes and when systems constructed under this project are ready to be put in operation, complete installation with appropriate break-outs, removals, redirection of flows, blocking unused pipes or other necessary work.

### **3.5 Adjusting Tops of Existing Units**

- .1 Remove existing gratings and frames and store for re-use at locations designated by HRWC.
- .2 Sectional units:
  - .1 Raise or lower straight walled sectional units by adding or removing precast sections as required.
  - .2 Raise or lower tapered units by removing cone section, adding, removing, or substituting riser sections to obtain required elevation, then replace cone section.
  - .3 Set manhole frame and cover to elevation and slope indicated. Centre frame over capping ring.
    - .1 For grade adjustment use precast grade rings, maximum of 2, minimum 150 mm thickness. Secure frame in place as per manufacturer's instructions.
  - .4 Set catch basin frame and grate to elevation and slope indicated. Centre frame over the opening.
    - .1 For grade adjustment use cast-in-place 35MPa concrete. Secure frame in place as per manufacturer's instructions.
- .3 Monolithic units.
  - .1 Raise monolithic units by roughening existing top to ensure proper bond and extend to required elevation.
  - .2 Lower monolithic units with straight wall by removing concrete to elevation indicated for rebuilding.



- .3 When monolithic units with tapered upper section are to be lowered more than 150 mm, remove concrete for entire depth of taper plus as much straight wall as necessary, then rebuild upper section to required elevation with cast-in-place concrete.
- .4 Re-use existing gratings, frames as directed by HRWC.
- .5 Set manhole frame and cover to elevation and slope indicated. Centre frame over capping ring.
  - .1 For 150 mm & 300 mm grade adjustments: Use precast grade rings, maximum of 2, minimum 150 mm thickness. Secure frame in place as per manufacturer's instructions.
  - .2 For 75 mm to 150 mm grade adjustments: Use cast-in-place 35MPa concrete. Cast-in-place concrete shall not exceed the outside edge of the capping ring. Formwork, grade stakes, shall not be permitted within the adjustment concrete or in the concrete between the frame and the capping ring. Frames shall be supported by all sides of the cast-in-place grade adjustment.
  - .3 For 25 mm to 75 mm grade adjustments: Use epoxy mortar. Epoxy mortar shall not exceed the outside edge of the capping ring. Formwork, grade stakes, shall not be permitted within the adjustment concrete or in the epoxy mortar between the frame and the capping ring. Frames shall be supported by all sides of the epoxy mortar grade adjustment.
- .6 Set catch basin frame and grate to elevation and slope indicated. Centre frame over the opening.
  - .1 For 150 mm & 300 mm grade adjustments: Use precast grade rings, maximum of 2, minimum 150 mm thickness. Secure frame in place as per manufacturer's instructions.
  - .2 For 75 mm to 150 mm grade adjustments: Use cast-in-place 35MPa concrete. Cast-in-place concrete shall not exceed the outside edge of the capping ring. Formwork, grade stakes, shall not be permitted within the adjustment concrete or in the concrete between the frame and the capping ring. Frames shall be supported by all sides of the cast-in-place grade adjustment.
  - .3 For 25 mm to 75 mm grade adjustments: Use epoxy mortar. Epoxy mortar shall not exceed the outside edge of the capping ring. Formwork, grade stakes, shall not be permitted within the adjustment concrete or in the epoxy mortar between the frame and

the capping ring. Frames shall be supported by all sides of the epoxy mortar grade adjustment.

### **3.6 Seal Over Existing Units**

- .1 Fill with cast-in-place concrete approved by the HRWC.

### **3.7 Testing**

- .1 Test wastewater manholes and structures.
- .2 Provide labour, equipment and materials required to perform testing.
- .3 Backfill prior to testing.
- .4 Notify HRWC 24 hours in advance of proposed test. Do test in presence of HRWC.
- .5 Vacuum testing as follows:
  - .1 Plug all inlet and outlet pipes. Restrain plugs.
  - .2 Place and seal vacuum tester head on the manhole frame.
  - .3 Draw vacuum of 250 mm Hg on the manhole and measure the time for the vacuum to drop to 225 mm Hg.
  - .4 Time to be not less than 45, 50, 65, and 80 seconds for manhole diameters of 1050mm, 1200mm, 1500mm, and 1800 mm respectively.
  - .5 For manholes deeper than 6 meters, increase test times by 2 seconds per 300mm of additional manhole depth.
  - .6 Locate and repair defects if test fails. Retest using same methodology.
  - .7 Repair leaks regardless of test results.