



## **4.0 WATER DISTRIBUTION SYSTEM**

### **4.1. General**

The design of the water system shall conform to the “Standards and Guidelines for Municipal Waterworks, Wastewater, and Storm Drainage Systems in Alberta”, as published by Alberta Environment and as amended by these Design Guidelines and Construction Standards.

#### ***4.1.1. Municipal Water System***

The Contractor may be required to tie into a municipal water system or to shut off system valves to undertake the proposed Work. When this is required, the Contractor shall:

- 1) Give the County sufficient notice of the proposed Work and schedule so proper planning and approvals can take place.
- 2) Supply all water necessary for the Work and obtain written permission from the County prior to using any hydrants.
- 3) Obtain written permission prior to operating any of the County’s valves and/or hydrants. The Contractor shall be held responsible for any damage done to the hydrants or surrounding area. The County may require their own personnel to operate their valves and/or hydrants.
- 4) Make an agreement with the County for payment of water used.
- 5) Be responsible for the supply of all water necessary for the Work.
- 6) Provide 24 hours notice to any property owner affected by water service disruption.
- 7) Supply an alternative water service if the water disruption is longer than 4 hours.



- 8) For establishments relying on an uninterrupted water source for their operations, an alternative water source shall be provided.
- 9) The above noted requirements shall be done at the Contractor's cost.

#### ***4.1.2. Design Requirements***

The minimum size of distribution main shall be 150 mm diameter for residential, 200 mm diameter for commercial and 300 mm diameter for industrial.

PVC pipe shall be used and the value of "C" in the Hazen-Williams formula shall be 120 for all types of pipes.

Per capita consumption shall be:

- 1) Average Daily Demand - 340 lpd
- 2) Maximum Daily Demand - 1.8 x Average Demands
- 3) Peak Hourly Demand - 3.0 x Average Demands

The design population shall be the ultimate for the area under consideration.

For non-residential developments, the minimum water consumption rate shall be equal to 0.20 L/sec per hectare. The applied peaking factor shall be  $P_f = 10Q^{-0.45}$  to a maximum of 25 and a minimum of 2.5, Q being in L/sec. Where possible, water demand shall be based upon site specific requirements for identified uses. Fire flow requirements are to be included in all calculations.

An analysis will be made for Peak Hour Demand, and mains shall be sized such that there will be a minimum residual pressure of 276 kPa (40 psi) at ground level at any location in the system.

Separate analysis shall be made for Maximum Demand plus Fire Flow. The residual pressure at any location at the ground level shall not be less than 140 kPa (20 psi).



Fire flow requirements shall be in accordance with the Fire Underwriters Survey publication entitled "Water Supply for Public Fire Protection – a Guide to Recommended Practice", latest revision thereof. Generally these are:

For single family residential 75 l/sec, for multi-family residential 90 l/sec, for Institutional 90 l/sec, commercial 190 l/sec, and light industrial 230 l/sec.

Where the size of the area to be developed warrants, or if required by the County, a network analysis will be carried out and all relevant information will be submitted with the design documents.

Water main looping will be required where the number of lots exceed 20 lots unless otherwise approved by the Director of Public Works.

#### ***4.1.3. Water Main - Location and Installation***

Mains shall be installed to provide a minimum depth of cover of 2.75 m below the final finished surface grade. Refer to Standard Drawing 4.1.

In all cases a distance of 3.0 m from the centreline of a road shall be maintained.

A minimum of a 3.0 m horizontal separation shall be maintained between a water main and any sewer main.

The minimum requirement for pipe bedding shall be Class "B" bedding.

Water main installation shall be in accordance with manufacturer's requirements and these Specifications.

Water mains less than or equal to 300 mm diameter in size will not apply for oversize.

#### ***4.1.4. Hydrant - Location and Installation***

The maximum allowable spacing between fire hydrants shall be 150 m in single-family residential areas and 120 m in multiple-family residential, school, and 100 m in industrial/commercial areas.



Hydrant locations shall be such that the distance to any building shall be no greater than 75 m. For the case of multi-family and/or commercial buildings with standpipes, the distance shall be 45 m unobstructed driving distances, between hydrant and standpipe.

Hydrants on the distribution main will be installed at the projection of property lines, except:

- 1) Where the hydrants are installed at the intersections, they shall be installed adjacent to the cut-off corners of the lot.
- 2) Where the hydrants are installed in a cul-de-sac, they will not be installed within the turning circle but shall be located at the tangent points.
- 3) Where a hydrant and sanitary manhole fall on the same property line projection, the manhole will be moved a minimum of 5 m away from a hydrant.

Hydrants shall be located to conform to curb and sidewalk design and shall be installed as follows:

- 1) The center of the barrel is to be 2 m back of face-of-curb or 0.5 m back of walk. With rural cross-sections, install hydrants 1.0 m from property line.
- 2) The maximum distance from the face of the curb to the hydrant shall be 3.5 m.
- 3) Shall be installed in accordance with the Standard Drawing 4.2 and the Director of Public Works Standards outlined in these documents.
- 4) Hydrants shall be plugged or draining depending on the site conditions (high ground water or poor soil drainage).
- 5) A gate valve will be provided on each hydrant lead.
- 6) Cathodic protection to be installed as per Standard Drawing 4.8, 4.9 and 4.10.
- 7) All bolts to be stainless steel.
- 8) All barrels to be epoxy coated.



Additional hydrants shall be installed at high value properties if deemed necessary by the County.

#### ***4.1.5. Valve - Location and Installation***

All valve boxes located in streets shall be left flush with the base course asphalt. Immediately prior to the final lift of asphalt being placed, these valve boxes shall be raised to final grade. Refer to Standard Drawing 4.3.

Valves on the distribution mains will be installed:

- 1) At the projection of a property line at intersections or in mid-block, for urban sections; 1 m from property line for rural sections.
- 2) With two valves at a tee and three valves at a cross.

#### ***4.1.6. Valve Box***

Valve box shall be Norwood Foundry Type A, PVC or Cast. Valve box shall consist of a cast iron bonnet of sufficient size to fit over the valve, and an adjustable cast iron top box with lid. Refer to Standard Drawing 4.4 and 4.5.

Valve boxes shall be of suitable length for depth of bury specified for mains, with possible adjustment of 300 mm up or down from this length.

Valve box extensions shall be cast iron suitable for use with the valve box to be installed.

All cast iron surfaces to have a bituminous coating for corrosion resistance.

Distribution main valves shall be located such that during a shutdown:

- 1) No more than one hydrant is taken out of service;
- 2) No more than four valves are required to affect a shutdown;
- 3) No more than twenty residential units are taken out of service by a shutdown, including cul-de-sacs; and



- 4) Valves shall be installed in accordance with the Contract Specifications for the project and as per the Standard Drawing.

#### ***4.1.7. Thrust Block***

At all hydrants, plugs, tees, crosses, bends and all other points of concentrated thrust, provide reaction blocking (thrust blocks), as detailed, to prevent movement. Place reaction blocking against solid undisturbed ground. Details provided herein are intended to be general, and are based upon soil load values of 7,300 kg/m<sup>2</sup> or more. Where soil will not provide this load value, provide additional bands and clamps, or provide more substantial reaction blocking, as required to take the anticipated reaction. Place blocking to provide access to pipe and fittings for repairs or future extensions of the line.

Thrust blocks will be provided as per the Standard Drawing 4.5 and 4.6. Thrust blocking shall be Type 50 sulphate resistant concrete having a minimum compressive strength of 20 MPa at 28 days.

Pipe restraint devices shall be used separately or in conjunction with thrust blocks, where identified as being required, and shall be in accordance with the manufacturer's recommendation. All restraint devices shall be stainless steel or suitable, resistant to corrosion, to the satisfaction of the County.

#### ***4.1.8. Hydrostatic Pressure Testing***

Tests shall be made only after completion of services, partial or complete backfill, and a minimum of 24 hours after the pipe has been filled with water. No test will be applied until at least 36 hours after the last concrete thrust block has been cast with high early strength cement, or at least seven days after the last concrete thrust block has been cast with sulfate resistant cement. The duration of each test shall be two (2) hours. Test pressure will be 2.0 times the normal system operating pressures or 1,035 kPa (150 psi), whichever is greater. Test pipeline in sections not exceeding 365 meters in length.



#### ***4.1.9. Disinfection***

All water mains will be disinfected in accordance with AWWA specification C651, latest revision.

Before being placed in service, and before certification of completion by the Director of Public Works, all installed mains will be disinfected according to the AWWA Standard C651-99 "Disinfecting Water Mains" and tested for bacterial content and chlorine residual.

On completing the chlorination of the mains, the Contractor shall set the system in operation as directed by the Director of Public Works.

Dechlorination of the chlorinated water may be required in some circumstances before discharging the water to the environment, in order to meet the regulatory requirements of the County or Alberta Environmental Protection. Dechlorination, if required, is to be performed by adding neutralizing chemicals (AWWA C651-86, Appendix B) to the chlorinated water as it is flushed from the system and before it enters the receiving environment.

#### ***4.1.10. Cathodic Protection***

All buried fittings and valves shall be cathodically protected with a 2.3 kg Zinc Anode, and all hydrants shall be cathodically protected with a 5.5 kg Zinc Anode.

Zinc Anodes shall conform to ASTM B418-73, Type II.

Lead Wires No. 10A WG/7, 2.0 m long.

Wire shall be connected to fittings with a cadweld.

A minimum of three litres of water shall be poured on each Anode to initiate the Anode's operation.

Refer to Standard Drawings 4.8, 4.9 and 4.10.



***4.1.11. Flushing of Existing and New Water Mains***

Prior to flushing of any watermains, the Lamont County Public Works Office will receive a minimum of two working days notice. Only County personal will operate existing valves.

***4.1.12. Usage of County Water***

The Developer's Director of Public Works shall be responsible for calculating the water used for flushing of mains. This calculation shall be submitted to the County at the time of the Construction Completion Certificate (CCC). The Developer shall be responsible for the cost of the water used to flush the mains and shall be invoiced accordingly. The cost of this water shall be calculated using the current charges, as may be amended from time to time, as outlined in the Water Rates Bylaw.

***4.1.13. Groundwater Supply for Un-serviced Residential Subdivisions***

The use of groundwater for un-serviced residential subdivisions shall follow the regulations set in the current edition of Environmental Guidelines for the Review of Subdivision in Alberta.

**END OF SECTION**