

SECTION 4B

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STANDARD DRAWINGS

W1	Single Family Residential Water Service Connection
W1A	Single Family Residential Inside Water Meter Installation
W2	Below Grade Flushout Detail
W3	Above Grade Flushout Detail
W4	Thrust Block Details
W4A	Thrust Block Areas
W5	Heavy Duty Manhole Cover and Frame
W5A	Utility Chamber Manhole Frame, Ring & Cover
W6	Hydrant Connection - Type 1
W7	Hydrant Connection - Type 2
W8	Air Release Valve Assembly - Type 1
W9	Air Release Valve Assembly - Type 2
W10	Plastic Meter Box For 19 mm Dia. Services
W11	Concrete Meter Box For 19 mm Dia. Services
W12	Concrete Meter Box For 25 mm and 37 mm Dia. Services
W13	Typical Meter Chamber
W14	Gate Valve
W15	Fire / Domestic Water Meter - Piping Layout
W16	Domestic Water Meters (50 mm to 450 mm Piping Layout
W17	Fire Line Service Piping Layout

SECTION 4B**WATER - INSTALLATION****4B.1 SCOPE**

This section will govern the installation of water pipe and waterworks appurtenances within the Municipality.

4B.2 GENERAL

4B.2.1 Any installations, not covered by this section, shall be in accordance with current AWWA Standards and manufacturer's recommendations.

4B.2.2 During construction, water and debris shall be prevented from entering the new system by keeping the excavation sufficiently dewatered and also by capping or plugging any openings with watertight fittings. Pipe and fittings shall be protected from contamination during construction.

4B.2.3 Any connection to the existing system shall be carried out by Municipal Crews at the Developer's expense. Operation of existing valves or hydrants shall be by Municipal personnel only.

4B.2.4 Where installations of other services cross under Asbestos Cement watermains, the Engineer may require that a section of the A.C. main be replaced with Ductile Iron or PVC pipe such that the full trench width is bridged. This work shall be done by Municipal crews at the Developer's expense unless otherwise approved by the Engineer.

4B.2.5 Ductile iron pipe shall be installed without joint conductance unless specifically required for corrosion protection.

4B.3 PIPING

4B.3.1 Standards for excavation, bedding, backfilling and restoration shall be in accordance with Section 3.

4B.3.2 Pipe shall be handled, stored and laid in accordance with the recommendations of the pipe manufacturer. Particular care shall be taken to ensure that before each joint is made, the pipe is cleaned and all dirt and other debris removed.

4B.3.3 Pipe shall not be backfilled until the bedding, grade and alignment has been approved by the Consulting Engineer.

4B.3.4 All pipe shall be laid to the designed alignment and grade with the following tolerances:

- a) Horizontal tolerance shall not be greater than 100 mm from designed location;
- b) Vertical tolerances shall not be greater than 20 mm from designed grades on 200 mm and larger watermains.

4B.4 **GATE VALVES**

- 4B.4.1 Gate valves shall be installed at the location shown on the design drawings in accordance with Standard Drawing W14.
- 4B.4.2 Each valve shall be provided with a valve box as specified on the Standard Drawing. The valve box shall be centred and plumb over the wrench nut of the valve, shall be set evenly on the valve bonnet, shall be supported so it does not transmit shock or stress to the valve and shall be braced against lateral movement of the sides of the trench. The top of the valve box shall be adjusted to the elevation required by the Engineer. Valve boxes, which are neither plumb nor centred over the valve nut shall be dug up and reset properly.
- 4B.4.3 A stem extension shall be installed where the valve operating nut bury is deeper than 1.2 m.

4B.4 **HYDRANTS**4B.5.1 **Hydrant Installation**

- a) Hydrants shall be installed at the locations shown on the design drawings and in accordance with Standard Drawing W6 or W7 and Section 4A.6.3
- b) Hydrant installation shall be in general accordance with AWWA manual M17.
- c) Hydrants shall be set plumb and such that **the pumper nozzle faces, and is at right angles to the road centreline** unless otherwise directed by the Engineer.
- d) Hydrants shall be **set with the ground flange 100 mm above finished ground or sidewalk surface** unless otherwise directed by the Engineer.
- e) Care shall be taken in installing the connection pipe from the main to the hydrant to ensure that the hydrant is set at the specified level.
- f) Drain rock shall be placed as shown on the standard drawing for a hydrant connection to a level above the hydrant drain openings. The drain rock shall be covered with roofing, tar paper or filter cloth before backfilling to prevent plugging up of the drainage pit.
- g) After installation, hydrants shall be covered with firmly secured burlap sacks until they are put into service.

4B.5.2 **Hydrant Thrust Blocking**

- a) **Hydrant thrust blocking and tie rod installation is to be inspected and approved by the Town inspector prior to backfill.**
- b) Hydrant thrust blocking shall only be used in situations where installation of tie rods is not acceptable as determined by the Engineer.

- c) Care shall be taken to ensure that concrete for thrust blocking does not interfere with the operation of flange bolts and nuts or prevent property operation of hydrant drains.
- d) Thrust block bearing areas shall be as shown on the drawings.

4B.6 AIR VALVES

Air valves shall be installed at the locations shown on the design drawings and in accordance with Standard Drawing W8 or W9. Care shall be taken to ensure that the air valve is properly located in the chamber to permit maintenance and removal. The air valve chamber must also be free draining; installation of a connection to the storm drain system may be required to ensure this.

4B.7 FLUSHOUTS

Permanent or temporary end of line assemblies shall be as applicable at the locations shown on the design drawings in accordance with Standard Drawing W2 or W3 and shall be located as directed by the Engineer.

4B.8 THRUST BLOCKING

4B.8.1 All plugs, caps, tees, crosses, reducers, valves, and bends deflecting 11-1/4 degrees or more, and all points where there is unrestrained thrust, shall be anchored to prevent movement by providing suitable thrust blocking, metal harness or tieback rods. Thrust blocking details are shown on Standard Drawing W4.

4B.8.2 **Thrust blocking and tie rod installation is to be inspected and approved by the Town inspector prior to backfill.**

4B.8.3 Reaction blocks shall be concrete having a compressive strength of not less than 20.7 Mpa at 28 days.

4B.8.4 Blocking shall be placed between undisturbed ground and the fitting to be anchored. The arrangement of the blocking shall be as shown on the standard drawing and all blocks shall be sized in accordance with good engineering practice for the prevailing soil conditions. The reaction blocking shall be so placed that the pipe and fittings will be accessible for repair. Where reaction blocking comes in contact with piping, 6 mil polyethylene or burlap sacking shall be placed between the pipe and concrete.

4B.8.5 End of line valves and caps shall be tied back with rods anchored to concrete thrust block as on Standard Drawing W4.

4B.9 WATER SERVICES

4B.9.1 Single family residential water services shall be installed at the locations shown on the design drawings in accordance with the Standard Drawing W1.

4B.9.2 A minimum of 100 mm of bedding shall be placed under the pipe and a minimum of 150 mm of

bedding shall be placed over the pipe. Trenching, bedding, and backfilling requirements shall be in accordance with Section 3.

4B.9.3 Meter boxes, meter setters and meters shall be installed by the contractor. Plastic meter boxes shall be used in untravelled areas. Concrete meter boxes, complete with steel lid, shall be used if the meter box is located under a traveled area such as a driveway. Care shall be taken to ensure that all boxes are installed close as possible to finished grade.

4B.9.4 Water meters shall be supplied and installed by the Developer's Contractor.

4B.9.5 All water services shall be connected to the main by means of an approved service saddle, as detailed on Standard Drawing W1. The water service pipe shall be connected to the upper half of the watermain inclined at an angle of 30 degrees with the horizontal leaving a suitable gooseneck. A corporation main stop shall be installed at the main in accordance with the manufacturer's specifications or instructions. Water services shall be installed from the watermain to the property line using the shortest and straightest route, however sufficient slack shall be provided to allow for settlement during backfilling and compaction.

4B.9.6 Wooden markers shall be installed at all meter boxes. The marker shall be 50 mm x 100 mm (2" x 4") wood and shall extend from the invert of the service to 600 mm above ground level. The top 600 mm shall be painted blue.

4B.10 **PRESSURE AND LEAKAGE TESTING**

4B.10.1 Pressure and leakage tests shall be performed on all installed pipes, hydrants, valves, fitting and service connections.

4B.10.2 Pressure and leakage tests can be commenced upon completion of all underground utility installation. Prior to testing, concrete thrust blocking shall be sufficiently cured to restrain fittings, valves and hydrants.

4B.10.3 Testing procedures shall be submitted to the Engineer for approval prior to commencement of testing.

4B.10.4 Hydrant lead valves and service corporation stops shall be fully opened during the test. Pressure and leakage tests shall be carried out between valved sections of the installation such that every valve in the system is tested for leakage in the shut-off position.

4B.10.5 Pressure and leakage testing shall be conducted in the presence of the Consulting Engineer and the Town of Ladysmith Works Inspector.

4B.10.6 Pressure and leakage tests for ductile iron piping shall be in accordance with AWWA C600.

4B.10.7 Testing of welded steel piping shall be in accordance with AWWA C206. No leakage shall be allowed.

4B.10.8 Pressure and leakage tests for PVC pipe shall be performed in the following manner:

- a) Fill the section to be tested slowly with water and expel all the air from the section.
- b) If air relief valves are not required at the high points of the test section, the pipe shall be tapped to release all air and approved plugs inserted upon completion of testing.
- c) Pump water into the test section until the static pressure reaches 1035 kPa (150 psi) or 1.5 times the average system operating pressure at the point of test, whichever is greater.
- d) Maintain the test pressure in the pipe to 70 kPa (10 psi) throughout the duration of the test by the addition of a measure quantity of water. The duration of the test shall be a minimum of one hour.
- e) The quantity of water required to maintain the test pressure shall be considered to be the leakage.
- f) The maximum allowable leakage shall be determined from the following formula:

$$L = \frac{HND \times \text{square root of } P}{130,000}$$

in which L = Maximum allowable leakage (litres/hours)

H = Test duration (hours)

N = Number of joints in the test section

D = Inside diameter of the pipe (mm)

P = Average test pressure (kPa)

- g) Should testing disclose leakage above the maximum allowable leakage the contractor shall locate and repair or replace the defect and retest the section until test results are satisfactory.
- h) A copy of the leakage and test pressure report shall be forwarded to the Town's Works Inspector.

4B.11 CHLORINATION AND FLUSHING

4B.11.1 Prior to chlorination, all piping and appurtenances shall be flushed with a minimum velocity of 1.0 m/s. Dispose of flushing water only to drainage works capable of carrying the flows.

Before being placed into service all new watermains shall be chlorinated throughout their entire length in accordance with the latest AWWA specification C601. The method to be used to introduce the disinfectant into the line must be approved by the Engineer and the Provincial Ministry of Health. Extreme care shall be taken to ensure that the existing system is not contaminated during the disinfecting process. Municipal personnel shall be involved in the operating of any valves interconnecting the existing and new system.

4B.11.2 Three methods of chlorination approved by AWWA are the continuous feed method, the slug

method and the tablet method. The continuous feed method is generally the most applicable to the small diameter watermain installations found in new developments. This method is briefly outlined below for reference. The slug method is suitable for use with large diameter mains, which, because of the volume of water involved, the continuous feed method is not practical. The tablet method is best suited to short extensions and small diameter mains, however it does not permit preliminary flushing. Refer to the latest revision of AWWA C601 for details of all three methods.

4B.11.3 Continuous Feed Method

When using the continuous feed method, water from the existing system shall be fed in the mains as chlorine is also fed at a constant measure rate. The two rates shall be so proportioned so that the chlorine concentration in the water in the pipe is maintained at a minimum of 50 mg/l free residual chlorine. During the application of chlorine, valves must be controlled to stop the treatment dosage from flowing back into the existing system. Chlorine application shall not cease until the entire main is filled with the chlorine solution; appropriate valves and hydrants shall be operated to ensure this. The chlorinated water shall be retained in the system for at least 24 hours, after which time the treated water shall not contain less than 25 mg/l free residual chlorine throughout the system.

4B.11.4 After chlorination is completed the mains shall be thoroughly flushed. Disinfection water shall not be discharged to the sanitary sewer, storm drainage system or a natural water course. Where necessary, the disinfection water shall be dechlorinated in order to ensure the discharge meets Ministry of Environment and Federal Fisheries requirements.

4B.11.5 Twenty-four hours after completion of chlorination and flushing, bacteriological sampling and testing arrangements shall be carried out by the Consulting Engineer in the presence of the Municipal Inspector. The system shall not be put into operation until test results have been reviewed and the Engineer has granted approval.

4.B.12 NOTIFICATION TO ENGINEER - SYSTEM TESTS AND CHLORINATION

The Engineer shall be given 48 hours written notice in advance of all system tests and pipe chlorination by the Contractor.