SECTION 5: SANITARY SEWER

5.0 INTRODUCTION

This section will cover the design of Wastewater Collection System including, but not limited to, underground collection mains, manholes service connections, and pumping facilities.

5.0.1 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 the City of Lethbridge Wastewater Collection System. Often, a combination of principles will come into play when designing a particular component of the system.

The design of sanitary sewer extensions must take public health and safety into account. Facilities that may put public safety or health at risk due to flooding, environmental overflows, or create unsafe access points are not acceptable.

5.0.2 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 Wastewater Utility has adopted this set of level of service requirements and, as such, they will form a basis for these principles of functionality. The following level of service objectives has been set:

i. Provide sewage collection adequate to meet the dry weather demand of the proposed development, with appropriate allowances made for wet weather inflows based on current sanitary sewer construction practices.
ii. Provide sanitary sewer capacity so that surcharging does not occur for design dry weather peak flows and so 99.5% of homes are protected from sewer back-up during peak wet weather flow events.
iii. No additional or new homes will be added to the “at risk” list as a result of any new development. “At risk” is defined as locations where surcharging of the sanitary sewer occurs to a level less than 2 m below the manhole rim for the design wet weather event.
iv. Limit wet weather inflows to less than 5% of the total volume of rainfall in the system during wet weather periods.

5.0.3 APPLICABLE REGULATIONS, GUIDELINES AND RESOURCES

The following documentations are the regulations which have provisions that pertain to sanitary sewer systems:

Provincial Regulations:

1) Environmental Protection and Enhancement Act

City of Lethbridge:

2) City of Lethbridge Regulations: Sewer Bylaw #3250

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

5.1 SANITARY SEWER PLANNING REQUIREMENTS

See Section 2.1 for Infrastructure Planning Requirements.

5.2 ENVIRONMENTAL CONSIDERATIONS

See Section 2.2 for Environmental Considerations.

5.3 TECHNICAL STANDARDS

5.3.1 HYDRAULIC NETWORK ANALYSIS

In general, a network wide hydraulic 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. An analysis is required, in particular, where sewage generation rates have been altered in a way that will affect existing customers.

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 stages of development.

5.3.2 SEWAGE GENERATION RATES

The sewage generation rates given below shall be used to calculate design flows.

Table 5.3.2.1 Sewage Dry Weather Flows

Zoning	Dry Weather Flow Rate
Residential	400 L/capita/d
Commercial	20 m^3/ha/d
Institutional	20 m^3/ha/d
Recreational	10 m^3/ha/d
Industrial (light and medium)	30 m^3/ha/d
Industrial (heavy)	Process specific

Table 5.3.2.2 Residential Density

Highest Observed (Varsity Village West)	40 persons per hectare
New Developments (Average Density)	30 persons per hectare
Recommended	Area Structure Plan Forecast

Table 5.3.2.3 Peaking Factor

Harmon's Peaking (field correlated)	$\frac{14}{4+\sqrt{p}}+1$

Table 5.3.2.4 Sewage Wet Weather Flows (In Addition to Dry Weather Flows)

Zoning	Wet Weather Flows
Residential (new developments)	500 L/capita/d
Residential (older developments)	2000 L/capita/d
Commercial	7.5 m^3/ha/d
Institutional	7.5 m^3/ha/d
Recreational	2.5 m^3/ha/d
Industrial	7.5 m^3/ha/d

In areas where the ground water table is at a depth of 3 metres or less below the surface, a groundwater infiltration allowance shall be accounted for as follows:

Table 5.3.2.5 Infiltration Allowance

Zoning	Infiltration Allowance
Residential	150 L/capita/d
Industrial	2.25 m^3/ha/d
Commercial	2.25 m^3/ha/d
Institutional	2.25 m^3/ha/d
Recreational	2.25 m^3/ha/d

5.3.3 INDUSTRIAL SEWAGE GENERATION

In circumstances where industrial sewage generation rates are being made without process specific information, the Wastewater Utility Manager should be consulted regarding the capacity to be provided.

5.4 SANITARY SEWER MAINS

5.4.1 DEAD END PIPES

In the case where dead ends are required due to construction phasing, a means of cleaning the main must be provided. This may be in the form of a temporary manhole, cleanout, or other structure as approved by the Wastewater Utility Manager.

5.4.2 LOW VOLUME PIPES

For 200 mm sanitary mains carrying a peak flow of less than 10 lps (half the capacity of the pipe), the minimum grade shall be increased to 0.60%.

5.4.3 LOCATION OF SANITARY SEWER MAINS

Sanitary sewer mains must be located so that future excavations do not encroach private property. To calculate the width of excavations, use the formula;

$W=2(D-1.5)+1.5$

Where W=width of excavation and D=depth to invert of pipe

Sanitary sewer mains must be a minimum of 2.5m away from adjacent water and storm pipes. The preferred spacing dictated by Government of Alberta is 3.0m.

5.5 SANITARY SEWER SERVICES

5.5.1 SUMP PUMP AND WEEPING TILE DRAINAGE

In no case will sump pump or weeping tile drainage be allowed to discharge into the sanitary sewer system.

5.5.2 SANITARY SEWER SERVICES

Residential Sanitary Sewer Services shall be no less than 100 mm in diameter and have a slope from the main to the property line of a minimum of 2%.

Sanitary Service connections shall comply with the National Plumbing Code.

All sanitary services, from property line to main, are to be shown on the construction and as-built drawings.

5.6 SANITARY SEWER MANHOLES

5.6.1 SANITARY SEWER MANHOLES IN TRAPPED LOWS

Wherever possible, Sanitary Sewer Manholes shall not be located within trapped lows. Where it is unavoidable, the manhole shall be fitted with a watertight seal.