

**CITY OF WHITEHORSE SERVICING STANDARDS MANUAL**  
**PART 3 - SPECIFICATIONS**  
**SECTION 3.7 – STORM AND SANITARY SEWER MAINS**

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## **SECTION 3.7 – SEWER MAINS**

### **3.7.1 SCOPE**

The work described in this sub-section pertains to supply and installation of sanitary and storm sewers.

### **3.7.2 MATERIALS**

All work described in this section is to be carried out in strict accordance with manufacturer's recommendations unless otherwise noted.

#### **3.7.2.1 SANITARY SEWER MAINS**

Pipe sizes are as shown on the construction drawings. Pipe used for the sanitary sewer mains are to conform to Section 2.4.3.

#### **3.7.2.2 INSULATION**

Sanitary sewer mains, if insulated, are to be insulated using a rigid foam, factory-applied material as specified in Section 2.4.4.

#### **3.7.2.3 STORM SEWER MAINS**

Pipe used for the storm sewer mains is to conform to Section 2.5.3.1.

#### **3.7.2.4 MANHOLES**

Manholes are to be as specified in Section 2.4.5.

#### **3.7.2.5 CATCH BASINS AND LEADS**

Catch basins and catch basin leads are to conform to Section 2.5.3.3.

#### **3.7.2.6 BEDDING SAND**

The bedding sand, free from organic material, is to meet the grading requirements specified in Section 3.5.2.1.

#### **3.7.2.7 BEDDING STONE**

Bedding stone is to be used when wet trenching conditions exist.

The bedding stone, free from organic material, is to meet the grading requirements specified in Section 3.5.2.2.

### **3.7.3 INSTALLATION**

The Developer is to install all manholes, drop inlets, junctions, risers, catch basins and other appurtenances at the locations shown on the construction drawings or as directed by the Consultant. Installation is to be in accordance with the standard drawing for each appurtenance with the base of each structure to be on solid unfrozen ground.

#### **3.7.3.1 BEDDING AND INITIAL BACKFILL**

All sewer pipe bedding and backfill is to conform to section 3.5.3.3.

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### **3.7.3.2 PIPE LAYING**

Each pipe is to be set to line and grade as shown on the Consultant's drawings. Pipe laying is to commence at the lowest point of the length being laid with the slope being uniform and continuous between manholes.

### **3.7.3.3 JOINTS**

All joints are to be made in strict accordance with the recommendations of the manufacturer and the specifications herein.

#### **3.7.3.3.1 Concrete Pipe**

To enable proper joints, bell or coupling holes are to be provided in the bedding material. Pipes are to be placed with the spigot ends pointing in the direction of flow. An O-ring type rubber gasket is to be used to join bell and spigot concrete pipe. The spigot may have a groove for the rubber gasket. The rubber gasket used is to be suitable for the particular size and type of bell and spigot pipe being installed. The ends of the pipe to be joined and the rubber ring are to be wiped clean and dry immediately before assembly.

Only the lubricant recommended by the rubber ring manufacturer is to be applied to the rubber ring or the ends of the pipe. Vertical or horizontal pipe deflection at the joints is not to exceed that recommended by the manufacturer. All gaskets are to conform to ASTM Specification C443.

Sewers 750 mm in diameter and larger are to have the joints coated with cement mortar from the inside for the full circle. The grout is to consist of 1 part cement to 2 parts clean, sharp sand, with sufficient water added to produce a stiff paste.

Regardless of the type of joint used, after each joint is made, the inside of the pipe is to be cleaned of all dirt and debris. All lifting holes are to be plugged with concrete mortar. The concrete mortar is to be troweled smooth and flush with the inside face of the pipe.

All joints and junctions of sewer pipe to manholes, catch basins, and curb inlets are to be carefully sealed with cement mortar.

#### **3.7.3.3.2 Polyethylene Pipe**

Wherever possible the polyethylene pipe should be joined by the method of thermal butt-fusion, as outlined in ASTM-D2657, Polyethylene Heat Joining Polyethylene Pipe and Fittings. Butt-fusion joining of pipe and fittings are to be performed in accordance with procedures recommended by the manufacturer.

#### **3.7.3.3.3 Ductile Iron and Polyvinyl Chloride Pipe**

Pipe joints are to conform to that specified in AWWA C111, latest revision thereof.

To enable proper joints, bell or coupling holes are to be provided in the bedding material.

Pipes is to be placed with the spigot ends pointing in the direction of flow. A ring tite connection is to be used to join bell and spigot. The ends of the pipe to be joined are to be wiped clean and dry immediately before assembly. Only the soap lubricant recommended by the manufacturer is to be applied to the ends of the

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pipe. Pipe deflection at the joints, either vertically or horizontally, are not to be excess of one half the manufacturer's recommended value. PVC pipe for sewers is not to be blue.

#### **3.7.3.3.4 CSP Ultra Flow Pipe**

Pipes are to be coupled using Hugger Band couplings complete with double "O" ring, rubber gaskets, and a 3-fastener coupler. The ends of the pipe to be joined are to be wiped clean and dry immediately before assembly. Only the vegetable lubricant recommended by the manufacturer is to be applied to the ends of the pipe. Coupler and bolts are to be installed and tightened to the torque rating specified by the manufacturer.

#### **3.7.3.4 APPURTENANCES**

The following are standard requirements for manholes and catch basins:

- Manholes and catch basins are to be constructed of precast concrete sections complete as shown on the standard drawings in Section 4.
- The area around the pipe at the junction of the sewer main and the manhole is to be grouted to form a smooth joint.
- The channeled floor is to be constructed according to the standard drawings in Section 4 utilizing type 50 cement.
- Manhole and catch basin sections are to be joined using a rubber gasket and cement mortar. Rubber gasket joints are to be made in accordance with the recommendations of the manufacturer. For cement mortar, a layer of mortar is to be applied to the inside and outside of each joint. All lifting holes are to be plugged with cement mortar and finished flush with the manhole wall. The mortar joints and holes are to be painted with a waterproof bituminous mastic on the outside of the joints.
- Manhole and catch basin frames and covers are to be set to the grade determined by the Consultant or as shown on the construction drawings.
- In freezing conditions, sand and cement are to be heated and the mortar mixture applied hot. The mortar is to be protected from freezing until mortar has set.

#### **3.7.3.5 CONCRETE**

All concrete for bedding, drop inlets, junctions, risers and other appurtenances is to be type 10, Normal or Type 50, sulphate resistant as specified by a Geotechnical Engineer, benching to be Type 50 only. Concrete is to develop a compressive strength of not less than 20 MPa in 28 days. The maximum slump is to be 100 mm. Aggregate proportioning, measurement, mixing, placing and finishing is to be done in accordance with the current issue of CSA Standard CAN3-A.23.1. Concrete poured during temperatures lower than five degrees Celsius is to have a temperature not less than 5 degrees Celsius, and suitable means are to be provided to maintain this temperature for 72 hours. Concrete surfaces are to be moist-cured for not less than 24 hours. All forms for concrete are to be oiled, tight, rigid, strong, and well braced.

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### **3.7.3.6 CONNECTION TO EXISTING UTILITIES**

The Developer is to break into existing manholes, catch basins, or sewers, after covering existing channels to prevent debris from entering the system. This work is to be performed to the proper Canadian Construction Standards and according to the dictates of good practice. Existing manhole floors are to be rechanneled and properly benched; the junction area is to be grouted to form a smooth joint; all debris, including concrete and excavated material, is to be removed; and the vicinity of the connection is to be left in a tidy condition acceptable to the Consultant.

### **3.7.4 TESTING**

Upon completion of backfilling, sewer mains are to be tested for alignment, obstructions, infiltration, and exfiltration. If any section of the sewer main does not meet the requirements for alignment, obstructions, and infiltration, the Developer is to make such repairs and replacements as necessary until the sewer main meets these requirements.

#### **3.7.4.1 TOLERANCES**

The following tolerances on alignment, grade, joints, and deflections are to be met before the Engineer accepts any sanitary or storm sewer:

**ALIGNMENT** - the centerline of 900 mm pipe and smaller is not to be more than 150 mm off the given line. The centerline of pipe greater than 900 mm is not to be more than 50 mm per 300 mm of diameter off the given line. Where the pipeline alignment is straight between manholes, a line of sight must exist from manhole to manhole.

**GRADE** - the invert of the sewer main is not to deviate from the given grade by an amount greater than 6 mm plus 20 mm per meter of diameter of sewer pipe.

**JOINTS** - Deflections at concrete pipe joints are not to exceed the specifications for concrete pipe in ASTM C76.

The Consultant or their authorized inspector are to visually inspect manholes, mains, and related appurtenances. If any work does not meet the requirements of the following specifications, the Developer is to make such remedies as necessary to complete the work.

If by manual inspection it is determined that:

- Service connections are not in accordance with the specifications;
- Tolerances of sewer lines are not in accordance with the specifications (ASTM C76, ASTM C655);
- Cracks of width greater than 0.25 mm longer than 300 mm;
- Any non-reinforced concrete pipe, manholes; catch basins leads or sewer appurtenances do not meet the specifications;
- Other conditions exist that do not meet the specifications;

Then these unsatisfactory conditions are to be remedied to the satisfaction of the Engineer.

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### **3.7.4.2 STORM AND SANITARY SEWER VIDEO INSPECTION**

#### **3.7.4.2.1 General**

All storm and sanitary sewers less than 800 mm in diameter are to be inspected by video camera. The camera inspection is to occur only after completion of backfilling of the trench to finished grade.

All video inspection is to be carried out in the presence of the Consultant, who is to be given at least 48 hours advance notice of any testing to be carried out.

The Developer is responsible for cleaning and flushing all lines.

The Developer is to be responsible for all works performed and for traffic control and any other related work incidental to the completion of the video inspection.

#### **3.7.4.2.2 Video Equipment**

The Developer is to provide video equipment for use in carrying out the video inspection.

The video equipment is to consist of a waterproof self-contained camera and monitoring unit connected by cable.

The camera must be capable of providing the following:

- Measurement within the line to an accuracy of 0.33m/km; and
- Sufficient illumination of the interior of the pipe to obtain proper exposure without introducing motion blur.

The video camera system must be 100% digital and is to be capable of producing continuous 600-line resolution digital video showing the entire periphery of the pipe and entire perimeter of all service connections. The following capabilities and items must also be available:

- Direct voice communication;
- A camera towing service;
- Self-contained electrical power; and
- Proper safety equipment to protect employees and the general public

The camera's rate of progress is to be uniform during inspection and is not to exceed 6 m/min.

#### **3.7.4.2.3 Video Technician Qualifications**

The Developer is to employ a qualified video technician acceptable to the Engineer and meeting the following qualifications:

- Fully trained in all aspects of sewer inspections; and
- Capable of making accurate observations and recording all conditions that may be encountered during the course of the inspection.

#### **3.7.4.2.4 Submission of Video**

Video footage of the inspection is to be submitted to the City of Whitehorse in mp4 file format.

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The following information is to be included on the video footage:

- 1) Project;
- 2) Location;
- 3) Time/Date;
- 4) From Manhole – To Manhole;
- 5) Pipe type;
- 6) Pipe size;
- 7) Flow (with or without);
- 8) Sewer Type (Storm or Sanitary);
- 9) Manhole Depth;
- 10) Name of Video Technician carrying out the inspection; and
- 11) Distance measured from manhole

**3.7.4.2.5 Additional Submittals**

A video log is to be maintained during the inspection and is to record the location and condition of all service connections and the location of all leaks, faults, open joints, breaks, cracks, collapses, settlements, obstructions, evidence of infiltration or any other defects affecting the overall performance of the sewer line. The location of all defects are to be referenced by distance from the manhole at which the inspection was initiated.

The video log is to be submitted, in Word document format, along with video inspection footage.

**3.7.4.2.5 Deficiencies**

All deficient work is to be recorded on video, including recorded location from manhole at which the inspection was initiated.

The Developer will be required to repair, re-install, restore or otherwise make good, to the satisfaction of the Engineer, any deficient work, including alignment problems, cracked or broken pipe, deformed pipe, leaks or any other faults not conforming to these specifications or those of the pipe manufacturer which the television inspection reveals.

**3.7.4.2.5 Re-Inspection**

After the deficiencies are repaired and corrected, but before final acceptance, the Engineer reserves the right to have the faulty areas re-inspected by the Developer.

Video footage and a new Video Log of the re-inspected faulty areas are to be submitted to the Engineer prior to final acceptance of the sewer line.

**3.7.4.3 INFILTRATION AND EXFILTRATION TESTS**

Infiltration and exfiltration tests may be conducted on all sewers. The Engineer is to choose those sewers to be tested after construction is completed.

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Test duration to be a minimum of 2.0 hours.

Prior to undertaking exfiltration testing, the pipe and manholes are to be allowed to absorb water for 24 hours before starting the test.

All infiltration and exfiltration tests are to be conducted after the service connections to the main have been installed (service connections include in-line tees/wyes, saddles, etc.).

The maximum allowable infiltration and exfiltration is 1.0 L/hour per 10 mm of pipe diameter per 100 m length of pipe.