



SECTION 4: WATER DISTRIBUTION

4.0 INTRODUCTION

This section will cover the design of Water Distribution facilities including, but not limited to, distribution piping, valves, fire fighting facilities, reservoir, and pumping facilities.

4.0.1 GENERAL

The overall design principles described in the introduction to these Standards is the basis on which all construction is undertaken in the City of Lethbridge. These guiding principles are expanded below to provide more specific guidance related to Potable Water Distribution Standards. Often, a combination of principles will come into play when designing a component of the system.

The design of water distribution systems must take extreme care with respect to safety. Any threat to the delivery or quality of City of Lethbridge water is unacceptable. The following fundamental factors are to be considered when designing potable water distribution facilities.

- i. Provision of high quality drinking water at all times
- ii. Minimized interruption in service delivery
- iii. Provision of adequate fire protection

Additional safety considerations may be required based on specific conditions.

4.0.2 LEVEL OF SERVICE OBJECTIVES

Level of service requirements have been defined based on a customer focus group formed during the 2000 Underground Infrastructure Master Plan. The City of Lethbridge Water Utility has adopted this set of level of service requirements and, as such, they will form a basis for these principles of functionality.

The minimum acceptable pressure delivered to each Lethbridge service connection is to be no less than 310 kPa (45 psi) during peak hour demand, and 345 kPa (50 psi) at maximum day demand. The maximum delivered pressure will not exceed 620 kPa (90 psi).

Water use rates:

Average Day Demand - 54 MLD, 700 gross Lpcd, 415 Lpcd

Maximum Day Demand – 120 MLD

Maximum 5-Day Demand – 95 MLD

Peak Hour Demand – 190 MLD

(MLD = million litres per day)



All extensions of the City of Lethbridge water distribution system will be designed and evaluated such that all customers, both existing and new, will not experience any lower level of service.

4.0.3 APPLICABLE REGULATIONS, GUIDELINES AND RESOURCES

The following documents are the regulations which have provisions that pertain to water distribution systems:

Provincial Regulations:

- Environmental Protection and Enhancement Act
- Water Act

City of Lethbridge:

- City of Lethbridge Regulations: Waterworks Bylaw #3999

Designers are encouraged to contact the Provincial and Federal Governments with regard to regulations which may apply, but are not listed here.

4.1 WATER DISTRIBUTION PLANNING REQUIREMENTS

See Section 2.1 for Infrastructure Planning Requirements.

4.2 ENVIRONMENTAL CONSIDERATIONS

See Section 2.2 for Environmental Considerations.

4.3 TECHNICAL STANDARDS

4.3.1 HYDRAULIC NETWORK ANALYSIS

In general, a hydraulic network analysis is required for any new development that has not been analyzed previously, or for any development that significantly alters the servicing scheme such that an existing hydraulic network analysis is no longer applicable. The developer will submit a report showing that the system will meet level of service requirements at the final development concept and also through interim development stages.



4.3.2 WATER MAINS

4.3.2.1 Location

- i. Line assignments for water mains installed in a street or avenue may be found in the City of Lethbridge Construction Specifications.
- ii. A minimum horizontal distance of 2.0m must be maintained between a water main and any gas main, power cable, telephone cable, duct line, or new tree installation.
- iii. Where power cables, telephone cables, television cables, or duct lines cross a water main, they shall be at a minimum distance of 2.0m from any valve, hydrant, or curb stop.
- iv. Where a water main is installed in a utility lot or easement, it shall be located on an alignment 1.5 m from a property line.
- v. Where a catch basin is installed at a street intersection, a minimum clearance of 1.5m shall be maintained from the water main and 3.0 m from water services.
- vi. Water mains must not be designed to be located under significant structures such as retaining walls, planters, etc.
- vii. Tracer wire should be installed on watermains that do not follow a standard line assignment, if the horizontal alignment changes between surface appurtenances or if the main is installed using trenchless methods.

4.3.2.2 Depth

- i. Minimum depth of cover to the top of uninsulated pipe shall be 2.0 m.
- ii. Maximum depth of cover to top of pipe shall be 2.9 m.

4.3.2.3 Sizing

- i. Sizing of water mains will be determined by hydraulic network analysis as set out in said section.
- iii. The minimum size for water mains will be 200 mm, except in cul-de-sacs which do not require hydrants for fire protection. In this case, the main will be no smaller than 150mm and be designed with flushing points to provide adequate flushing velocities.

4.3.2.4 Looping

- i. The number of services allowed at the end of a phase without looping will be 70 provided that they will be looped as per the outline plan.
- ii. The number of services allowed at the end of a phase without looping on a permanent basis is 35.



4.3.2.5 Dead Ends

- i. Dead ends will be avoided wherever possible. Where looping is not possible, flushing points will be included in the design.

4.3.2.6 Water Main Disinfection

- i. All new water mains shall be disinfected and flushed before being put into service in accordance with the latest edition of AWWA Standard C651 for Disinfecting Water Mains.

4.3.3 FIRE HYDRANTS

Fire Hydrants shall be located:

- i. Minimum of 1.0m from property line.
- ii. Where structures (i.e. fence, hard landscaping) are erected along property line, the offset distance must be a minimum of 1.0m.
- iii. Where a fire hydrant is installed at a corner of an intersection, it shall be installed at the beginning of the curve of the curb return.
- iv. In cul-de-sacs that are 90 m or less in length, the fire hydrant shall be installed on the intersecting street at or near the intersection of the cul-de-sac. Where the water main in the cul-de-sac is a dead end, a flushing point must be included in the design.
- v. Fire hydrant spacing shall be measured along the centerline of the streets.
- vi. Hydrants shall be placed opposite of driveway locations on residential property lots.
- vii. Residential Hydrant Spacing:
 - a. The maximum allowable spacing between fire hydrants shall be 180 m.
 - b. The maximum allowable spacing between the back of homes in a cul-de-sac and a hydrant outside of the cul-de-sac shall be 150 m.
- viii. Institutional, Commercial, High Density Residential Hydrant Spacing:
 - a. The maximum spacing between fire hydrants shall be 90 m, or as required by City of Lethbridge Fire Protection.

4.3.4 VALVES

The location and spacing of valves in the water system should be such that when in operation:

- i. No more than two fire hydrants may be taken out of service by a water main shutdown.
- ii. No more than four valves are required to affect a shutdown.
- iii. No more than 30 single-family lots may be taken out of service by a water main shutdown.
- iv. Valves will be designed at a maximum of 600 m apart on water transmission mains, defined as 400 mm diameter or larger.



- v. Mainline valves at intersections of water mains shall be located on the projection of property lines.
- vi. Hydrant valves shall be installed at a minimum distance of 1.0 m from the water main.
- vii. There shall be a minimum horizontal separation of 1.5 m between a catch basin lead and a valve. Deflection of a catch basin lead in order to avoid a hydrant lead is acceptable.

4.3.5 WATER SERVICES

The scope of work as described in this section refers to the portion from the main stop at the distribution main to the curb stop. The curb stop shall be 300 mm from the property line on the City side and greater than 3.0 meters from any structure foundation. New water services will be 25mm minimum diameter to provide capacity for residential sprinklers. The Developer must comply with the requirements of the Waterworks Bylaw and the National Plumbing Code. All water services, from property line to main, are to be shown on the construction and as-built drawings.

4.3.5.1 Park Irrigation Services

Connections may be made to the water distribution system for irrigation water where alternate sources of water are not feasible.

4.3.6 PRIVATE WATER DISTRIBUTION SYSTEMS

Water distribution systems must comply with these standards where they service a private development. To protect the quality and safety of water supplied by the City of Lethbridge, these Standards apply to any potable water distribution system from the main, in the city right-of-way, to the property line.