



CITY OF  
*Lethbridge*

**DESIGN STANDARDS**  
**2021 Edition**

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# CITY OF LETHBRIDGE DESIGN STANDARDS 2021 EDITION

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## ACKNOWLEDGEMENTS

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We gratefully acknowledge the generous inputs of all City Staff involved in preparing the base design standards, both those directly involved in the steering group as well as those who read and commented on the various chapters and provided feedback.

We also acknowledge the input of Developers, Consultants and Contractors, and the Building Industry and Land Development Association.

The Design Standards will continue to grow and improve. The continuing inputs from the community, various City of Lethbridge staff as well as Developers, Consultants and Contractors will ensure that these Design Standards continue to improve the community in which we live.

## COPYRIGHT

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## **FOREWORD**

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The Citizens of Lethbridge indicate that they value, and wish to maintain, the quality of life that our city provides. Residents of Lethbridge are accustomed to high levels of service and the City of Lethbridge continuously strives to meet and exceed those expectations.

The primary outcome of these design standards will be that residents of Lethbridge will declare that growth is not reducing, but instead improving, our quality of life. The intent of these standards is to provide direction to developers such that we reach that outcome. Users of this manual will discover that it is not totally prescriptive in nature, but that what is conveyed is the intent of the standards, thereby enabling the designer to present a solution that meets or exceeds that intent.

The effectiveness of these design standards will be judged by the generations who come behind us – We are confident that the design principles expressed in these standards will contribute to the realization of our goal.

We invite you, as users of this manual, and perhaps as a resident of our city, and definitely as one who is helping to create what Lethbridge is, to participate in the ongoing revision of these standards.

Bud Hogeweide, C.E.T.  
Former Infrastructure Steward

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## SECTION 1: DESIGN BASIS

*The mission of the City of Lethbridge is to serve its residents and visitors, to provide leadership, and to assist the community in building and maintaining a healthy, attractive, and economically viable city.*

*Integrated Community Sustainability Plan/Municipal Development Plan City of Lethbridge July 5, 2010*

*We will continue to work together to ensure that Lethbridge is a leader in environmental stewardship, innovation and active leadership. We are recognized as being safe, healthy, vibrant, prosperous, economically viable and a place where all people can fully participate in community life.*

### 1.0 PURPOSE

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Design standards are an important part of accomplishing the mission of the City of Lethbridge. Standards are meant to provide a service for designers, giving clear direction, and allowing them to streamline the design, review, and approval process. Design standards also demonstrate leadership by providing specifics with regard to the vision of building and maintaining a healthy, attractive, and economically viable city. Finally, design standards assist the community by providing a common set of requirements based on the unique conditions encountered in Lethbridge.

The design standards are being issued to provide additional guidance to developers and their consultants. These standards will provide a consistent approach to development by clearly defining the expectations of the City of Lethbridge. The intent of the standards is not to simply dictate what would be an acceptable design, but to provide the design basis, which can be used to evaluate novel or innovative designs. Options and design guidelines will also be proposed in areas where strict standards are not required.

One goal of development is to provide a safe and enjoyable place for people to live and work. This must be done in a cost effective manner, while considering environmental impacts, as well as future maintenance and replacement costs. This is, in fact, the vision statement of the design standards that guides the development of the rest of this document.

The objectives of the design standards are:

- 1) To provide clear standards to designers regarding the design of infrastructure in the City of Lethbridge.
- 2) To ensure that infrastructure built for the City of Lethbridge meets community quality of life expectations by being safe, functional, and aesthetically pleasing, while protecting the environment, and having reasonable life cycle costs.



## **1.1 DESIGN PRINCIPLES**

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The intent of providing overall design principles is to describe the desired outcomes. With a clear idea of the intent behind a standard, it becomes easier to interpret and apply in atypical situations. This also gives freedom to designers with regard to an innovative design, which is true to the overall intent of the standards, but may not fit within all the specific requirements.

These basic design principles are a reflection of the community's quality of life expectations. Infrastructure is built to serve the community and it is the community that determines the service levels. The citizens should not be expected to adapt their life style to fit within the municipal infrastructure, but rather municipal infrastructure should be adapted to meet community expectations.

### **1.1.1 SAFETY**

Public safety is the highest priority. Designers must consider safety as the highest priority. This includes physical safety of the city's citizens as well as the safety of the city staff required to operate and maintain the facilities. Safety in this context also means the protection of health and property.

### **1.1.2 FUNCTIONALITY**

The design elements must function reliably for their expected design life, providing a level of service on par with prevalent community expectations. The citizens of our community have come to expect a certain level of service and quality of life. Functionality means the infrastructure must consider all members of the community and must appropriately account for those with different abilities. New additions to the system must not negatively impact existing levels of service. The City of Lethbridge defines community expectation through the use of public forums, project committees, and day-to-day interactions with the public.

### **1.1.3 ACCESSIBILITY**

In the public realm, accessibility refers to users of all abilities being provided a functional level of service. A guiding principle would be that users of varying abilities would have a similar level of service as those without constraints. Most commonly, accessible design will be focused on the sidewalk and pathway systems along roadways and within parks. The design of an accessible sidewalk and pathway system will have similar criteria as the roadway system in terms of slopes, continuity, and accommodating a variety and number of users.

### **1.1.4 AESTHETICS**

Extensive consultation with the public resulted in community values such as "small town atmosphere", cleanliness, parks, playgrounds, and wide tree lined streets being articulated in the Municipal Development Plan. Aesthetics applies at the contact points between the physical



infrastructure and the community, specifically to those areas and structures which will be seen and used by the public.

### **1.1.5 ENVIRONMENTAL PROTECTION**

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As stewards of the environment, charged with creating a healthy city and protecting the natural endowments within our jurisdiction, the City of Lethbridge promotes any design measures which reduce or mitigate the impacts of development.

Some basic environmental principles can be defined to assist in decisions about infrastructure design and subdivision planning. Best practices in municipal servicing incorporate such principles. The City of Lethbridge promotes design choices and processes based on these principles. Design options should:

- Enhance energy conservation and the efficient use of energy while decreasing emission that contributes to air pollution.
- Acknowledge the regional environmental conditions, semi arid grassland ecosystem, and prevailing west winds.
- Create and enhance opportunities for bio-diversity and maintenance of natural ecological function.
- Consider the effects of environmental hazards on development.

Stricter Environmental Protection standards are on the horizon for many aspects of development. These include such items as storm water management and wind erosion protection. The citizens of our community have also identified environmental protection as an important priority. The City of Lethbridge wants to take a proactive approach to protecting the environment from adverse impacts of development and living.

### **1.1.6 LIFE CYCLE COSTS**

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The cost of maintaining and eventually replacing infrastructure ultimately becomes the responsibility of the City. Design of new infrastructure must take this factor into account in order to obtain the best possible balance between initial capital costs, future maintenance costs, ongoing replacement costs, and the other design principles. Providing a well-thought-out design that considers the cost, ease, and frequency of maintenance and then following up with quality construction are the main factors needed to achieve reasonable life cycle costs.

## **1.2 RELATED RESOURCES – PROVINCIAL AND FEDERAL REQUIREMENTS**

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The City of Lethbridge Design Standards supplements the existing standards, codes, guidelines, and regulations regarding municipal infrastructure. These design standards provide additional



detail for conditions unique to Lethbridge. Even though the requirements of the City of Lethbridge Design Standards have been met, the Developer is still responsible to comply with other appropriate regulations and obtain the required provincial and federal approvals.

These design standards refer in large extent to the most recent provincial and federal standards and guidelines. All Water Distribution, Sanitary Sewer, and Storm Water Management Systems must be designed so that they meet, as a minimum, the standards and design requirements set out in the latest editions of the Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems, Environmental Protection and Enhancement Act, and Water Act published by Alberta Environment.

This document takes its direction from the City of Lethbridge Municipal Development Plan and the standards presented here naturally flow out of the community values and planning goals stated there. Developers are also referred to the following City of Lethbridge documents, which provide additional information governing the subdivision development approval, construction, and handover process:

- City of Lethbridge, Service Agreement
- City of Lethbridge, Consulting Engineer's Land Development Field Services Guidelines.
- City of Lethbridge, Construction Specifications

### **1.3 INPUT FROM DESIGNERS, BUILDERS AND DEVELOPERS**

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This document is a storehouse where past experience can be built upon, designs, which are proven, can be promoted, and standards, which prove to be inappropriate, can be changed or improved.

As stated by Alberta Environmental Protection - "These standards shall not be considered as rigid requirements where variation will achieve a better technical and/or economical solution. Indeed it is encouraged that consulting engineers continuously seek new and better solutions."

If the users of this design standard manual feel that it is incomplete or that it can be improved upon, they are encouraged to submit their comments to the Urban Construction Manager for inclusion into future editions of the design standards.

The documents are modular in nature and can be easily updated and changed. New editions will be issued every 2 years.



## SECTION 2: GENERAL CONSIDERATIONS

### 2.0 INTRODUCTION

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This section covers general issues including infrastructure planning requirements, utility line assignments, developer fence locations, entry features, top of bank setbacks, and other design issues not specifically noted in other chapters.

#### 2.0.1 IN GENERAL

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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 general issues described above.

#### 2.0.2 LEVEL OF SERVICE OBJECTIVES

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##### *2.0.2.1 Utilities*

The community at large expects building lots to have access to all utilities including shallow utilities consisting of electricity, communications, and natural gas. This standard documents how location assignments are made in the road right of way and easements for each utility. This is done so that services can be provided in a consistent manner without the creation of unnecessary conflicts and facilitating the maintenance and repair of the services.

##### *2.0.2.2 Safe Development Setback Line*

The Safe Development Setback Line is established with the safety of the public and environmental considerations in mind. These setbacks ensure that buildings are not built so near the top of bank that they would be endangered by slope stability issues, and protect environmentally sensitive areas and ecosystems. In determining where property lines are located in relation to the safe setback line, the principle that no additional restrictions should be placed on the adjacent lots to account for slope stability issues should be applied. For example, irrigation restrictions should not be required on the lots adjacent to the safe setback line.

The Safe Development Setback Line in Lethbridge has been determined as a result of extensive detailed geotechnical investigations. Details of the current top of bank setbacks are provided in the River Valley Area Redevelopment Plan. Contact the Subdivision Planning Officer for the Development Setback Line that applies to your area.



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## 2.1 PLANNING REQUIREMENTS

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These infrastructure planning requirements should be viewed as a supplement to the requirements and process administered by the Planning Department. Contact the Planning Department for detailed planning requirements for Area Structure Plans, Outline Plans, and Subdivisions.

### 2.1.1 AREA STRUCTURE PLAN – INFRASTRUCTURE REQUIREMENTS

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#### 2.1.1.1 STORM WATER – AREA STRUCTURE PLAN REQUIREMENTS

An area structure plan shall include the following information regarding storm water management:  
Definition of general catchment areas

- i. Predevelopment peak flows, volumes and hydrographs, inflow and outflow points.
- ii. Post development peak flows, volumes, and hydrographs.
- iii. Generalized storm pond locations and storage volumes.
- iv. Proposed location of connections to the downstream Major and Minor Systems and proposed release characteristics at each location compared to pre-development characteristics.
- v. Description of the impacts of the proposed development on the downstream Major and Minor systems and a description of measures proposed to offset negative flooding, erosion, and water quality impacts caused as a result of the development.
- vi. A map or description of the Major system flow routes from the boundary of the development to the outlet. Outlets will usually be considered as the first water body or natural channel reached by storm water runoff from the development.
- vii. System performance for low intensity long duration storms will need to be reviewed, particularly the performance of storm water ponds. Examples of these events are the 1995, 2003, and 2005 June storms.
- viii. Identification of offsite water system extensions required to provide service to the development area complete with order of magnitude cost estimates and projected year of construction.

#### 2.1.1.2 SANITARY SEWER – AREA STRUCTURE PLAN REQUIREMENTS

An area structure plan shall include the following information regarding the sanitary sewer system:

- i. Generalized trunk layouts, particularly where they are not expected to follow roadway alignments.
- ii. Land use and sewage generation rates.
- iii. Expected peak flows and design flows.
- iv. Impacts on the existing system and capacity of the existing system at connection locations.
- v. Estimated sewer catchment boundaries at each connection point.
- vi. Conceptual location and size of Lift-stations and force-mains.



- vii. Identification of offsite sanitary sewer system extensions required to provide service to the development area complete with order of magnitude cost estimates and projected year of construction.

This analysis may require a computer network analysis.

#### ***2.1.1.3 WATER DISTRIBUTION – AREA STRUCTURE PLAN REQUIREMENTS***

An area structure plan shall include the following information regarding the water distribution system:

- i. Land uses, expected peak demands, fire flow requirements.
- ii. General pipe layouts.
- iii. Impacts on the existing system and capacity of the system at connection points.
- iv. Identification of offsite water system extensions required to provide service to the development area complete with order of magnitude cost estimates and projected year of construction.

This analysis may require a computer network analysis.

#### ***2.1.1.4 TRANSPORTATION – AREA STRUCTURE PLAN REQUIREMENTS***

An area structure plan shall include the following information regarding the transportation system:

- i. Definition of general land use areas.
- ii. Estimated trip generation data for the various land use areas.
- iii. General locations of arterial and major collector roads and intersections.
- iv. General location of pedestrian and bicycle corridors and circulation routes.
- v. Impacts on the existing system and proposed measures to mitigate negative impacts on adjacent arterial roads.
- vi. Impacts on the development from noise off arterial roads and proposed measures to mitigate noise.
- vii. Schematic representation of proposed transit routes.
- viii. Schematic representation of the active transportation network.
- ix. Identification of offsite arterial road extensions required to provide access to the development area complete with order of magnitude cost estimates and projected year of construction.

Additional analysis may be required for high traffic generation land uses and areas with limited capacity for increased traffic volumes.

#### ***2.1.1.5 PARKS AND OPEN SPACE – AREA STRUCTURE PLAN REQUIREMENTS***

An area structure plan shall include the following information regarding parks and open space:

- i. General locations of parks and open space.
- ii. Estimated percentage of reserve dedication by type (MR, ER, SR).
- iii. Classification of municipal reserves (i.e. Tot Lot, Neighborhood Park, etc.).



### **2.1.2 OUTLINE PLAN – INFRASTRUCTURE REQUIREMENTS**

The Subdivision Officer is the focal point for the outline plan process. All required outline plan information should be submitted to him for distribution.

For each outline plan, contact Infrastructure Services so a focal point for the master servicing plan can be appointed to facilitate engineering reviews and comments.

#### ***2.1.2.1 STORM WATER – OUTLINE PLAN REQUIREMENTS***

The following information regarding storm water management shall be included with the supporting documentation submitted with the outline plan:

- i. A description of any differences between the Area Structure Plan and the proposed outline plan with regard to the storm water management system.
- ii. A conceptual overland drainage plan showing major system overland flow routes and trapped lows within the entire development, and demonstrating continuity of flow from upstream developments through the proposed outline plan area.
- iii. A conceptual servicing plan showing the routing of trunk lines and pond outlets.
- iv. Description of how development phasing has been considered so that at no time are the identified peak release rates exceeded during the period from the start of development to the complete build out of the area. The description should include those trigger points, showing by area, when various storm water management facilities become necessary.
- v. Refined storm pond locations and volumes and a description of phasing strategies if required.
- vi. Description of proposed sources of make-up water for wet pond facilities.

#### ***2.1.2.2 SANITARY SEWER – OUTLINE PLAN REQUIREMENTS***

The following information regarding the sanitary sewer system shall be included with the supporting documentation submitted with the outline plan:

- i. A comparison between the Area Structure Plan and the outline plan noting the changes and their impacts.
- ii. A conceptual servicing plan will be included with the information showing the location of sanitary sewers, lift stations, and any other sanitary facilities.
- iii. A description of development phasing, noting trigger points where sanitary sewer facilities or upgrades are required. The phasing should identify, by area, when each lift-station is required.

#### ***2.1.2.3 WATER DISTRIBUTION – OUTLINE PLAN REQUIREMENTS***

The following information regarding the water distribution system shall be included with the supporting documentation submitted with the outline plan:



- i. A comparison between the Area Structure Plan and the outline plan noting the changes and their impacts.
- ii. A conceptual servicing plan will be included with the information showing the location of water mains and any other water distribution facilities.
- iii. A description of development phasing, noting trigger points where water distribution facilities or upgrades are required in order to ensure defined levels of service are maintained.

#### ***2.1.2.4 TRANSPORTATION – OUTLINE PLAN REQUIREMENTS***

The following information regarding the transportation system shall be included with the supporting documentation submitted with the outline plan:

- i. Any differences between the Area Structure Plan and the proposed outline plan.
- ii. Location of all roads and laneways within the development.
- iii. Identification of roads as Arterial, Collector or Local.
- iv. Identification of the active transportation networks.
- v. Intersections, which will require signals and the development trigger points where they become necessary.
- vi. Identification of roadways along which direct property access may be restricted.
- vii. Identification of roadways along which on street parking may be restricted.
- viii. Location of traffic calming features (roundabouts, curb extensions, raised crosswalks, etc.).
- ix. Location and conceptual plan of entryway features.
- x. Description of the impacts of the proposed development on the adjacent existing transportation system. Contact the Transportation Manager for additional details regarding this requirement.
- xi. Preliminary projected phasing and timing of the build out of the area, noting trigger points at which transportation facilities or upgrades are required.

#### ***2.1.2.5 PARKS AND OPEN SPACE – OUTLINE PLAN REQUIREMENTS***

The following information regarding Parks and Open Space shall be included with the supporting documentation submitted with the outline plan:

- i. Location and boundaries of land dedicated as Municipal reserve.
- ii. The amount of land and percentage dedicated in the completed subdivision.

Detailed open space planning begins based on the approved outline plan. A detailed landscape plan will be developed using a public input process that includes the developer and the City of Lethbridge. The detailed landscape plan shall be submitted to Community Services for final approval.

Contact the Parks and Open Space Manager for additional information regarding the detailed landscape planning process.



#### ***2.1.2.6 ELECTRIC DISTRIBUTION – OUTLINE PLAN REQUIREMENTS***

A copy of the outline plan showing the general layout of the development is required by the Electric Utility to plan general cable layouts, land uses, anticipated peak demands, and proposed switching cubicle locations. The Electric Utility will model its facilities based on the submission and make recommendations to developers.

#### ***2.1.2.7 CONSTRUCTION APPROVAL – INFRASTRUCTURE REQUIREMENTS***

Prior to requesting a service agreement and submitting engineering drawings for construction approval, new phases of development must follow the appropriate process for subdivision as administered by the Subdivision Officer.

Developers must also contact the Open Space Manager regarding detailed landscape planning process for Municipal Reserve and to indicate if they wish to enter into an Open Space Agreement.

Developers must also contact the Electric Utility Manager regarding the design and construction of the electrical distribution infrastructure required for the development.

#### ***2.1.2.8 CONSTRUCTION APPROVAL SUBMISSION***

Submissions for construction approval shall include the following:

- i. A letter stating that these design standards have been followed and detailing any deviations from the standards along with a justification for the deviation.
- ii. Engineering drawings of the subdivision stamped by a Professional Engineer registered to practice in the province of Alberta.
- iii. The Engineering drawings shall follow the requirements under the field services guidelines and be sufficient to construct the infrastructure required for the development.
- iv. The drawings shall also include any additional information requested by the Urban Construction Coordinator acting reasonably.
- v. Drawings and supporting documentation describing the storm water system shall include the following information:
  - a. A description of how the area fits in with the rest of the development in terms of drainage, showing that peak release characteristics from the entire development are still below previously defined limits.
  - b. Any interim storm water management measures required to maintain storm water releases within requirements.
  - c. Any interim erosion control measures required to protect flow routes until build out is complete.
  - d. Estimated flow depths and velocities for critical locations such as storm pond inlets, outlets and overflows.
  - e. Extent, depth, volume, and duration of ponding in both trapped lows and ponds.



- f. A description of how the storage provided in ponds and trapped lows complies with the requirements of the outline plan.
- vi. Drawings and supporting documentation describing the sanitary and water systems shall include the following information:
  - a. A description of how the area fits in with the rest of the development
  - b. All pipe and appurtenances required for the utilities
- vii. Drawings and supporting documentation describing the transportation system shall include the following information:
  - a. Location of all lot lines and identification of the ultimate number of dwelling units served at intersections and links or estimated trip generation data.
  - b. Identification of driveway locations.
  - c. Any interim measures required to provide access to the area for regular traffic and/or emergency services until build out is complete.
- viii. Detailed irrigation and landscaping plans for entryways, boulevards, medians, and any other area that will ultimately be maintained by City forces.
- ix. The drawings shall include a grading plan showing any pre-existing conditions that may affect building construction such as fill in excess of 1.2m deep, previously buried pipe or dugouts.
- x. The drawings shall include the proposed types and locations of all developer constructed facilities within or adjacent to roads, public rights of way, and easements. This particularly applies to fences, entryway features, trees, bushes, boulevard landscaping, and irrigation systems.
- xi. Detailed landscape plans of all Open Space in the current phase as approved by the Open Space Manager or an indication that the minimal landscaping requirements under the service agreement will be followed.
- xii. Drawings describing the Electrical System shall include proposed locations for the Electric Utility surface facilities, including Transformers, pedestals, and street lights.

## **2.2 ENVIRONMENTAL CONSIDERATIONS**

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As stewards of the environment, charged with creating a healthy city and protecting the natural endowments within our jurisdiction, the City of Lethbridge promotes any design measures which reduce or mitigate the impacts of development.

Environmental principles of design are discussed in Section 1 Design Principles. For the environmental principles to be effectively translated into action, they must be considered at all stages of the planning and design process. Specific environmental design and planning guidelines for the City of Lethbridge can be found in each section.

Designers are referred to STANDARDS AND GUIDELINES FOR MUNICIPAL WATERWORKS, WASTEWATER AND STORM DRAINAGE SYSTEMS published by Alberta Environmental Protection for general environmental requirements.



## 2.3 TECHNICAL STANDARDS

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### 2.3.1 GENERAL CONDITIONS

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#### *2.3.1.1 Utilities Located in Lanes*

Generally, utilities are not to be located in lanes. In those cases where a utility located in a lane is considered advantageous, the City Engineer will consider it on a case by case basis. In those cases where a utility in a lane is being extended from a previous phase of development, the utility shall only continue along the lane to the first available location where it can be brought to the front of lots.

#### *2.3.1.2 Standard Line Assignments*

The standard line assignment and depth zone for the various deep and shallow utilities can be found in the current edition of the City of Lethbridge Construction Specification.

#### *2.3.1.3 Fences, Entryways and Other Features*

- i. Permanent structures built by the developer and located in or adjacent to the road right of way should be located so they do not conflict with the standard line assignments.
- ii. Detailed plans describing the makeup of landscaping, fences, and entry features to be handed over to the City of Lethbridge must be submitted for approval when requesting a service agreement. Features and landscaping which require minimal maintenance or are easily maintained by existing City equipment are preferred.
- iii. The developer shall provide access to the flanking boulevards from adjacent properties to minimize the amount of boulevard to be handed over to the City for maintenance. Standard practice within Lethbridge is that the adjacent property owner is responsible for maintenance of the adjacent boulevards and associated landscaping.



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## SECTION 3: STORMWATER MANAGEMENT

### 3.0 INTRODUCTION

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This section covers the design of Stormwater Management facilities including, but not limited to, conveyance systems, storage systems, and treatment.

#### 3.0.1 GENERAL

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The overall design principles described in the introduction to these standards are the basis on which all construction is undertaken in the City of Lethbridge. Often, a combination of principles will come into play when designing a particular component of the system.

The purpose of stormwater management is to handle precipitation so it does not become an inconvenience or present a hazard to the community, while also reducing impacts on the environment. Current practice is to use a system of underground pipes, overland flow routes, as well as wet and dry stormwater detention facilities.

Lethbridge would like to take a proactive role in promoting measures to reduce the impacts on the environment due to development. In this respect, these guidelines may be more restrictive than the requirements of Alberta Environmental Protection.

The system must be designed to provide access to components for maintenance. Overland conveyance routes should be designed to limit the potential for erosion. Outfalls and other structures must be as low maintenance as possible.

Stormwater facilities should be designed to be neat and tidy with a minimal amount of maintenance. Wherever possible, stormwater facilities such as wet or dry ponds or major system conveyance should be integrated into a multi-use facility. In combined open space/stormwater facilities the area's primary purpose will be as community green space with the stormwater purpose as a secondary role. The pond's shape, slopes, inlets, and outlets must be designed with safety and aesthetics in mind.

New systems must be designed without exceeding peak flow capacities of the older systems to which they connect; this applies to both overland flow routes and well as underground components of the system.

The designer must take into consideration safety concerns in the design of storm management facilities because rain and runoff events can be sudden and unexpected.



The following safety factors should be considered in the design of stormwater management facilities:

- 1) Depth, Speed and Extent of Overland Flow and Ponding
- 2) Preventing Access to the Piped Portion of the System
- 3) Ability to Escape from Ditches and Ponds
- 4) Preventing the Formation of Slipping Hazards
- 5) Access for Emergency Vehicles
- 6) Prevention of Flooding and Erosion Damage

### **3.0.2 LEVEL OF SERVICE OBJECTIVES**

Level of service for Stormwater Management Systems has traditionally been defined using the return period of the design storms used to size the system. This is described in terms of the Major and Minor systems. The Minor system handles small frequent runoff events and currently consists mainly of underground pipes. The major system handles any runoff which cannot be taken by the minor system and usually consists of overland flow from large infrequent events.

- i. The Minor (underground) portion of the system shall be designed with capacity for a one in 5 year storm. The piped system shall convey flows from the one in 5 year storm. Ponding in trapped lows shall not occur for storms up to and including the 1 in 5 year event. Ponding and overland flow must be confined to public property and right of ways. Section 3.3 provides minor system design guidelines.
- ii. The Major System storm ponds and overland flow within new developments, shall safely handle a one in 100 year event without causing flooding of private property or erosion damage. Ponding and overland flow shall be confined to public property and right of ways and be limited to no more than 300 mm deep as measured at the gutter of the streets for the 1 in 100 year event. Once collected, Stormwater shall remain on public property. Section 3.5 provides major system design guidelines.
- iii. Peak post development flow rates shall not exceed pre-development flows resulting from the one in 5 year event. Where downstream constraints exist, post development flow rates may be restricted to less than the one in 5 year pre-development flow. The allowable release rate shall be maintained for all design storms up to and including the one in 100 year event.
- iv. New developments must include measures to improve stormwater quality. Specifically Alberta Environment's MUNICIPAL POLICES AND PROCEDURES MANUAL requires "a minimum of 85% removal of sediments of particles size 75 microns or greater." Erosion and sediment control must be in place as permanent features of development. These include grassed swales and runways to trap silt and ponds designed with dimensions and detention times promoting settling. Higher priority will be placed on environmental considerations along the coulee banks and adjacent to environmental reserves. The City has already taken steps to improve stormwater



quality by implementing a street cleaning program, placing limitations on pesticide use, instituting a doggie bag program and requiring catch basin sumps.

### **3.0.3 REGULATIONS**

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The following list is the regulations which have provisions that pertain to stormwater management applicable within the City of Lethbridge:

Provincial Regulations:

- 1) Water Act
- 2) Environmental Protection and Enhancement Act

Federal Regulations:

- 1) Fisheries Act

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

## **3.1 STORMWATER PLANNING REQUIREMENTS**

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See Section 2.1 for Infrastructure Planning Requirements.

## **3.2 ENVIRONMENTAL CONSIDERATIONS AND BEST MANAGEMENT PRACTICES**

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See Section 2.2 for Environmental Considerations.

### **3.2.1 EROSION CONTROL AND SEDIMENTATION**

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- i. Erosion protection shall be adequately provided on all permanent surfaces and channels in the development area to resist the one in 100 year event
- ii. Concentrated flows over the top of the riverbank, down unprotected slopes, or into unprotected coulees will not be permitted. Sheet flow must occur along the entire top of bank and adequate erosion controls must be implemented to prevent rill erosion and gully formation. In conjunction with erosion protection, slope drains may be used to collect flows and safely convey them to the bottom of the slope.
- iii. Catch basins shall be provided with a sump to improve sedimentation.

### **3.2.2 REDUCING HAZARDOUS CHEMICALS, PETROLEUM PRODUCTS, PESTICIDES AND HERBICIDES**

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- i. Stormwater containment and treatment will be required for developments purposing to use hazardous materials on site. It is recommended that Developers



contact the City Engineer at the concept stage when considering these types of facilities.

- ii. Stormceptors or other oil and grit separators should be considered for any development with large parking areas or where there is a risk of a petroleum product spill.
- iii. Stormceptors or an approved alternate oil and grit separator will be required at all sites containing gas stations. The device shall be installed in an easement or in public property to allow access by City forces for maintenance and cleaning.
- iv. Please refer to Section 7.0 Parks and Open Space of this standard with regards to planting designs and methods that are naturally pest and weed resistant.

### **3.2.3 STORMWATER QUALITY BEST MANAGEMENT PRACTICES**

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The City of Lethbridge strongly recommends the use of any measures taken in the design which improve stormwater quality, reduce peak flows, and reduce runoff volumes. The following items are suggested for consideration in new developments:

- i. Grass swales and runways should be incorporated into pond inlets and green strip conveyance paths. Flow spreaders to encourage sheet flows across grassed areas are highly desirable. Flows across vegetation have been shown to be effective in improving stormwater quality and in reducing volumes.
- ii. Appropriately sized trash racks and properly designed transitions from paved to grass areas which will limit the transport of materials off the street into the piped portion of the system.
- iii. Constructed wetlands which mimic natural processes for treating stormwater should be considered a viable alternative to either dry-ponds or wet pond features. Constructed wetlands and similar features would be especially appropriate for use in developments adjacent to the river valley provided that safe set back requirements are followed.
- iv. Wet and dry ponds with larger length to width ratios are preferred because of their increased sedimentation efficiencies. Target length to width ratios are greater than 5 to 1. Increased flow path lengths can be achieved through the use of interior berms and baffles.
- v. Where possible detention times of 24 to 48 hours should be used for ponds to allow greater time for sedimentation.
- vi. Sediment fore bays are encouraged at pond entrances. Fore bay designs should include consideration of access for maintenance and sediment removal.
- vii. A canal water supply system will be provided for all wet ponds. Systems will be designed to serve all wet ponds within an Outline plan area.



### **3.2.4 SERVICE CONNECTIONS**

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- i. All sub-divisions must be built with storm sewers adjacent to all lots. All lots approved shall drain to a sump discharging to the storm sewer system as per the requirements of Section 9.1.4 Foundation Drainage.
- ii. Foundation drain collectors shall discharge to the stormwater service. Foundation drains shall not be connected to the sanitary sewer system.
- iii. Storm Service connections shall comply with the National Plumbing Code.
- iv. Properties zoned for non-residential land uses and for multi-family residential (excluding duplex lots) must retain runoff volumes in excess of the 1 in 5 year return period and up to a 1 in 100 year return period on site. The excess runoff control may take the form of parking lot, rooftop, or underground storage, as well as wet or dry ponds. Infrastructure Services shall approve runoff control designs.
- v. Sump pump outlets and roof leaders shall discharge flows no closer than 1.0 m from the property line. Where possible, drainage across property lines shall be spread to encourage sheet flow and reduce concentrated erosive flows.

## **3.3 ESTIMATION OF PEAK FLOWS, RUNOFF VOLUMES AND HYDROGRAPHS**

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### **3.3.1 GENERAL RULES OF THUMB**

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In order to provide a quick design and review of stormwater management systems the City has created the following rules of thumb:

- i. Major overland flow – 200L/sec/Ha
- ii. Minor system flow – 90L/sec/Ha
- iii. Wet Pond Storage – 1000m<sup>3</sup>/Ha for 0 release rate situations
- iv. Pond size is to be a minimum of 1.5 Ha of normal water level area but larger is preferred

### **3.3.2 COMPUTER MODEL SIMULATION**

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The City will not require any computer model simulation of the proposed major and minor systems unless the general rules of thumb mentioned above are unattainable. Computer simulation will be required to assess the impacts of added development on the existing storm water system and to assist in designing detention facilities for optimal release rates and timing. The City establishes allowable release rates based on previously submitted storm water management reports. Where



designers can show that capacity is available in the downstream system larger release rates may be allowed.

### **3.3.2.1 Design Storms**

The following storms shall be used to evaluate the stormwater management system behavior:

- 1) One in 5 year 4 hour duration storm
- 2) One in 100 year 4 hour duration storm
- 3) One in 100 year 24 hour duration storm

Additional storm of varying duration and return periods should be used to adequately design stormwater management systems. Though not a requirement, it is suggested that historic long-term precipitation data and data from historical storms be used to evaluate the performance of stormwater management designs.

### **3.3.2.2 Natural Conditions**

Natural conditions refer to the state of the land in the development area prior to its alteration by people. The impacts of the proposed development on peak flows and volumes shall be evaluated based on the following baseline conditions. Table 3.3.2.1 describes the general parameters to be used for the estimation of runoff characteristic resulting from natural conditions. These values represent typical conditions for Lethbridge and are provided as guidelines. Where a designer has more accurate information or actual values, they should be used.

*Table 3.3.2.1 General Parameters for Runoff Estimation*

<b>Soil Type</b>	Silty-Clay
<b>Porosity</b>	0.48
<b>Effective Porosity</b>	0.42
<b>Hydraulic Conductivity</b>	0.5mm/hr
<b>Soil Suction head</b>	292.2 mm
<b>Cover Type</b>	Short Prairie Grass
<b>Manning's n</b>	0.15
<b>Permeability</b>	100%
<b>Initial Moisture Deficit</b>	0.21-0.26



### **3.3.2.3 Developed Conditions**

- i. Developed conditions should reflect the expected zoning of the development. Estimates of percent impervious area should be taken from similar developments within the City. Table 3.3.2.3 Percent Impervious Area may be used as a guide, representing minimum values unless actual values are calculated from similar existing areas.
- ii. Guidelines for Manning's "n" can be found in any text on open channel flow. An online resource can be found here: <http://www.fhwa.dot.gov/bridge/wsp2339.pdf>
- iii. Initial Moisture Deficit (IMD) should be estimated conservatively to account for lawn watering in the range 0.10 to 0.30. Alternatively, long-term precipitation data sets are available from Environment Canada to allow better estimates of antecedent moisture conditions however these again may estimate IMD to high because lawn watering is not considered.
- iv. Soil characteristics for Topsoil may be used in the analysis for landscaped areas. Typical values are provided in Table 3.3.2.2

*Table 3.3.2.2 Topsoil Characteristics*

<b>Soil Type</b>	Loam – Topsoil
<b>Porosity</b>	0.46
<b>Effective Porosity</b>	0.43
<b>Hydraulic Conductivity</b>	3.4 mm/hr
<b>Soil Suction Head</b>	88.9 mm



Table 3.3.2.3 Percent Impervious Area

<b><i>PERCENT IMPERVIOUS AREA</i></b>	
Land Use or Surface Characteristics	Percent Impervious
Undeveloped Farmland/Prairie	0
<b>Commercial Uses</b>	
Mainly Commercial Areas	95
Neighborhood Commercial	70
<b>Residential*</b>	
Single Family	45
Multi-Family	65
Apartments	70
<b>Industrial</b>	
Light Industrial	80
Heavy Industrial	90
<b>Open Spaces:</b>	
Parks/Cemeteries	7
Playgrounds	13
Schools	50
Lawns	0
<b>Streets/Lanes:</b>	
Paved	90
Gravel	15
<b>Aggregated Areas:</b>	
Natural Area/Park/ER	5
Urban Residential	60
Commercial	85
Industrial	95
<p>Note: These values are rough estimates only. Where possible imperviousness of comparable previously built areas should be used.</p>	
<p>Values taken from Storm Water Management Guidelines, Alberta Environment, January, 1999</p>	
<p>* Residential values do not include adjacent streets.</p>	



### 3.3.2.4 Additional Information

- i. Depression storage can be estimated using the following formula.

$$d_p = 0.77 * S^{-0.49}$$

where:  $d_p$  is depression storage in millimeters  
 $S$  is ground slope in %

### 3.3.3 RATIONAL METHOD

- i. The Rational Method can be used for the preliminary design of stormwater conveyance systems to provide initial estimates of peak flows for the first iteration of pipe sizing using a computer model simulation.

#### 3.3.3.1 Rainfall Intensity – Frequency - Duration

- i. Rainfall intensities at other times shall be calculated using the following formula and the constants for the various return periods given in the table below.

$$i = \frac{a}{(t + b)^c}$$

Where:

$i$  is the rainfall intensity in millimeters per hour.

$t$  is the time of concentration at the point of design

$a$   $b$  and  $c$  are the constants for the respective design storm return period given in the table below.

Table 3.3.3.1 Rainfall Intensity Constants

Storm Return Period	$a$	$b$	$c$
1 in 5 Year Storm	440.69	0	0.696
1 in 100 Year Storm	1019.20	0	0.731

More detailed information on the above data can be obtained from Environment Canada at:  
[http://climate.weather.gc.ca/prods\\_servs/engineering\\_e.html](http://climate.weather.gc.ca/prods_servs/engineering_e.html)



### **3.3.3.2 Rational Method Runoff Coefficients**

- i. The runoff coefficients in the following table are recommended for use in calculations using the Rational Method. The table provides coefficients for the 1 in 5 year event. The coefficients shall be increased by 25% when performing the analysis for the 1 in 100 year event.

*Table 3.3.3.2 Runoff Coefficients*

<b>Land Use</b>	<b>Runoff Coefficient</b>
Agricultural Land / Natural Prairie	0.15
Parks	0.20
Residential	0.40
Commercial	0.80
Institutional	0.80
Industrial	0.70

## **3.4 MINOR SYSTEM**

### **3.4.1 TRAPPED LOWS (MINOR SYSTEM STORAGE)**

- i. New developments shall be designed to limit the number of trapped lows required. The additional storage provided by trapped lows is marginal and the additional maintenance required by the use of Inlet Control Devices makes trapped lows undesirable.
- ii. Trapped lows shall be designed so no significant ponding occurs for events up to the one in 5 year event. The maximum depth of ponding in trapped lows shall be 300 mm as measured from the gutter for the 1 in 100 year event. Detailed design drawings shall show the extent of flooded area at trapped lows during a 1 in 100 year rainfall event.
- iii. Ponding in trapped lows shall be contained within the road right-of-way or public property.
- iv. Overland flow routes out of trapped lows must conform to the requirements of section 3.5.1.
- v. Trapped lows shall not be located so they inundate sanitary manholes. Where sanitary manholes must be located within a trapped low, special provisions to limit stormwater inflow to the sanitary sewer must be taken and approved by the City Engineer.
- vi. Trapped lows shall be surveyed and the actual extents, spill elevations, and catch basin elevations confirmed on the as-built drawings.



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### **3.4.2 PIPED SYSTEM AND GUTTERS**

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- i. The minimum grade on gutters or paved surfaces shall be 0.6%. Grades 1% or greater are preferred on curved gutters and curb returns.
- ii. Minimum grade of lanes shall be 1.5% for a minimum distance of 5 m from the back of concrete along the lane. The minimum grade of lanes shall be 1% at other locations.
- iii. The surface of the asphalt in the lane shall be at least 12 mm higher than the concrete where the asphalt meets the back of concrete.
- iv. Maximum depth of flow in gutters for the one in 5 year event shall be the lesser of 150 mm or the height of the sidewalk top above the gutter.
- v. In the design of pipes a roughness coefficient equivalent to a Manning's n of 0.013 shall be used to account for the degradation of the pipe over time.
- vi. The piped system shall be designed so that no surcharging occurs during the 1 in 5 year event.
- vii. Back of lot concrete gutter swales (Drawing STR-20) and concrete grade beams shall be used solely for back of lot grade control. Grade of swales and grade beams shall be between 0.6% and 6%.
- viii. Back of lot grading shall be designed such that safe depth and velocity requirements for runoff are met for a one in 100 year event.
- ix. Runoff shall travel less than 75 m along a back of lot swale or grade beam before reaching a lane, catch basin, open space or back to front swale or grade beam. Runoff shall be prevented from crossing sidewalks.

### **3.4.3 CATCH BASINS**

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- i. Catch basins which discharge directly to the piped system without passing through a downstream detention facility are required to be installed with flow restriction devices to limit peak flows from the catch basin back to the peak flow from the contributing area to the predevelopment peak runoff for the one in 5 year event.
- ii. Catch basins which discharge via storm detention ponds may have flow control devices placed in them to create trapped lows for additional storage. It is preferred that storage be provided through other methods other than trapped lows on the street.
- iii. Where they are required low maintenance Inlet Control Devices or designs, which limit clogging, are encouraged.
- iv. Catch basins shall not be located in the expected wheel path of vehicles.
- v. Catch basins shall not be located in front of driveways, wheelchair ramps, or in entryways.
- vi. Catch basins shall be built with a 350 mm deep sedimentation sump.
- vii. Catch basins in lanes are discouraged. Where possible, lanes shall drain to a street. Where required, catch basins located in lanes shall be constructed with 10 m of



weeping tile installed below the granular base course down the centerline of the lane each direction from the catch basin.

- viii. Catch basin leads to be installed with a minimum 1% grade

#### **3.4.4 CONNECTIONS TO EXISTING PIPED SYSTEMS**

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- i. The designer is required to show that the system downstream from the development has adequate capacity to accommodate changes in peak flows and volumes resulting from the development. The City will provide conservative estimates of downstream system capacities upon request.
- ii. In areas where the stormwater system capacity is less than required for the one in 5 year return period, peak flows off the development/redevelopment must not be increased above predevelopment levels. Flows from the development must be retained on site and released so that the length and severity of surcharging in the downstream system is not increased.

### **3.5 MAJOR SYSTEM**

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#### **3.5.1 OVERLAND FLOW**

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- i. New developments shall have a continuous route for overland flow from the point of precipitation to a suitable outlet. Continuity of overland flow routes between adjacent developments shall be maintained. The overland flow route will handle runoff from storms that exceed the one in 5 year event.
- ii. The route must be adequate to contain the one in 100 year event without causing flooding of private property or erosion damage to existing facilities. Flow and ponding shall be contained within public property and right-of-ways.
- iii. Where private property is used to convey runoff from multiple lots:
  - a. The means of conveyance shall be designed appropriately.
  - b. The full width of flow under the design 100 year rainfall event shall be protected by an easement.
- iv. Once overland flow routes have reached public property, they must remain on public property. Providing an escape route for a trapped low via an easement between private residences will not be allowed. Overland flow routes of this type are only allowed along roadways, walkways, and other public properties.
- v. The combined conveyance capacity of public right-of-ways downstream of a trapped low shall be equal to or great than the combined conveyance capacity of public right-of-ways upstream.
- vi. The following Table 3.5.1.1 provides safe flow velocity – depth relationships. Overland flows shall not exceed these limits for storms up to the one in 100 year



event. In locations where these limits cannot be met, measures must be taken to ensure public safety by limiting access and posting appropriate warning signs. Exceptions to these defined limits will be evaluated on a case-by-case basis. Note that the table provides safety limits only and does not address erosion resistance requirements.

*Table 3.5.1.1 Maximum Combination of Gutter Flow Depth and Velocity*

<b>Water velocity (m/s)</b>	<b>Maximum Permissible Depth (m)</b>
0.50	0.80
1.00	0.32
2.00	0.21
3.00	0.09

- vii. Overland flow routes depth and velocity relationships will be determined for critical locations. Critical locations are those points where maximum flow rates are encountered, where high velocity flow is expected, where overland flow may present a danger to the public, and locations where there is particular risk of significant erosion or flooding damage.
- viii. Depth and velocity will be calculated using Manning's Equation for open channel flow or an approved alternative method.

### **3.5.2 USE OF ROADWAYS AS OVERLAND CONVEYANCE**

- i. Local roadways may be used as part of the Major system conveyance route, provided that the requirements of section 3.5.1 are adhered to for the 1 in 100 year event.
- ii. Maximum depth of flow or ponding on local roads shall be 300mm at the gutter of the road in a 1 in 100 year event.
- iii. Collector roadways may be used as part of the Major system conveyance route, provided that the requirements of section 3.5.1 are adhered to for the 1 in 100 year event.
- iv. Depth of crossing flow or of ponding in trapped lows in Collector roads shall not exceed the lesser of 300 mm at the gutter of the road or 100 mm at the crown of the road in a 1 in 100 year event.
- v. Collector roadways should have at least one lane, which is not inundated parallel with the direction of flow.
- vi. The travel lanes of Arterial roadways shall not be used as part of the Major system. The City Engineer, on a case-by-case basis, will consider exceptions where it is especially difficult or expensive to prevent flows from entering the arterial road right



of way. In cases where Arterial roads must be used, the designer shall show that flow or ponding along the roadway will not adversely impact the operation of the arterial road.

- vii. Special permission must be obtained in order to use easements as part of the major overland flow route system.

### **3.5.3 DRY PONDS**

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- i. Estimation of required storage volumes, peak flows, and drainage times shall be done using an approved computer model.
- ii. The pond shall provide sufficient storage so that operation of the emergency overflow does not occur during 1 in 100 year events.
- iii. The dry pond shall be graded to properly drain all areas after its operation. The pond bottom shall have a minimum slope of 2.0% (Refer to Section 7.0 Parks and Open Space for details).
- iv. Ponds should be designed with organic shapes and undulating edges to provide visual relief. Rectangular ponds or dugout like ponds should be avoided.
- v. The maximum one in 100 year high water level shall be 0.45 m below the floor elevation of the building on properties having a common property line with the pond.
- vi. An emergency overflow shall be provided on all ponds. The path from the pond overflow to an approved outlet must be identified. Safe depth/velocity relationships cannot be exceeded and adequate erosion protection shall be provided for the emergency overflow and the overland flow routes within the development when operating with peak flows estimated for the 1 in 100 year event.
- vii. All inlets and outlet structures associated with dry ponds shall have grates provided over their openings to restrict access and prevent entry into sewers by children or other persons. A maximum clear bar spacing of 100 mm shall be used for gratings.
- viii. Grated outlet structures are to be designed with a hydraulic capacity of at least twice the required capacity to allow for possible plugging.
- ix. Velocity of flow through gratings on inlets to pipes shall not exceed 1.0 m/s for maximum expected flows during the one in 100 year event.
- x. Appropriate means of limiting access to outlets and reducing the danger of falls from headwalls and wing walls shall be taken.
- xi. Where possible, dry ponds should be incorporated into parks and open space.
- xii. In the design of combined park/dry pond facilities, the park usage of the area shall take precedence over dry pond requirements.
- xiii. Dry ponds located in parks shall include special needs access and egress points having slopes of less than 1 vertical to 12 horizontal.
- xiv. Design of the area about the high water level is covered in Section 7: Parks.



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### **3.5.4 WET PONDS – PHYSICAL CHARACTERISTICS**

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- i. Estimation of required storage volumes, peak flows, and drainage times shall be made using an approved computer model.
- ii. The pond shall provide sufficient active storage so that operation of the emergency overflow does not occur during 1 in 100 year events.
- iii. A minimum horizontal distance of 5 meters shall be maintained from any property line to the high water level. Design of the area past the 5m setback is covered in Section 7: Parks.
- iv. A silt trap or forebay shall be provided at the inlet of each pond.
- v. Access to the pond shall be provided to accommodate expected maintenance traffic including a boat ramp facilitate maintenance for floating or submerged facilities.
- vi. The lake bottom and side slopes shall be composed of an impervious material up to the 1 in 100 year level.
- vii. The maximum one in 100 year water level shall be 0.45 m below the lowest floor elevation of buildings on properties having a common property line with the pond.
- viii. The lowest adjacent manhole invert shall be at or above the normal water level elevation.
- ix. The pipe crown at the lowest manhole upstream of the pond shall be above the high water level during a 1 in 5 year storm event to limit back water effects.

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### **3.5.5 WET PONDS – WATER QUALITY**

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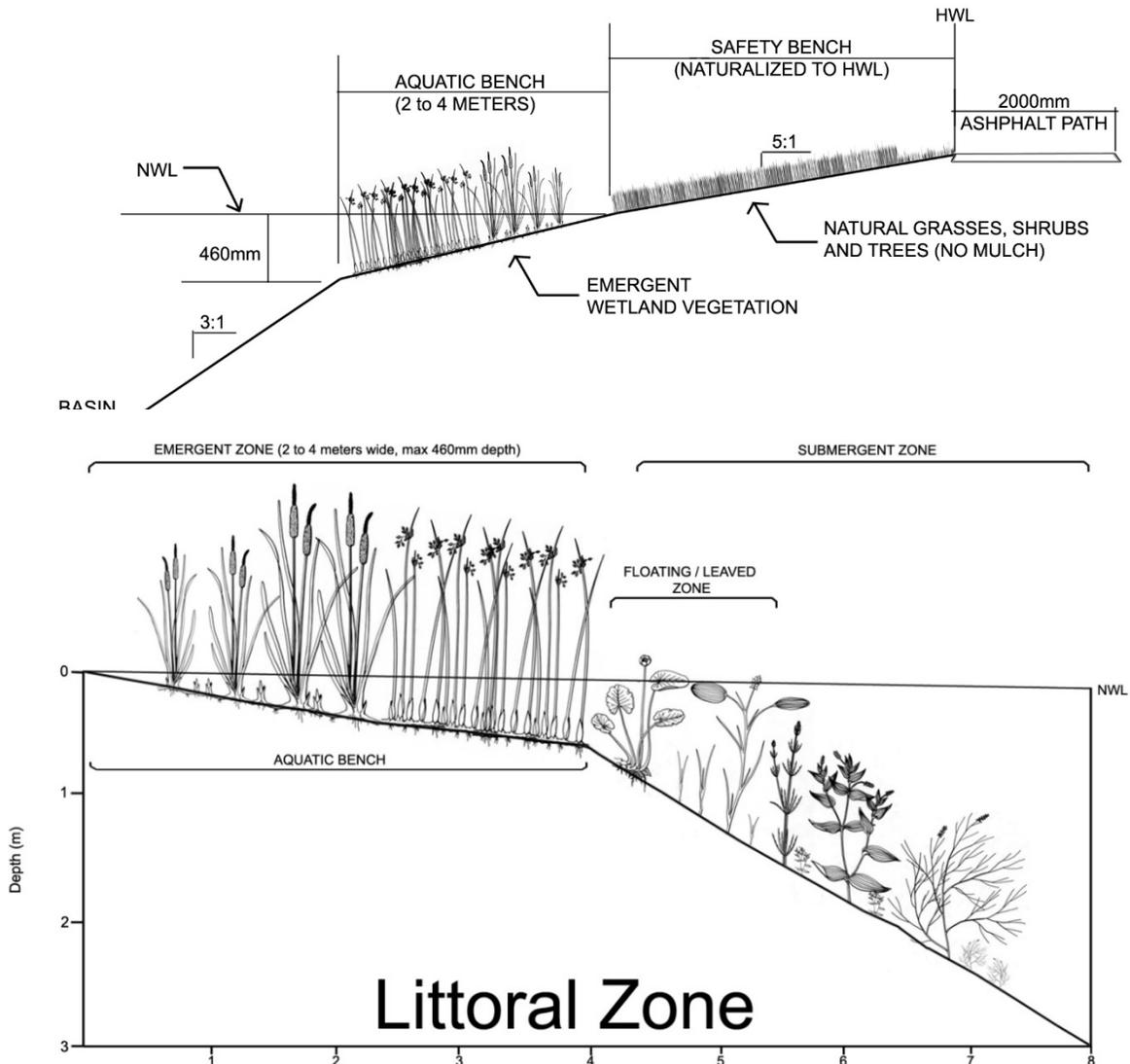
- i. Performance Objectives
  - a. *AESTHETICS*: (Maintain water clarity, colour and prevent odour)
    - i. Keep the pond looking and smelling clean.
  - b. *NUTRIENT CONTROL*: (remove nutrients, litter/debris)
    - i. Suspended solids – 85% reduction of 75 micron particles and larger by weight.
    - ii. Total phosphorus and nitrogen – the pond shall incorporate proven strategies showing removals of these nutrients.
    - iii. Litter –the pond shall incorporate strategies that facilitate the trapping and subsequent collection of litter.
- ii. Design Considerations
  - a. POND CONFIGURATION:
    - i. Ponds shall be designed with sufficient area (minimum 1.5 ha), dimensions, and flow characteristics to minimize aquatic weeds and maintain acceptable water quality. Inlets, outlets, pond shape, internal baffles, and aquatic benching will be arranged to prevent stagnant areas and promote circulation. No dead bay areas shall be permitted. A wedge-shaped pond with the major inflows on the narrow end can prevent short-circuiting and stagnation.



- ii. Ponds shall have a power drop location added.
- iii. Wet ponds should be designed with a length to width ratio of at least 3:1 to promote sedimentation. If the length to width ratio is lower, the flow path through the pond should be maximized.
- b. *EXTENTS Of AQUATIC BENCHES*: All ponds will include aquatic benches either:
  - i. As a continuous ring 2-4 m in width around the perimeter of the permanent pool or,
  - ii. Arranged in bands across the flow path covering a minimum of 20% of the open water area as measured at the normal water level. This type of aquatic benching will be arranged as wetland zones at the inlet and outlets from the pond.
- c. *RIP RAP*
  - i. Where a vegetated aquatic bench is not provided for shoreline, protection rip rap must be used. Rip rap is to be a minimum of 200mm diameter stones to minimize loss as a result of rip rap being thrown into the lake.
- d. *AQUATIC BENCH CONFIGURATION*:
  - i. The aquatic benches will have a maximum depth of 450 mm below the normal water line.
  - ii. Organic soils at least 150mm in depth will be used as a planting bed on aquatic benches. Organic soils can serve as a sink for pollutants and generally have high water holding capacities.
  - iii. Vegetation will be seeded or planted to initiate the growth of aquatic plants. Robust, non-invasive, perennial plants that establish quickly are ideal. The designer should select species that are tolerant of a range of depths, inundation periods, etc. Monoculture planting should be avoided due to the risk from pests and disease.
- e. *CIRCULATION / TURN OVER*
  - i. A source of water is to be provided to all ponds as a make-up water supply and to allow flushing/refreshing of the pond permanent pool during low precipitation and high temperature periods.
  - ii. A pond aeration and circulation system is to be provided for all ponds.
- f. *LANDSCAPING*
  - i. Land adjacent to wet pond facilities shall comply with the Parks and Open Space Chapter of this design standard.
  - ii. Ponds should be designed with organic shapes and undulating edges to provide visual relief and integrate them into the park and open space. Rectangular ponds or dugout like ponds should be avoided.



- iii. Irrigation systems will not be installed below the High Water Level. Naturalized (native) vegetation is acceptable plant material between the HWL and NWL. All plant material below the HWL will require minimal maintenance.
- iv. A physical division will be installed between the un-manicured vegetation below the High Water Level and manicured vegetation above it. This division can take the form of an asphalt pathway or moving strip.
- v. When the irrigated areas in the vicinity of a wet pond exceed 2.5 ha, the pond will be provided with a canal water supply and an irrigation pump house.
- vi. If the lake is to be considered as a source for irrigation water, then water quality must be modeled to ensure public safety



Littoral Zone - The distribution of different types of macrophytes is largely determined by physical factors such as depth, light, wave action and sediment texture.



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## SECTION 4: WATER DISTRIBUTION

### 4.0 INTRODUCTION

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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

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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

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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**

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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**

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See Section 2.1 for Infrastructure Planning Requirements.

## **4.2 ENVIRONMENTAL CONSIDERATIONS**

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See Section 2.2 for Environmental Considerations.

## **4.3 TECHNICAL STANDARDS**

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### **4.3.1 HYDRAULIC NETWORK ANALYSIS**

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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.



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## 4.3.2 WATER MAINS

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### 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**

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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**

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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**

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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**

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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.



## SECTION 5: SANITARY SEWER

### 5.0 INTRODUCTION

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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

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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

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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**

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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**

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See Section 2.1 for Infrastructure Planning Requirements.

## **5.2 ENVIRONMENTAL CONSIDERATIONS**

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See Section 2.2 for Environmental Considerations.

## **5.3 TECHNICAL STANDARDS**

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### **5.3.1 HYDRAULIC NETWORK ANALYSIS**

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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 <sup>3</sup> /ha/d
Institutional	20 m <sup>3</sup> /ha/d
Recreational	10 m <sup>3</sup> /ha/d
Industrial (light and medium)	30 m <sup>3</sup> /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)	$\frac{14}{4 + \sqrt{p}} + 1$
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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 <sup>3</sup> /ha/d
Institutional	7.5 m <sup>3</sup> /ha/d
Recreational	2.5 m <sup>3</sup> /ha/d
Industrial	7.5 m <sup>3</sup> /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*

<b>Zoning</b>	<b>Infiltration Allowance</b>
<b>Residential</b>	150 L/capita/d
<b>Industrial</b>	2.25 m <sup>3</sup> /ha/d
<b>Commercial</b>	2.25 m <sup>3</sup> /ha/d
<b>Institutional</b>	2.25 m <sup>3</sup> /ha/d
<b>Recreational</b>	2.25 m <sup>3</sup> /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**

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### **5.5.1 SUMP PUMP AND WEEPING TILE DRAINAGE**

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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**

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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**

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### **5.6.1 SANITARY SEWER MANHOLES IN TRAPPED LOWS**

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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.



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## SECTION 6: TRANSPORTATION

### 6.0 INTRODUCTION

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This section covers the design of the transportation system including but not limited to roadways, lanes, sidewalks and pathways located within road right of way.

#### 6.0.1 GENERAL

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Current practice is to use a system of arterial roadways, collector roadways, local roadways, lanes, sidewalks, and pathways to move people and goods.

The overall design principles described in the introduction to these standards are the basis on which all construction is undertaken in the City. Often, a combination of principles will come into play when designing a particular component of the system.

The designer must consider safety in the design of transportation facilities. At a minimum, the following safety factors shall be considered in the design of the transportation system:

- i. Number and types of vehicles using the roadway;
- ii. Accessibility of an area to emergency services;
- iii. Spacing, type, intersecting angle, and location of intersections and crosswalks;
- iv. Sight distance (decision, stopping, intersection, etc.);
- v. Level of access from adjacent properties;
- vi. Traffic calming requirements;
- vii. Playground and school zone locations;
- viii. Pedestrian facilities;
- ix. Cycling facilities;
- x. Intersection offsets;
- xi. Intersection control (Yield, Stop, roundabout or traffic signal);
- xii. Median treatment;
- xiii. Traffic control device warrants; and
- xiv. Requirements identified by the Alberta Building Code.

Designers shall consider how the transportation system interacts with other components of the City's infrastructure. In particular, this applies to major overland flow routes forming part of the Storm Water Management System (See Chapter 3).



### 6.0.2 LEVEL OF SERVICE OBJECTIVES

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The objective of the transportation system is to allow movement of people and goods into, out of, and within the city while maintaining quality of life.

In considering the layout of streets, safety and convenience are overarching principles. Design of local roadways shall focus on providing safe access to adjacent properties, while minimizing speed and potential for transient traffic use.

When considering the impact of development of adjacent areas on existing arterial and collector roadways, more traditional definitions of level of service will be used. The City, in these cases, considers level of service “D” and a “Volume to Capacity” ratio of 0.80 to be acceptable operating conditions during peak traffic periods. Improvements are identified / required when the level of service reaches the “D/E” transition.

In addition to providing a minimum level of service for traffic flow, roadways and other surface improvements in the road right of way shall be designed to provide a useful life of 20 years with a minimal maintenance program.

### 6.0.3 APPLICABLE REGULATIONS, GUIDELINES AND RESOURCES

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The following legislation provides information related to the design of transportation systems:

- 1) *Traffic Safety Act*

The following guidelines provide information on the design of transportation systems:

- 1) *Geometric Design Guide for Canadian Roads* Transportation Association of Canada, current edition.
- 2) *Manual of Uniform Traffic Control Devices for Canada* Transportation Association of Canada, current edition.
- 3) *Canadian Traffic Signal Warrant Matrix Procedure* Transportation Association of Canada, current edition.
- 4) *Pedestrian Crossing Control Guide* Transportation Association of Canada, current edition.

Designers of transportation systems are also referred to the following useful resources for additional information on Transportation Systems:

- 1) *Transportation Association of Canada*, <http://tac-atc.ca/>
- 2) *Alberta Transportation*, [www.transportation.alberta.ca](http://www.transportation.alberta.ca)
- 3) *Institute of Transportation Engineers*, <http://www.ite.org/>



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## 6.1 TRANSPORTATION REQUIREMENTS

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### 6.1.1 TRAFFIC IMPACT ASSESSMENTS

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A Traffic Impact Assessment (TIA) shall be completed for all new development or redevelopment that generates 100 additional trips during a peak hour period and/or is expected to create operational difficulties associated with the safe and efficient movement of traffic, pedestrians, bicycles, and transit vehicles.

A traffic impact assessment shall be required even if there are less than 100 peak hour trips when one or more of the following conditions are anticipated or present:

- The development/redevelopment is located in an area of high roadway congestion and/or a high expected rate of population or employment growth;
- The development is located within or adjacent to a residential community that has over-spill of parking issues and may have a residential parking permit program in place;
- The development is located in an area with existing parking issues;
- The development, its access or type of operation is not envisaged by local land-use or transportation plans;
- The development or redevelopment proposal requires amendment of the applicable official plan(s);
- As part of the proposed development, a new traffic signal is proposed to be installed on the arterial road network; or,
- If the development/redevelopment has the potential to create unacceptable adverse operational and safety impacts on the road network. Examples include the following:
  - Inadequate horizontal or vertical sight distances at access points;
  - The proximity of the proposed access points to other existing driveways or intersections;
  - Lack of existing left or right turn lane(s) on the adjacent roadway at the proposed access point(s);
  - The vehicular traffic generated by the development/redevelopment would result in volume/capacity ratios at an adjacent intersection becoming critical (i.e. greater than 0.80 overall or Level of Service D).

The onus is on the proponent/consultant to demonstrate that a traffic impact assessment is not required.

Qualifications to conduct a Traffic Impact Assessment



- When the scale of the development/redevelopment warrants a traffic impact assessment, it is the proponent's responsibility to retain a qualified transportation engineering consultant experienced in transportation planning and traffic engineering.
- The consultant's representative, the engineer responsible for the traffic impact assessment, shall be a member of the Institute of Transportation Engineers and registered as a Professional Engineer in the Province of Alberta. The report must be dated and signed accordingly. The signing Engineer is verifying that appropriate assumptions, procedures, and calculations have been undertaken during the process of completing the traffic impact assessment and that they are the individual who is taking corporate/professional responsibility for the work.

A Traffic Impact Assessment Guideline is available from the Transportation Business Unit for use by transportation consultants. The following guidelines provide additional information on traffic impact assessments:

- 1) *Transportation Impact Analysis for Site Development, Institute of Transportation Engineers*
- 2) *Transportation and Land Development, Institute of Transportation Engineers*
- 3) *Access Management Manual, Transportation Research Board*
- 4) *Trip Generation, Institute of Transportation Engineers*
- 5) *Traffic Impact Assessment Guideline, Alberta Transportation*

Specific requirements for the completion of a TIA are provided by the Transportation Business Unit on a case by case basis and generally include, but are not limited to:

- Identification of intersections to be included in the TIA;
- Proposed development layout;
- Development horizons (existing, interim, 10 year, 30 year, full build out, etc – horizons to be determined based on development size, complexity, and proposed staging);
- Confirmation of trip generation rates prior to analysis;
- Review of trip distribution assumptions prior to analysis (internal and external to site);
- Review of trip assignment prior to analysis (internal and external to site);
- On site circulation;
- On site parking layout;
- Access;
- Pedestrian requirements;
- Cycling requirements;
- Adjacent on-street parking;
- Transit requirements;



- Safety review;
- Traffic Signal Warrants (most recent available from TAC); and
- Synchro and/or Sidra analysis of intersections (City of Lethbridge factors).

Results of the TIA shall identify improvements in the transportation network required to support the proposed development. When considering the results of an Area Structure Plan or Outline Plan TIA, the developer shall be responsible for all improvements identified until the full build out of the development area, in a manner agreed upon with the City.

Traffic Impact Assessments can be separated into three categories:

- TIAs for Urbanization Plans and Area Structure Plans. These TIAs focus on the impact the new development area will have on the existing transportation network and the connection points to the existing/future external transportation network.
- TIAs for Outline Plans. At this level, the TIA will review the internal road network of the proposed development area and also refine the requirements for the access points.
- TIAs for specific development projects. These TIAs look specifically at an individual development site or sites that may be associated with rezoning or development permit applications.

Further information on the three types of Traffic Impact Assessments is available within the Traffic Impact Assessment Guideline.

Additional information is provided in Section 2 General Considerations for Planning Requirements.

### **6.1.2 ENVIRONMENTAL CONSIDERATIONS & BEST MANAGEMENT PRACTICES**

As stewards of the environment, charged with creating a healthy city and protecting the natural endowments within our jurisdiction, the City promotes any design measures which reduce or mitigate the impacts of development.

In particular, design features and construction methods which contribute to improved storm water and air quality are strongly encouraged. Specifically related to transportation design and planning are measures which promote pedestrian and bicycle traffic and encourage the use of public transit.

Designers are referred to [STANDARDS AND GUIDELINES FOR MUNICIPAL WATERWORKS, WASTEWATER AND STORM DRAINAGE SYSTEMS](#) and [STORMWATER MANAGEMENT GUIDELINES FOR THE PROVINCE OF ALBERTA](#) both published by Alberta Environmental Protection for a list of Best Management Practices, which can be designed into the transportation system to reduce the environmental impacts of urbanization.



## **6.2 TRANSIT REQUIREMENTS**

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The City of Lethbridge is committed to transit orientated developments (TOD). To accomplish this goal, all developments shall locate moderate to higher density developments within an easy walk of a major transit stop, generally with a mix of residential, employment, and shopping opportunities designed for pedestrians without excluding vehicles. Major senior facilities shall be located adjacent to roadways with transit routes.

### **6.2.1 GENERAL**

---

Transit routes shall not be located on Local roadways. They should be located on any of the following:

- Arterial (accommodated with pull outs),
- Super Collector,
- Community Entrance Roads,
- Major Collector,
- Minor Collector, or
- Industrial Collector roadways.

### **6.2.2 WALK DISTANCES**

---

Transit services shall be considered where the location exceeds the following distance from a transit route:

- 400 metres walking distance for residential areas (an area may be excluded from consideration if 90% of all residences in the built up area are currently served);
- 250 metres walking distance to all medium and high density residential buildings;
- 250 metres walking distance to institutional facilities including major educational, medical and recreational services;
- 200 metres walking distance to major seniors' residences and seniors activity centres; and
- 750 metres to industrial land uses.

### **6.2.3 BUS STOPS**

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Bus stops shall not be located less than 250 metres apart (multiple stops at a single location may be considered), are to be spaced to achieve the walking distance standards, and their location selected to maximize safety considerations.



Stops and the area around them shall be accessible to people with disabilities, including wheelchairs and other mobility aids. Pads shall be installed at all stops and curb cuts at each corner. In general bus stops should be located downstream of intersections.



## 6.3 ARTERIAL

### 6.3.1 ARTERIAL

### *Design*

TRAFFIC VOLUME (vehicles per day)	NUMBER OF LANES	RIGHT-OF-WAY REQUIREMENT	MINIMUM INTERSECTION SPACING (Property Lines)
Over 15,000	2 to 6	45.0 m to 75.0 m	400 m
<b>FUNCTION</b>			
<ul style="list-style-type: none"> <li>To allow movement between sections and subdivisions within the City of Lethbridge</li> <li>Arterial roadways are generally laid out on 1.6 km intervals along the boundaries of neighbourhoods</li> <li>To function as part of the Truck Route system</li> </ul>			
<b>CONDITIONS</b>			
<ul style="list-style-type: none"> <li>Intersections may be grade separated when warranted</li> <li>An ultimate arterial is a divided roadway with full access control</li> <li>Arterials may intersect with Arterial, Super Collector, or Community Entrance roadways</li> <li>Right in right out access to adjacent property will be considered by the Transportation Business Unit pending completion of a Traffic Impact Assessment by the applicant</li> <li>No direct vehicular access is allowed to adjacent residential property</li> <li>Intersection spacing on an Arterial shall be no closer than 400 m property line to property line unless agreed to in writing by the Transportation Business Unit.</li> <li>The minimum acceptable distance between the termination of an interchange ramp and the centreline of the first intersection is 400 m</li> <li>Where intersections are at grade, channelization may be required to control turning movements</li> <li>All transit stops shall be accommodated in pull outs</li> <li>WB-20 design vehicle with 1.0 m buffer for all arterial access points to commercial land uses</li> </ul>			
<b>FEATURES</b>		<b>NOTES</b>	
Posted Speed (kph)	50 to 80	<ol style="list-style-type: none"> <li>Basic right of way requirement is 45.0 m. An additional 15.0 m shall be added to each side adjacent to residential development</li> <li>Design and construction shall be undertaken by the City of Lethbridge when necessary and as funding becomes available</li> <li>ROW shall be purchased from the developer by the City at the time of subdivision at the current market rate for raw land</li> <li>Developers adjacent to Arterial roadways shall make provision for storm water management for the Arterial road adjacent to their development</li> </ol>	
Parking	No		
Sidewalk	Regional pathway on one side or, if warranted, both sides		
Traffic Signals	As Warranted		



Pedestrian Crossing	At Grade Ramps required	5. Subdivision design shall aim for back of lot grades to be 600mm above the shoulder curb elevation of the arterial road 6. All intersections shall be as near as possible to 90 degrees 7. Modification of the Arterial roadway standard will be considered by the Transportation Business Unit on a case-by-case basis 8. Arterial roadway construction may be staged to meet traffic volume requirements 9. Play grounds shall be placed a sufficient distance from an arterial roadway to eliminate the need for a playground zone 10. Manholes shall not be placed in pathways	
Bikeway	Regional Pathway		
Transit Route	Yes		
Truck Route	Yes		
Sound Attenuation	15 m in ROW adjacent to residential areas		
Pavement Markings	Yes	<b>Reference Drawings</b>	SLA_06

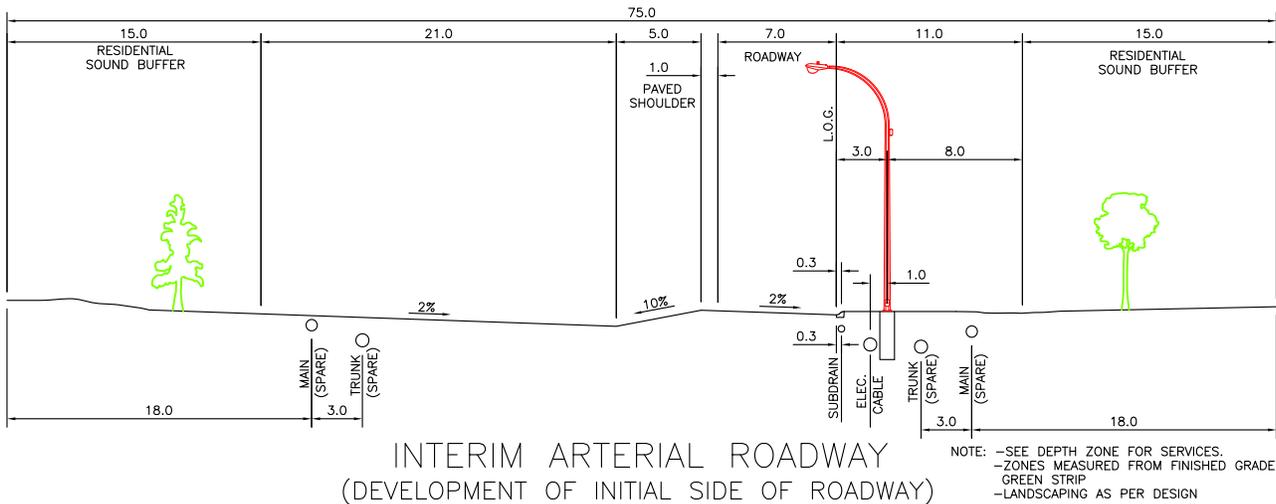
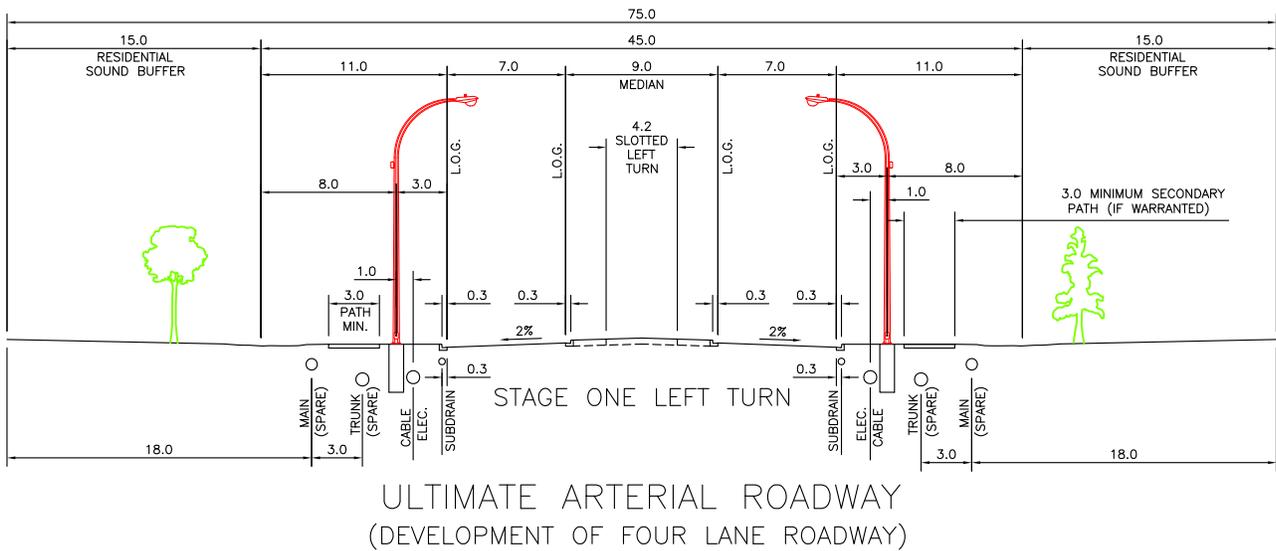
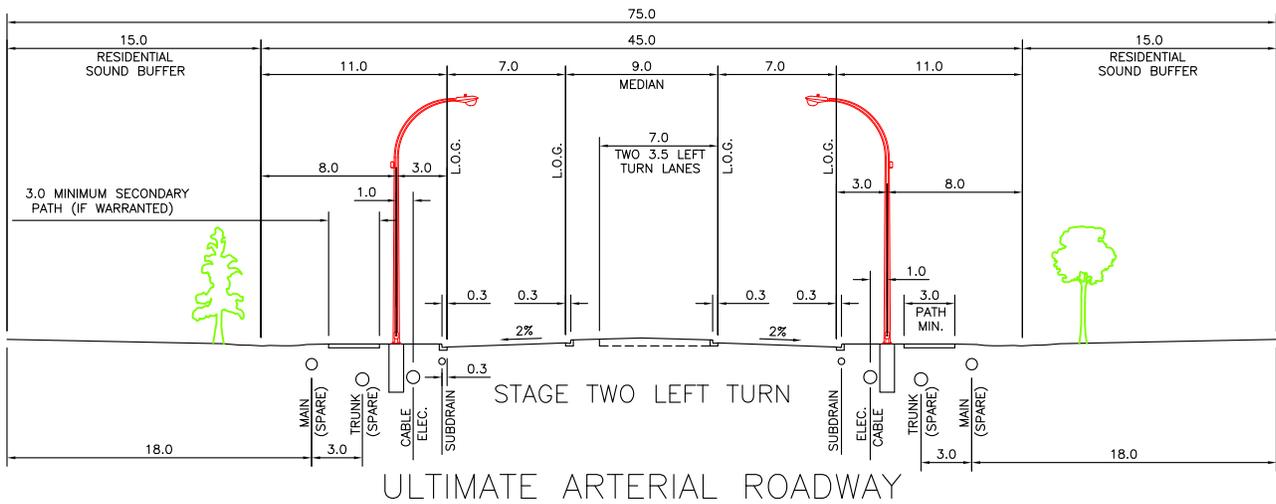
## 6.3.2 ARTERIAL

## *Geometric*

CLASSIFICATION	DESIGN SPEED	DESIGN VEHICLE
Urban Arterial Divided (UAD 60)	60-90 kph	WB-20  (1.0 m buffer with a minimum of 0.3 m each side of vehicle)
Urban Arterial Divided (UAD 70)		
Urban Arterial Divided (UAD 80)		
Urban Arterial Divided (UAD 90)		
<b>HORIZONTAL ALIGNMENT</b>		
<b>Minimum Stopping Sight Distance</b>		<b>Minimum Radius of Curvature</b>
(As per current TAC GDGCR)		(As per current TAC GDGCR)
<b>Median Left Turn Bay</b>		
All arterial intersections to allow: <ul style="list-style-type: none"> <li>• Stage 1 – single slotted left turn bays with opposing left turns capable of operating simultaneously</li> <li>• Stage 2 – dual parallel left turn bays with opposing left turns capable of operating simultaneously</li> <li>• Left turn bay storage lengths as per 6.12.1 Intersection Design</li> <li>• (As per current TAC GDGCR)</li> </ul>		
<b>VERTICAL ALIGNMENT</b>		
<b>Maximum &amp; Minimum Grades</b>		



<ul style="list-style-type: none"><li>• Max 6%, Min 0.6%</li></ul>	
<b>Grade at Intersections</b>	
<ul style="list-style-type: none"><li>• (As per current TAC GDGCR)</li></ul>	
<b>Vertical Curves &amp; Super Elevation</b>	
<ul style="list-style-type: none"><li>• Vertical curve lengths in meters should not be less than speed in kilometers per hour</li><li>• Use 0.04 or 0.06 superelevation tables</li></ul>	
<b>PAVEMENT STRUCTURE</b>	<b>REFERENCE DRAWINGS</b>
STR 18a	City of Lethbridge Engineering Standards;



INTERIM ARTERIAL ROADWAY  
(DEVELOPMENT OF INITIAL SIDE OF ROADWAY)

DATE	REVISION	BY
11/06	BUFFERED UTILITIES	R.J.K.
01/13	PATHWAYS ADDED	R.J.K.
02/16	TREES ADDED	R.J.K.
FILE:	TRAN_6.3.dwg	



CITY OF  
*Lethbridge*

INFRASTRUCTURE SERVICES

75m ARTERIAL ROAD

DRAWN:	R.J.K.
DESIGN:	R.J.K.
CHECKED:	R.A.B.
APPROVED:	D.L.J.
SCALE:	N.T.S.
DATE:	10/05/1999
DWG NO:	TRAN_6.3



## 6.4 SUPER COLLECTOR

### 6.4.1 SUPER COLLECTOR

### *Design*

TRAFFIC VOLUME (vehicles per day)	NUMBER OF LANES	RIGHT-OF-WAY REQUIREMENT	MINIMUM INTERSECTION SPACING (Property Lines)
2,000 to 15,000	2 to 4 (see Geometric note)	<i>See Note 1</i>	200 m

#### FUNCTION

- To distribute traffic in commercial areas, between residential communities, and as community entry roadways
- To serve secondary traffic generators such as commercial centres, recreational facilities, schools, and traffic from neighbourhood to neighbourhood within the community
- To connect commercial areas and residential communities to arterials
- May be used as a transit route

#### CONDITIONS

- Direct access to abutting commercial properties shall be based on intersection spacing requirements
- Residential frontage is not permitted on a Super Collector
- Super Collectors may intersect with Local roadways, Minor Collectors, Major Collectors, Community Entrance Roads, other Super Collectors, or Arterial roadways
- Developers shall complete a Traffic Impact Assessment prior to approval of commercial driveway access to a Super Collector.
- When a Super Collector intersects with an Arterial, all turns driveway access from adjacent properties shall not be allowed within a minimum distance of 200 m from the edge of the Arterial right of way
- Right in right out driveway access to adjacent property will be considered by the Transportation Business Unit pending completion of a Traffic Impact Assessment by the applicant
- Intersection spacing on Super Collectors shall not be less than 200 m property line to property line unless agreed to in writing by the Transportation Business Unit.

FEATURES		NOTES
Posted Speed (kph)	50	1. Basic right of way requirement is 30.0 m. Additional right of way shall be required for trees in boulevard and/or median 2. Divided roadway 3. All intersections shall be as near as possible to 90 degrees 4. Super Collector roadways shall not end in a cul-de-sac
Parking	No	
Sidewalk	Yes ( <i>see Note 8</i> )	
Traffic Signals	As Warranted	



Pedestrian Crossing	At Grade Ramps required	5. Super Collector roadways shall be configured in loops and/or intersect with other Collector or Arterial roadways at a minimum of two locations 6. Modification of the Super Collector standard will be considered by the Transportation Business Unit on a case-by-case basis 7. If the roadway is adjacent to low density residential development, one storey single family residential dwellings must back onto the Super Collector unless sufficient noise attenuation is provided by the developer 8. Separate sidewalk, curb and gutter shall be provided on one side and regional pathway on one side 9. Play grounds shall be placed a sufficient distance from a super collector to eliminate the need for a playground zone 10. If left turn bays will not be developed at the intersection the median width must be reduced if not being used for landscaping. 11. Manholes shall not be placed in pathways	
Bikeway	TBD		
Transit Route	Yes		
Truck Route	No		
Sound Attenuation	As warranted		
Pavement Markings	Yes	<b>Reference Drawings</b>	SLA_07

## 6.4.2 SUPER COLLECTOR

## *Geometric*

CLASSIFICATION	DESIGN SPEED	DESIGN VEHICLE
Urban Collector Divided (UCD 60)	60	Residential - WB-17 Commercial - WB-20 (1.0 m buffer with a minimum of 0.3 m each side of vehicle))
<b>HORIZONTAL ALIGNMENT</b>		
<b>Minimum Stopping Sight Distance</b>	<b>Minimum Radius of Curvature</b>	
(As per current TAC GDGCR)	(As per current TAC GDGCR)	
<b>Median Left Turn Bay</b>		
<ul style="list-style-type: none"> <li>Left turn bay storage lengths as per 6.12.1 Intersection Design</li> <li>(As per current TAC GDGCR)</li> </ul>		
<b>VERTICAL ALIGNMENT</b>		
<b>Maximum &amp; Minimum Grades</b>		
<ul style="list-style-type: none"> <li>Max 6%, Min 0.6%</li> </ul>		



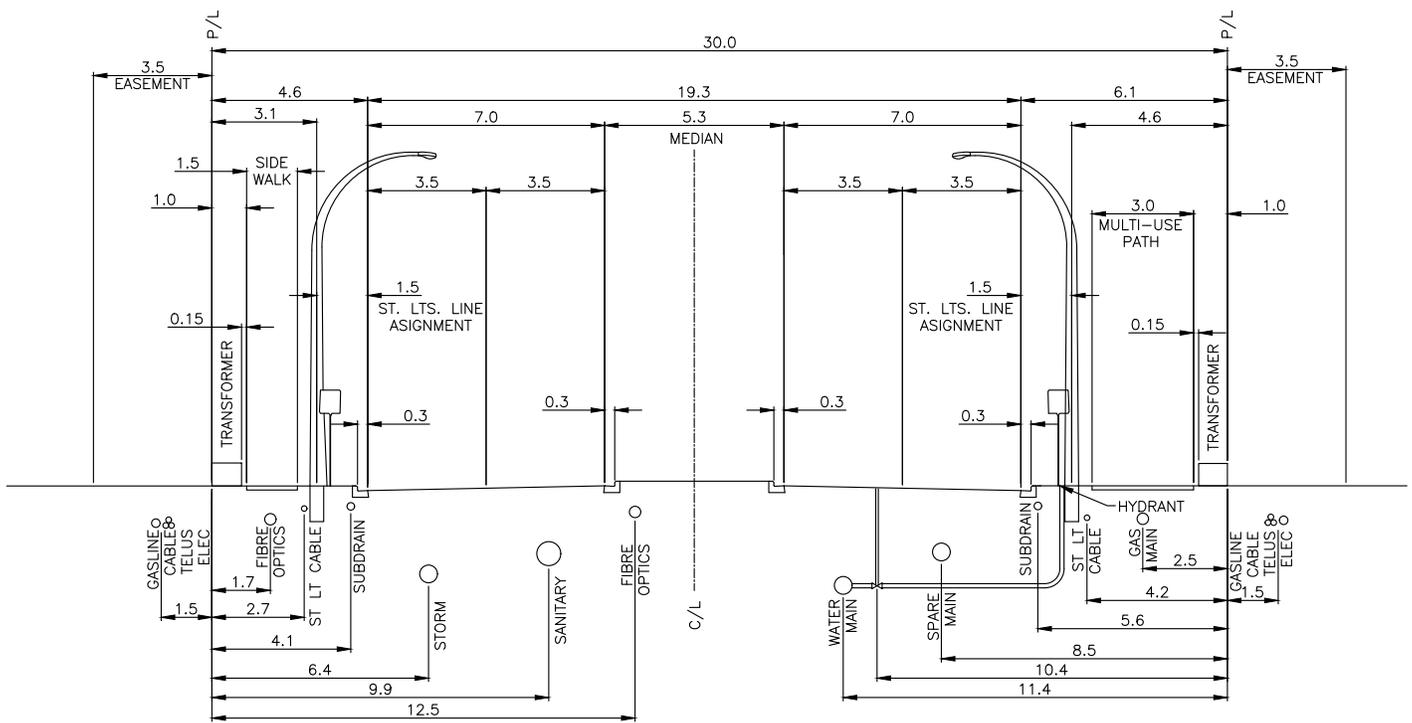
<b>Grade at Intersections</b>	
<ul style="list-style-type: none"><li>• (As per current TAC GDGCR)</li></ul>	
<b>Vertical Curves &amp; Super Elevation</b>	
<ul style="list-style-type: none"><li>• Vertical curve lengths in meters should not be less than speed in kilometers per hour</li><li>• Use 0.04 or 0.06 superelevation tables</li></ul>	
<b>PAVEMENT STRUCTURE</b>	<b>REFERENCE DRAWINGS</b>
STR 18a	City of Lethbridge Engineering Standards;

### NOTES

Super Collectors are required in commercial and high volume residential areas. The number of lanes is dependent on future traffic volume and intersection control. Design of the appropriate super collector cross-section requires careful consideration. The following list identifies several of the alternate super collector concepts.

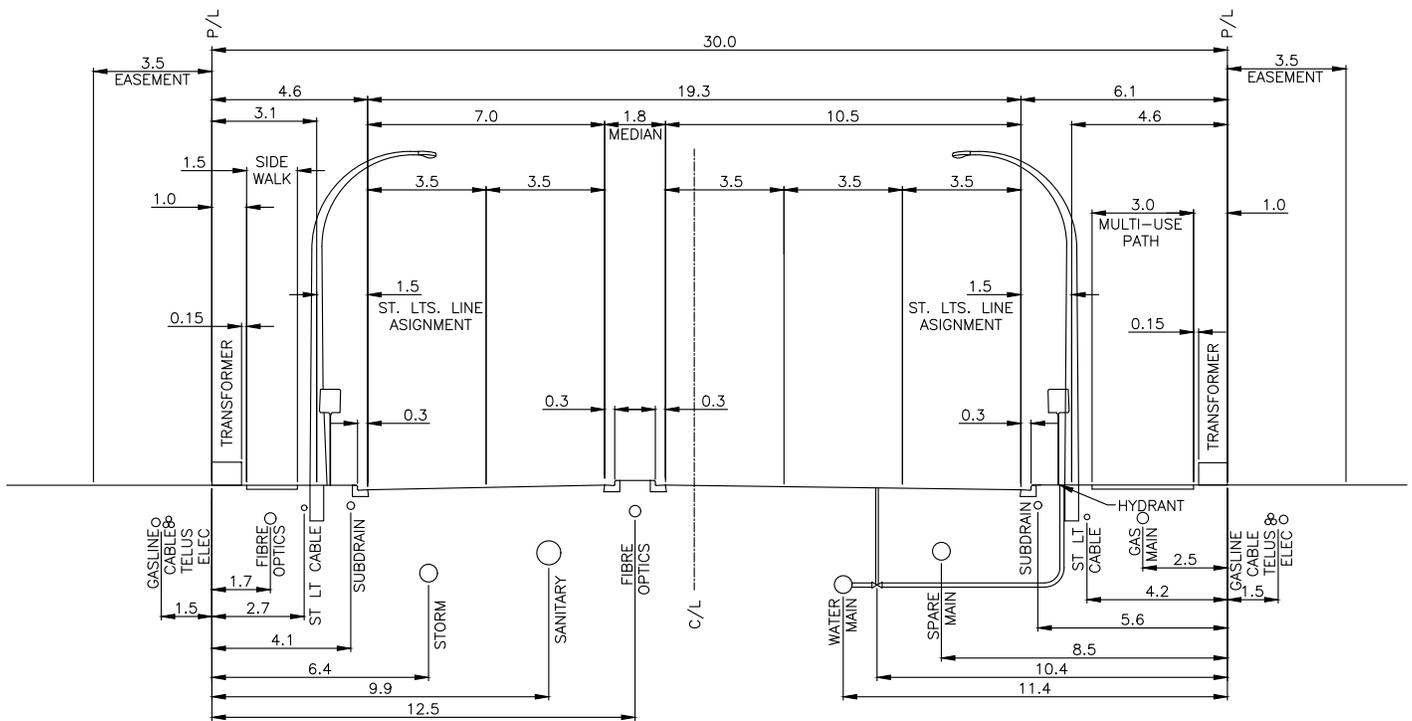
- Two lane, no parking, conventional intersection
- Two lane, parking, conventional intersection
- Two lane, no parking, roundabout intersection
- Two lane, parking, roundabout intersection
- Four lane, no parking, conventional intersection
- Four lane, no parking, roundabout intersection

Cross-sections approaching roundabout intersections or conventional intersections that do not require development of a left turn bay may require a reduction in the median width if not being used for landscaping. The median width in these cases shall be based on engineering requirements including, but not limited to, safety, sight distance, access control, adjacent parking, and maintenance.



## TYPICAL SECTION

NOTE: SHALLOW UTILITY EASEMENT:  
 -3.5m 4 PARTY TRENCHING (RESIDENTIAL)  
 -ADDITIONAL RIGHT OF WAY WILL BE REQUIRED TO PROVIDE TREES IN BOULEVARD AND/OR MEDIAN



## LEFT TURN SECTION

DATE	REVISION	BY
02/05	REVISED	W.G.C.
02/07	REVISED	R.J.K.
12/07	REVISED	R.J.K.
01/11	SHALLOW UTILITIES	R.J.K.
04/16	1.5m SIDEWALKS	R.J.K.
FILE:	TRAN_6.4.dwg	



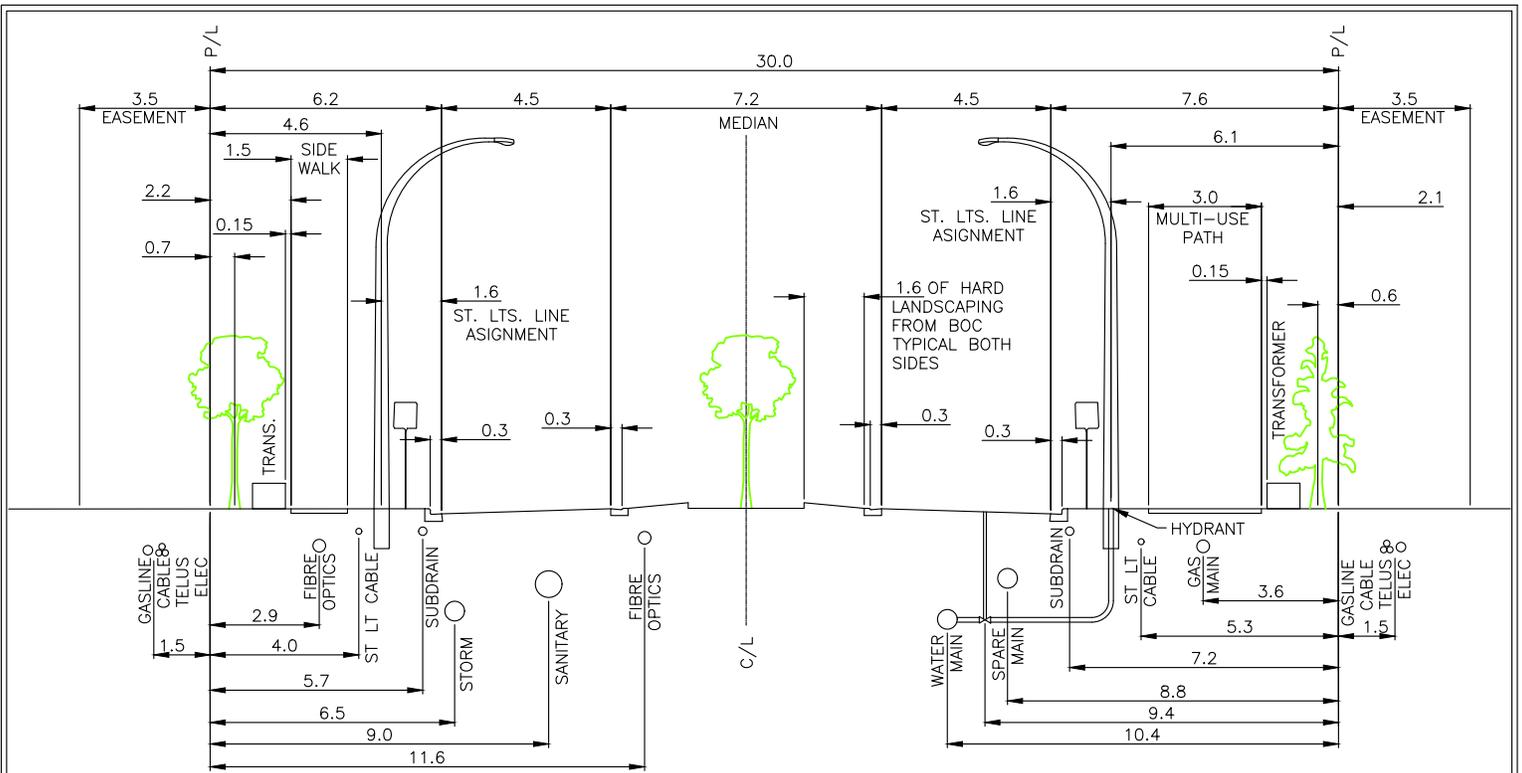
**CITY OF**  
*Lethbridge*

INFRASTRUCTURE SERVICES

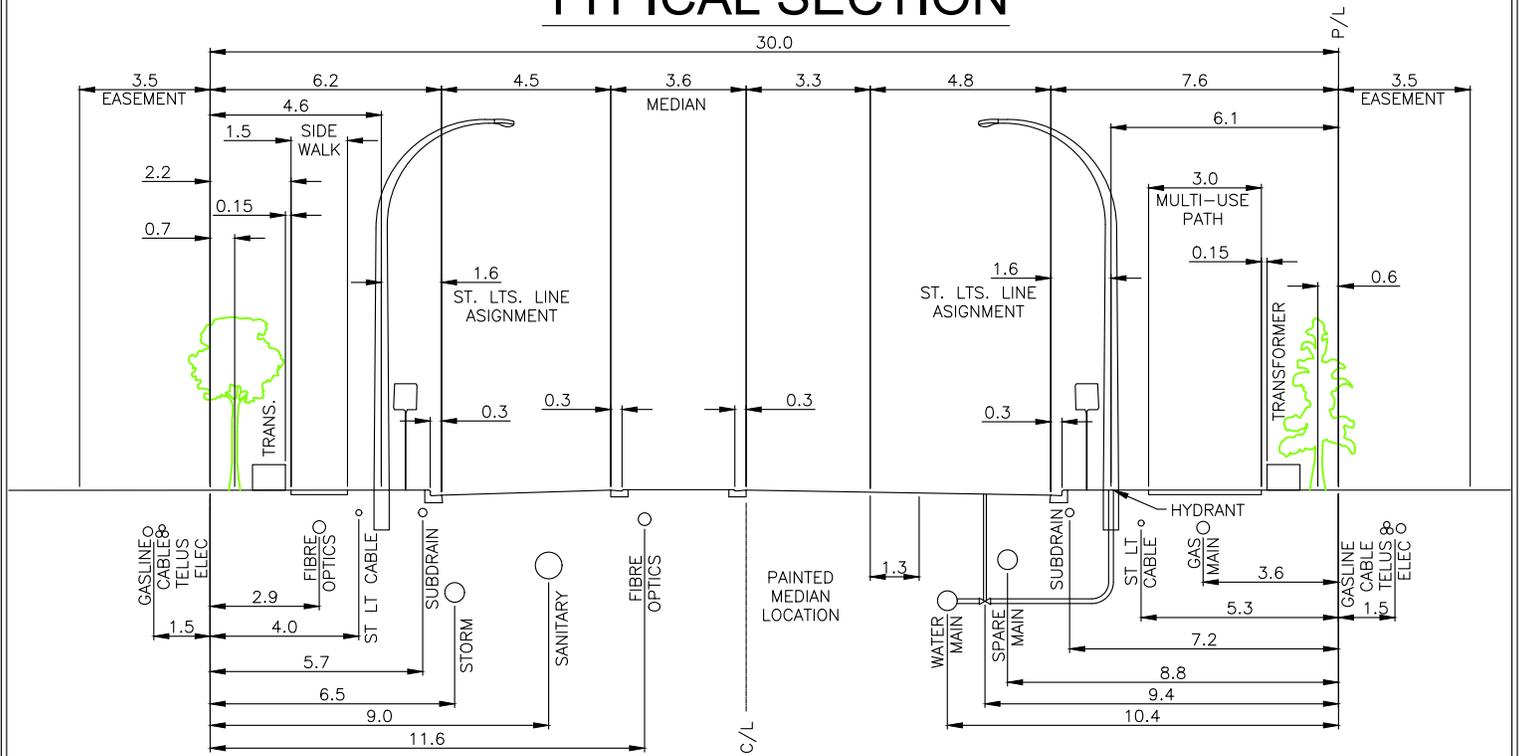
30m SUPER COLLECTOR  
 (4 LANES)

WITH CONVENTIONAL INTERSECTION

DRAWN:	R.J.K.
DESIGN:	R.J.K.
CHECKED:	R.A.B.
APPROVED:	D.L.J.
SCALE:	N.T.S.
DATE:	04/02/2004
DWG NO:	TRAN_6.4



**TYPICAL SECTION**



**LEFT TURN SECTION**

DATE	REVISION	BY
02/11	SHALLOW UTILITIES	R.J.K.
04/16	1.5m SIDEWALKS	R.J.K.
FILE:	TRAN_6.4a.dwg	



**CITY OF**  
*Lethbridge*

INFRASTRUCTURE SERVICES

30m SUPER COLLECTOR  
(2 LANES)

WITH CONVENTIONAL INTERSECTION

DRAWN:	R.J.K.
DESIGN:	R.J.K.
CHECKED:	R.A.B.
APPROVED:	D.L.J.
SCALE:	N.T.S.
DATE:	15/11/2006
DWG NO:	TRAN_6.4a



## 6.5 COMMUNITY ENTRANCE ROAD

### 6.5.1 COMMUNITY ENTRANCE ROAD

### *Design*

TRAFFIC VOLUME (vehicles per day)	NUMBER OF LANES	RIGHT-OF-WAY REQUIREMENT	MINIMUM INTERSECTION SPACING (Property Lines)
2,000 to 8,000	2	28.0 m	120 m
<b>FUNCTION</b>			
<ul style="list-style-type: none"> <li>To distribute traffic between residential communities and as community access points from Arterial roadways</li> <li>To serve secondary traffic generators such as neighbourhood commercial centres, recreational facilities, schools and traffic from neighbourhood to neighbourhood within the community</li> <li>To serve as a transit route</li> </ul>			
<b>CONDITIONS</b>			
<ul style="list-style-type: none"> <li>Direct access shall be permitted to abutting commercial properties</li> <li>Residential frontage shall not be permitted on a Community Entrance Road</li> <li>Community Entrance Road shall intersect with Local roadways, Minor Collectors, Major Collectors, other Community Entrance Roads, Super Collectors or Arterial roadways</li> <li>Developers shall complete a Traffic Impact Assessment prior to approval of commercial driveway access to a Community Entrance Road.</li> <li>When a Community Entrance Road intersects with an Arterial, driveway access from adjacent properties shall not be allowed within a minimum distance of 60 m from the edge of the Arterial right of way</li> <li>Intersection spacing on Community Entrance Roads shall not be less than 120 m property line to property line unless agreed to in writing by the Transportation Business Unit.</li> <li>Right in right out access to adjacent commercial property shall be considered by the Transportation Business Unit on a case-by-case basis.</li> </ul>			
<b>FEATURES</b>		<b>NOTES</b>	
Posted Speed (kph)	50	<ol style="list-style-type: none"> <li>Divided roadway</li> <li>All intersections shall be as near as possible to 90 degrees</li> <li>The cross section shall increase to four lanes at intersections if additional capacity is required for turning movements</li> <li>Intersection control by yield signs, stop signs or traffic signal as warranted</li> <li>No residential access permitted</li> <li>Sufficient carriageway is required to permit two way traffic on either side of the median if a road closure is in effect on the other side of the median</li> </ol>	
Parking	No		
Sidewalk	Yes ( <i>see Note 8</i> )		
Traffic Signals	As Warranted		
Pedestrian Crossing	At Grade Ramps required		
Bikeway	TBD		

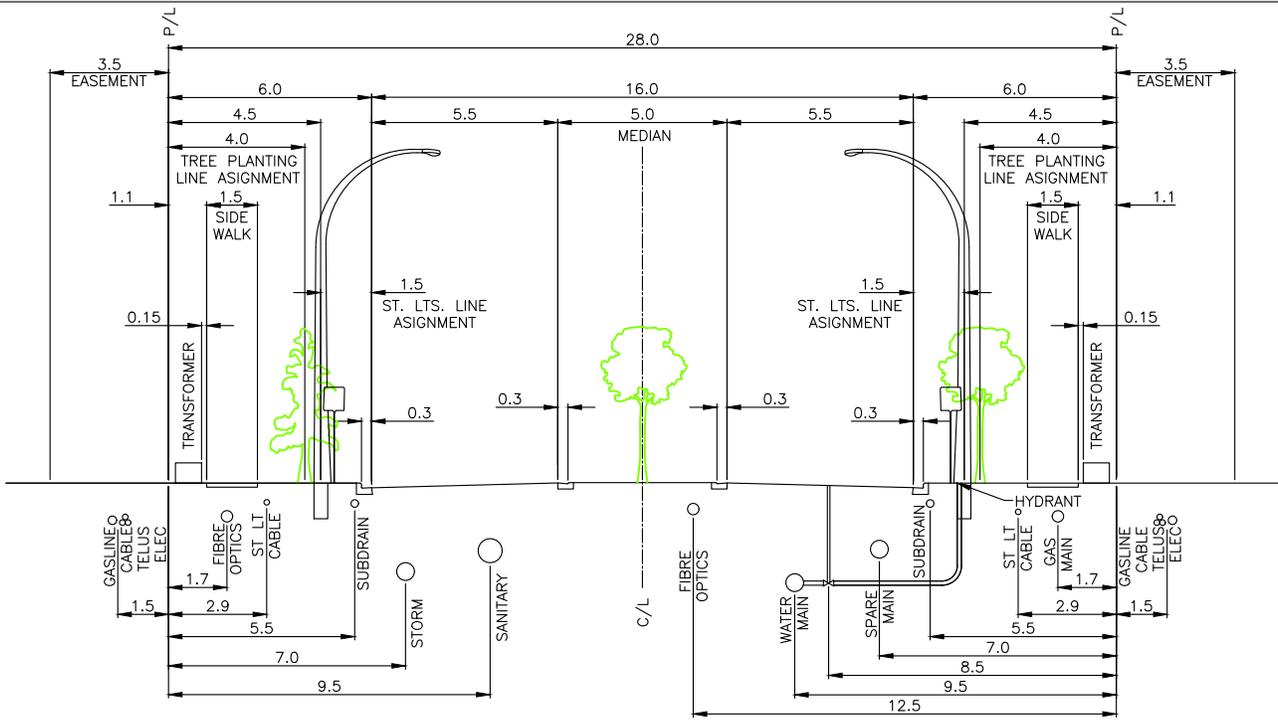


Transit Route	Yes	7. Modification of the Community Entrance Road standard will be considered by the Transportation Business Unit on a case-by-case basis
Truck Route	No	
Sound Attenuation	As warranted	
Pavement Markings	Yes	8. Separate sidewalk, curb, and gutter on both sides 9. Play grounds must be placed a sufficient distance from a community entrance road to eliminate the need for a playground zone
		<b>Reference Drawings</b>

## 6.5.2 COMMUNITY ENTRANCE ROAD

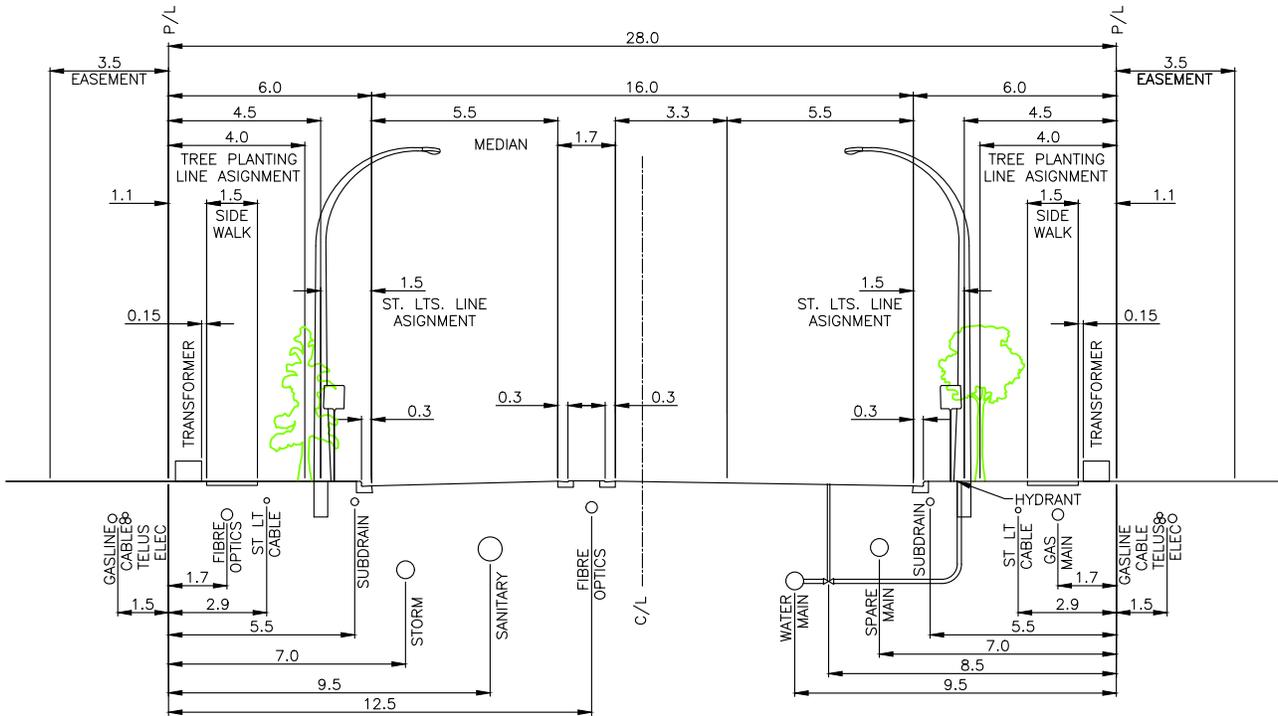
## *Geometric*

CLASSIFICATION	DESIGN SPEED	DESIGN VEHICLE
Urban Collector Divided (UCD 60)	60 kph	Residential - WB-17 Commercial - WB-20 (1.0 m buffer with a minimum of 0.3 m each side of vehicle)
<b>HORIZONTAL ALIGNMENT</b>		
<b>Minimum Stopping Sight Distance</b>		<b>Minimum Radius of Curvature</b>
As per current TAC GDGCR		As per current TAC GDGCR
<b>Median Left Turn Bay</b>		
<ul style="list-style-type: none"> <li>Left turn bay storage lengths as per 6.12.1 Intersection Design</li> <li>As per current TAC GDGCR</li> </ul>		
<b>VERTICAL ALIGNMENT</b>		
<b>Maximum &amp; Minimum Grades</b>		
<ul style="list-style-type: none"> <li>Max 6%, Min 0.6%</li> </ul>		
<b>Grade at Intersections</b>		
<ul style="list-style-type: none"> <li>As per current TAC GDGSCR</li> </ul>		
<b>Vertical Curves &amp; Super Elevation</b>		
<ul style="list-style-type: none"> <li>Vertical curve lengths in meters should not be less than speed in kilometers per hour</li> <li>Use 0.04 or 0.06 superelevation tables</li> </ul>		
<b>PAVEMENT STRUCTURE</b>		<b>REFERENCE DRAWINGS</b>
STR 18a		City of Lethbridge Engineering Standards;



### TYPICAL SECTION

NOTE: SHALLOW UTILITY EASEMENT:  
-3.5m 4 PARTY TRENCHING



### LEFT TURN SECTION

DATE	REVISION	BY
01/11	SHALLOW UTILITIES	R.J.K.
04/16	1.5m SIDEWALKS	R.J.K.



**CITY OF**  
*Lethbridge*

INFRASTRUCTURE SERVICES

28m COMMUNITY ENTRANCE  
COLLECTOR ROAD

DRAWN:	R.J.K.
DESIGN:	R.J.K.
CHECKED:	R.A.B.
APPROVED:	D.L.J.
SCALE:	N.T.S.
DATE:	26/02/2004
DWG NO:	TRAN_6.5

FILE: TRAN\_6.5.dwg



## 6.6 MAJOR COLLECTOR

### 6.6.1 MAJOR COLLECTOR

### *Design*

TRAFFIC VOLUME (vehicles per day)	NUMBER OF LANES	RIGHT-OF-WAY REQUIREMENT	MINIMUM INTERSECTION SPACING (Property Lines)
2,000 to 8,000	2	25.0 m	120 m
<b>FUNCTION</b>			
<ul style="list-style-type: none"> <li>To collect and distribute traffic within residential communities</li> <li>To provide access to the adjacent residential lots within the subdivision</li> <li>To serve secondary traffic generators such as neighbourhood commercial centres, recreational facilities, schools, and traffic from neighbourhood to neighbourhood within the community</li> <li>To serve as a transit route</li> </ul>			
<b>CONDITIONS</b>			
<ul style="list-style-type: none"> <li>Direct access shall be permitted to abutting residential and commercial properties</li> <li>Major Collectors shall intersect with Local roadways, Minor Collectors, other Major Collectors, Community Entrance Roads, or Super Collectors</li> <li>Lane intersections with Major Collector roadways are not preferred. (All efforts should be taken to eliminate the intersection)</li> <li>Adequate emergency services access shall be provided to all abutting properties</li> <li>Lane connections to Major Collector roadways will be treated as driveways until the lane generates more than 250 vehicles per day. (No less than 30m from the nearest intersection measured from property line to property line)</li> <li>Intersection spacing on Major Collector roadways shall not be less than 120 m property line to property line unless agreed to in writing by the Transportation Business Unit</li> </ul>			
<b>FEATURES</b>		<b>NOTES</b>	
Posted Speed (kph)	50	<ol style="list-style-type: none"> <li>Undivided roadway</li> <li>All intersections shall be as near as possible to 90 degrees</li> <li>Intersection control by yield signs, stop signs, or a roundabout as warranted</li> <li>Parking permitted on both sides of roadway, but may be restricted on higher volume sections by the Transportation Business Unit on a case by case basis</li> <li>Major Collector roadways shall not end in a cul-de-sac</li> </ol>	
Parking	Yes (see Note 4)		
Sidewalk	Separate sidewalk, curb and gutter on both sides		
Traffic Signals	As Warranted		



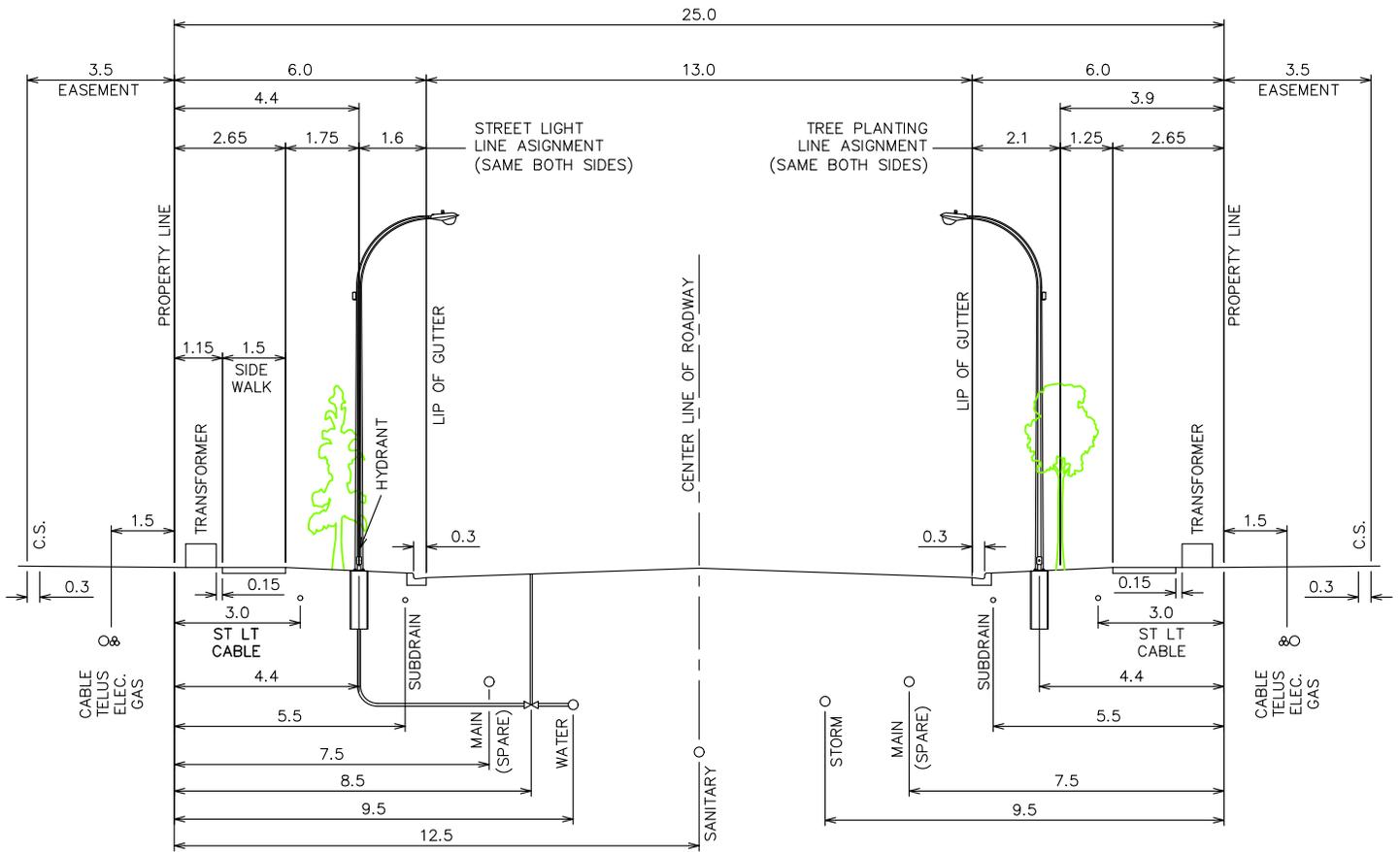
Pedestrian Crossing	At Grade Ramps required	6. Major Collector roadways shall be configured in loops and/or intersect with other Collector or Arterial roadways at a minimum of two locations	
Bikeway	TBD	7. All Major Collector roadways shall have yellow centerline pavement markings.	
Transit Route	Yes	8. No front residential driveway access on Major Collectors with projected volumes exceeding 7000 vehicles per day	
Truck Route	No	9. Major Collector roadways shall be configured to discourage transient traffic through residential neighbourhoods	
Sound Attenuation	No	10. Modification of the Major Collector standard shall be considered by the Transportation Business Unit on a case-by-case basis	
		11. Playground and School zones shall be minimized on Major Collector roadways	
		12. Traffic calming shall be considered on Major Collectors with potential for transient traffic	
Pavement Markings	Yes	<b>Reference Drawings</b>	SLA_05



## 6.6.2 MAJOR COLLECTOR

## *Geometric*

CLASSIFICATION	DESIGN SPEED	DESIGN VEHICLE
Urban Collector Undivided (UCU 50) Urban Collector Undivided (UCU 60)	50 - 60 kph	Residential - WB-17 Commercial - WB-20 (1.0 m buffer with a minimum of 0.3 m each side of vehicle)
<b>HORIZONTAL ALIGNMENT</b>		
<b>Minimum Stopping Sight Distance</b>	<b>Minimum Radius of Curvature</b>	
(As per current TAC GDGCR)	(As per current TAC GDGCR)	
<b>VERTICAL ALIGNMENT</b>		
<b>Maximum &amp; Minimum Grades</b>		
<ul style="list-style-type: none"><li>Max 6%, Min 0.6%</li></ul>		
<b>Grade at Intersections</b>		
<ul style="list-style-type: none"><li>(As per current TAC GDGCR)</li></ul>		
<b>Vertical Curves &amp; Super Elevation</b>		
<ul style="list-style-type: none"><li>Vertical curve lengths in meters should not be less than speed in kilometers per hour</li><li>Use 0.04 or 0.06 superelevation tables</li></ul>		
<b>PAVEMENT STRUCTURE</b>	<b>REFERENCE DRAWINGS</b>	
STR 18a	City of Lethbridge Engineering Standards;	



NOTE: -SEE DEPTH ZONES OF SERVICES. HYDRANT, TRANSFORMERS AND STREET LIGHTS ARE CENTERED ON LOT LINE EXTENSIONS

-WIRE FOR ELECTRIC/TELUS/SHAW AND GAS CABLE 1.5m BACK FROM PROPERTY LINE

-TRANSFORMERS & PEDESTALS 0.15m BACK OF SIDEWALK

-SHALLOW UTILITY EASEMENT 3.5m 4 PARTY TRENCHING (RESIDENTIAL)

DATE	REVISION	BY
01/01	REVISED	A.D.
01/04	REVISED	W.G.C.
02/04	REVISED	W.G.C.
11/06	UPDATE	R.J.K.
11/07	UPDATE	R.J.K.
03/14	UTIL. SPACING	R.J.K.
04/16	1.5m SIDEWALK	R.J.K.
FILE:	TRAN_6.6b.dwg	



**CITY OF**  
*Lethbridge*

INFRASTRUCTURE SERVICES

25m MAJOR COLLECTOR

DRAWN:	R.J.K.
DESIGN:	R.J.K.
CHECKED:	R.A.B.
APPROVED:	D.L.J.
SCALE:	N.T.S.
DATE:	30/01/1997
DWG NO:	TRAN_6.6b



## 6.7 MINOR COLLECTOR

### 6.7.1 MINOR COLLECTOR

### *Design*

TRAFFIC VOLUME (vehicles per day)	NUMBER OF LANES	RIGHT-OF-WAY REQUIREMENT	MINIMUM INTERSECTION SPACING (Property Lines)
up to 4000	2	21 or 23 m	60 m
<b>FUNCTION</b>			
<ul style="list-style-type: none"> <li>To collect and distribute traffic within residential communities</li> <li>To provide access to the adjacent residential lots within the subdivision</li> <li>To serve secondary traffic generators such as recreational facilities and schools</li> <li>To serve as a transit route</li> </ul>			
<b>CONDITIONS</b>			
<ul style="list-style-type: none"> <li>Direct access shall be permitted to abutting residential properties, schools, and recreational facilities</li> <li>Minor Collectors shall intersect with Lanes, Local roadways, other Minor Collectors, Major Collectors, Community Entrance Roads, or Super Collectors</li> <li>Adequate emergency services access shall be provided to all abutting properties</li> <li>Intersection spacing on Minor Collector roadways shall not be less than 60 m unless agreed to in writing by the Transportation Business Unit</li> <li>Lane connections to Minor Collector roadways will be treated as driveways until the lane generates more than 250 vehicles per day. (No less than 30 m from the nearest intersection measured from property line to property line)</li> </ul>			
<b>FEATURES</b>		<b>NOTES</b>	
Posted Speed (kph)	50	<ol style="list-style-type: none"> <li>Undivided roadway</li> <li>All intersections shall be as near as possible to 90 degrees</li> <li>Intersection control by yield signs or stop signs as warranted</li> <li>Parking permitted on both sides of roadway, but may be restricted under special circumstances</li> <li>Minor Collector roadways shall not end in a cul-de-sac</li> <li>Minor Collector roadways shall be configured in loops and/or intersect with other Collector roadways at a minimum of two locations</li> <li>Minor Collector roadways shall be configured to discourage transient traffic through residential neighbourhoods</li> <li>Modification of the Minor Collector standard shall be considered by the Transportation Business Unit on a case-by-case basis</li> </ol>	
Parking	Yes (Both Sides)		
Sidewalk	Combined or separate sidewalk, curb and gutter on both sides		
Traffic Signals	As Warranted		
Pedestrian Crossing	At Grade Ramps required		
Bikeway	TBD		

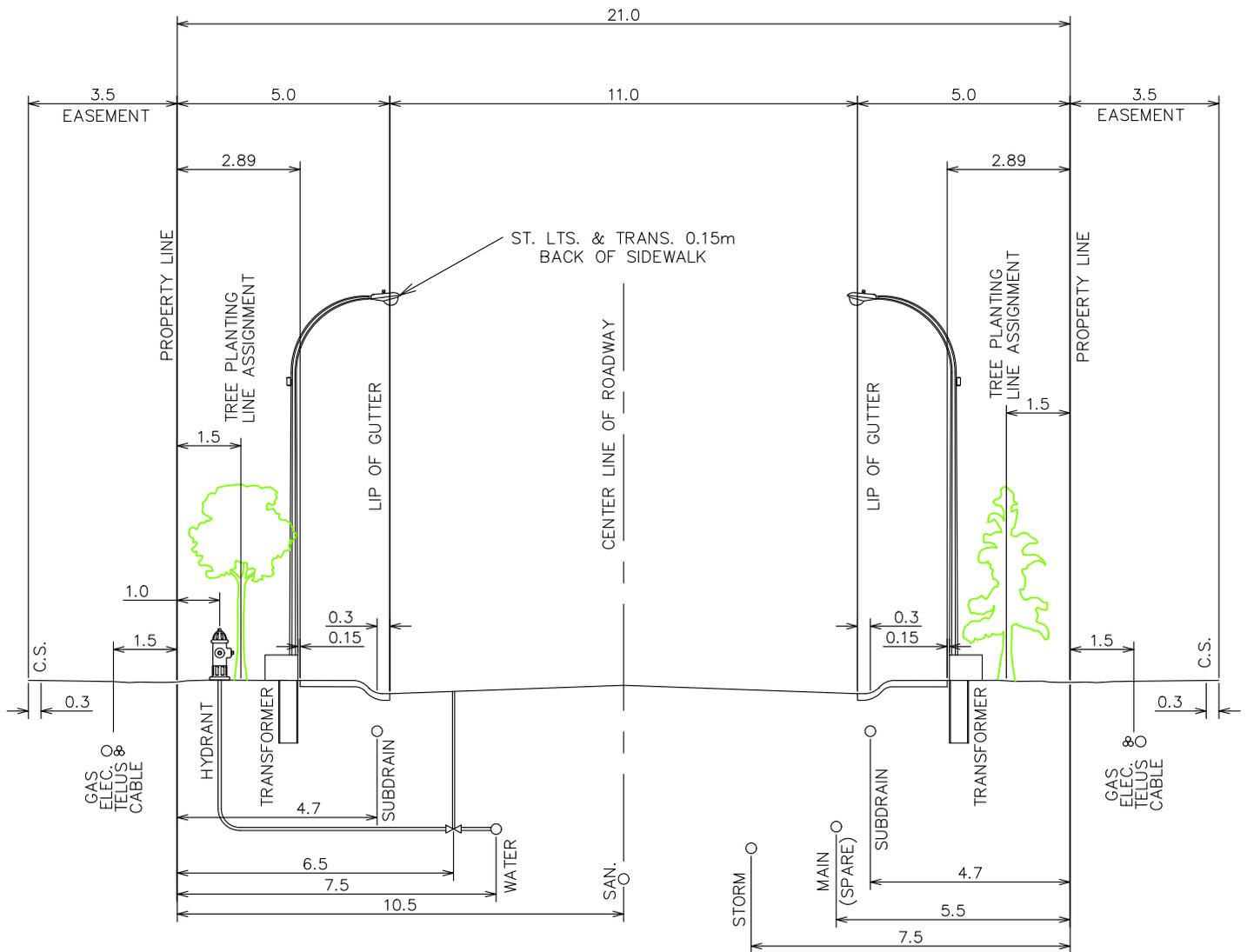


Transit Route	Yes	9. Use of a Minor Collector requires written approval of the Transportation Business Unit 10. Traffic calming shall be considered on Minor Collectors with potential for transient traffic	
Truck Route	No		
Sound Attenuation	No		
Pavement Markings	No	<b>Reference Drawings</b>	SLA_04

## 6.7.2 MINOR COLLECTOR

## *Geometric*

CLASSIFICATION	DESIGN SPEED	DESIGN VEHICLE
Urban Collector Undivided (UAU 50)	50 kph	WB-17 (1.0 m buffer with a minimum of 0.3 m each side of vehicle)
<b>HORIZONTAL ALIGNMENT</b>		
<b>Minimum Stopping Sight Distance</b>		<b>Minimum Radius of Curvature</b>
(As per current TAC GDGCR)		(As per current TAC GDGCR)
<b>VERTICAL ALIGNMENT</b>		
<b>Maximum &amp; Minimum Grades</b>		
<ul style="list-style-type: none"> <li>Max 6%, Min 0.6%</li> </ul>		
<b>Grade at Intersections</b>		
<ul style="list-style-type: none"> <li>(As per current TAC GDGCR)</li> </ul>		
<b>Vertical Curves &amp; Super Elevation</b>		
<ul style="list-style-type: none"> <li>Vertical curve lengths in meters should not be less than speed in kilometers per hour</li> <li>Use 0.04 or 0.06 superelevation tables</li> </ul>		
PAVEMENT STRUCTURE	REFERENCE DRAWINGS	
STR 18a	City of Lethbridge Engineering Standards;	



NOTE: -SEE DEPTH ZONES OF SERVICES. HYDRANT, TRANSFORMERS AND STREET LIGHTS ARE CENTERED ON LOT LINE EXTENSIONS

- TRANSFORMERS & PEDESTALS 0.15m BACK OF SIDEWALK,
- WIRE FOR ELECTRIC/TELUS/SHAW AND GAS CABLE 1.50m BACK FROM PROPERTY LINE
- SHALLOW UTILITY EASEMENT 3.5m 4 PARTY TRENCHING (RESIDENTIAL)



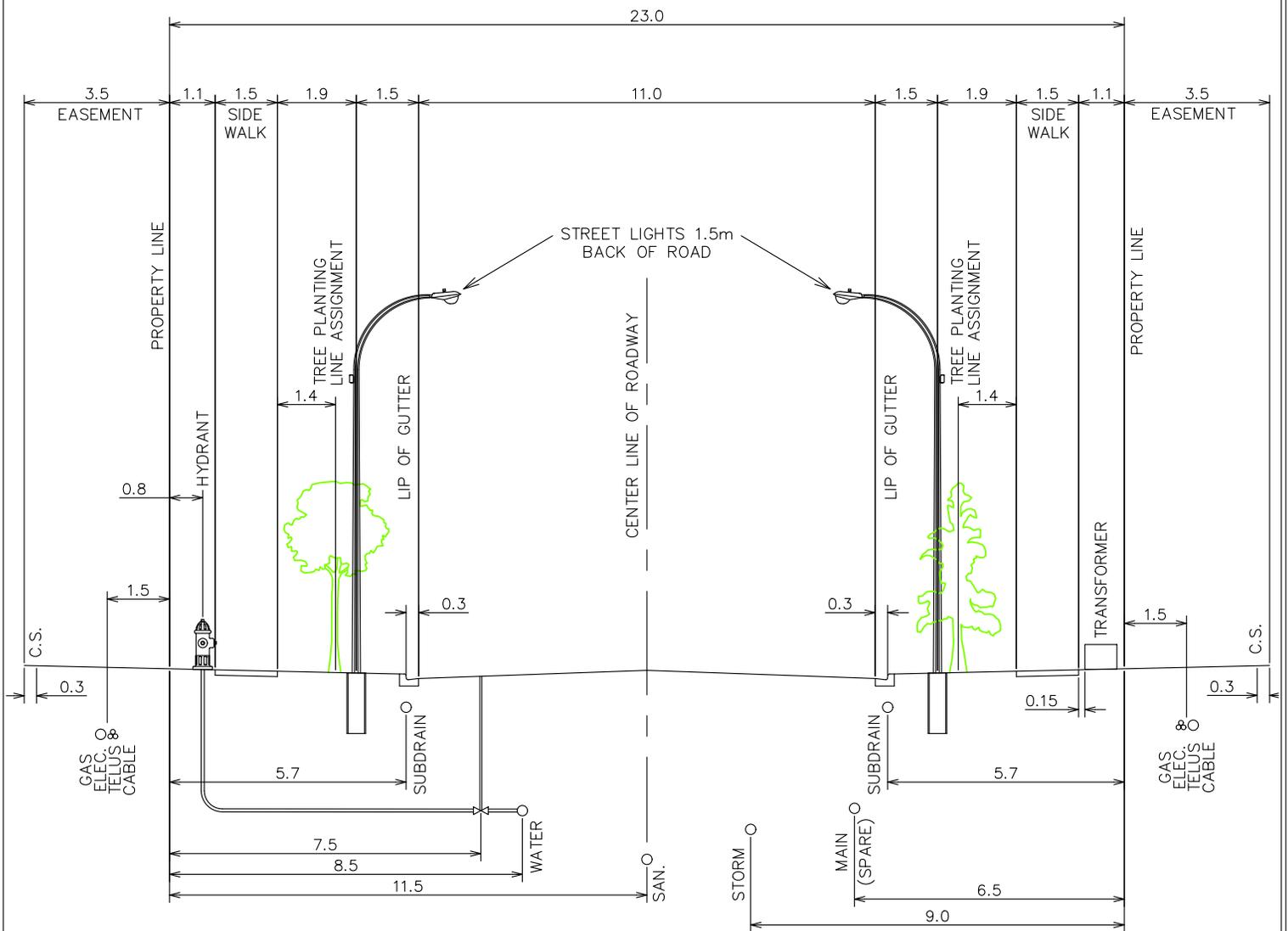
**CITY OF**  
*Lethbridge*

INFRASTRUCTURE SERVICES

21m R.O.W. MINOR COLLECTOR  
(MONO SIDEWALK WITH TREES)

DRAWN:	R.J.K.
DESIGN:	R.J.K.
CHECKED:	R.A.B.
APPROVED:	D.L.J.
SCALE:	N.T.S.
DATE:	30/01/1997
DWG NO:	TRAN_6.7

DATE	REVISION	BY
01/00	REVISED	K.A.
01/01	REVISED	A.D.
01/05	REVISED	W.G.C.
11/06	UPDATE	R.J.K.
01/11	R.O.W. WIDTH	R.J.K.
03/14	UTIL. SPACING	R.J.K.
04/16	1.5m SIDEWALK	R.J.K.
FILE:	TRAN_6.7.dwg	



NOTE: -SEE DEPTH ZONES OF SERVICES. HYDRANT, TRANSFORMERS AND STREET LIGHTS ARE CENTERED ON LOT LINE EXTENSIONS

-WIRE FOR ELECTRIC/TELUS/SHAW AND GAS CABLE 1.50m BACK FROM PROPERTY LINE

-SHALLOW UTILITY EASEMENT 3.5m 4 PARTY TRENCHING (RESIDENTIAL)

DATE	REVISION	BY
04/16	1.5m SIDEWALK	BY
FILE:	TRAN_6.7a.dwg	



**CITY OF**  
*Lethbridge*

INFRASTRUCTURE SERVICES

23m R.O.W. MINOR COLLECTOR  
SEPARATE SIDEWALK WITH TREES

DRAWN:	R.J.K.
DESIGN:	R.J.K.
CHECKED:	R.A.B.
APPROVED:	D.L.J.
SCALE:	N.T.S.
DATE:	14/02/2011
DWG NO:	TRAN_6.7a



## 6.8 INDUSTRIAL COLLECTOR

### 6.8.1 INDUSTRIAL COLLECTOR

### *Design*

TRAFFIC VOLUME (vehicles per day)	NUMBER OF LANES	RIGHT-OF-WAY REQUIREMENT	MINIMUM INTERSECTION SPACING (Property Lines)
NA	2 to 4	20.0 m	120 m
<b>FUNCTION</b>			
<ul style="list-style-type: none"> <li>To collect and distribute traffic within industrial areas</li> <li>To serve as a transit route</li> </ul>			
<b>CONDITIONS</b>			
<ul style="list-style-type: none"> <li>Direct access shall be permitted to abutting commercial and industrial properties</li> <li>Industrial Collectors shall intersect with Lanes, other Industrial Collectors, Community Entrance Roads, Super Collectors, or Arterial roadways</li> <li>Adequate emergency services access shall be provided to all abutting properties</li> <li>When an Industrial Collector intersects with an Arterial, driveway access from adjacent properties shall not be allowed within a minimum distance of 60 m from the edge of the Arterial right of way</li> <li>Intersection spacing on Industrial Collector roadways shall not be less than 120 m unless agreed to in writing by the Transportation Business Unit</li> <li>Parking may be restricted to accommodate turning requirements for larger vehicles</li> <li>Parking may be restricted on higher volume Industrial Collectors</li> </ul>			
<b>FEATURES</b>		<b>NOTES</b>	
Posted Speed (kph)	50	<ol style="list-style-type: none"> <li>Undivided roadway</li> <li>All intersections shall be as near as possible to 90 degrees</li> <li>Intersection control by yield signs or stop signs as warranted</li> <li>All Industrial Collector roadways shall have yellow centerline pavement markings.</li> <li>Parking permitted on both sides of roadway, but may be restricted under special circumstances</li> <li>Industrial Collector roadways shall not end in a cul-de-sac</li> <li>Industrial Collector roadways shall be configured in loops and/or intersect with other Industrial Collector or Arterial roadways at a minimum of two locations</li> </ol>	
Parking	Yes (see Note 4)		
Sidewalk	Both Sides		
Traffic Signals	As Warranted		
Pedestrian Crossing	At Grade Ramps required		
Bikeway	TBD		
Transit Route	Yes		
Truck Route	Yes		

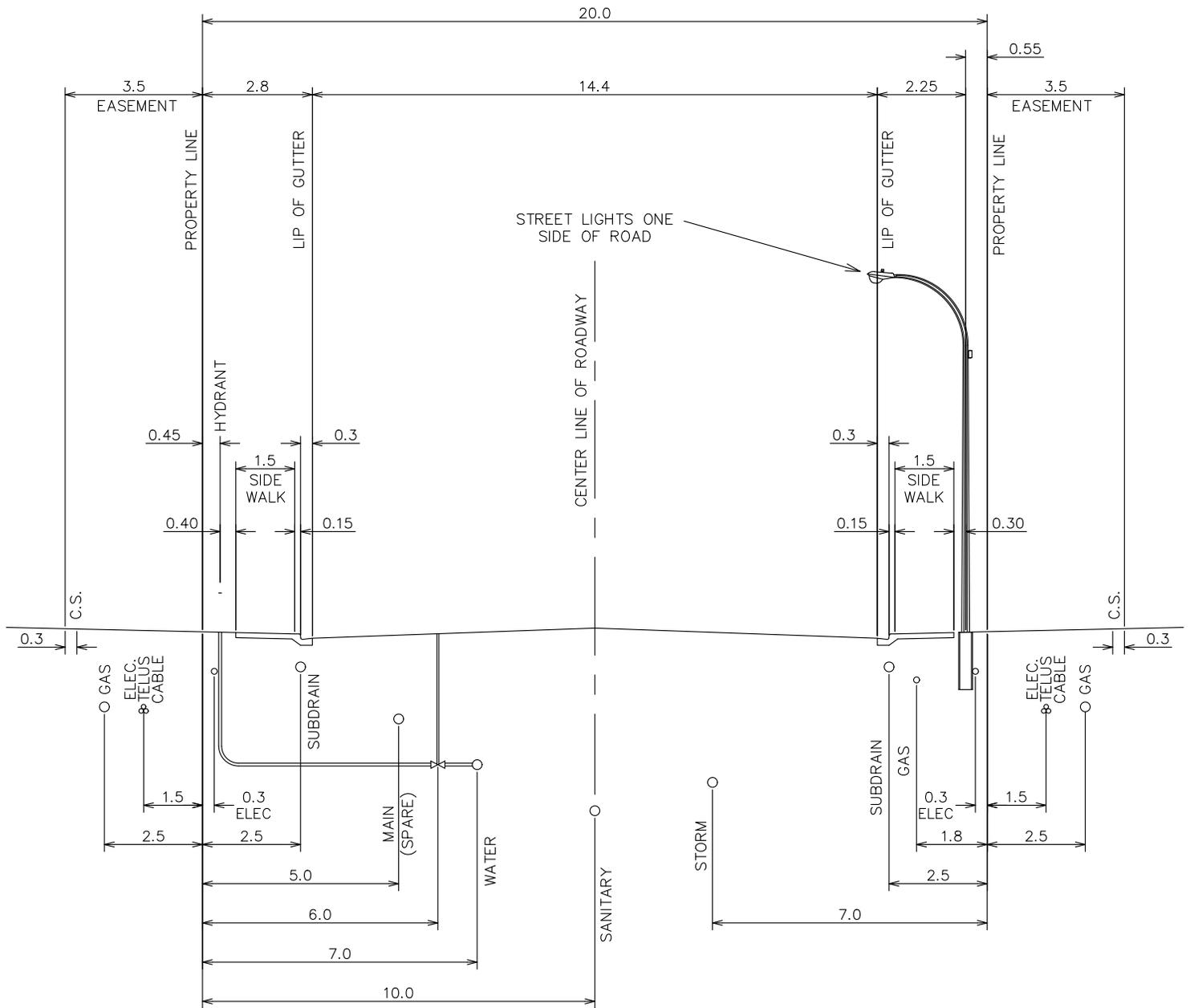


Sound Attenuation	No	8. Modification of the Industrial Collector standard shall be considered by the Transportation Business Unit on a case-by-case basis	
Pavement Markings	At signalized intersections	<b>Reference Drawings</b>	SLA_09

## 6.8.2 INDUSTRIAL COLLECTOR

## *Geometric*

CLASSIFICATION	DESIGN SPEED	DESIGN VEHICLE
Urban Collector Undivided (UCU-60)	60	WB-20 or larger dependent on projected land use (1.0 m buffer with a minimum of 0.3 m each side of vehicle)
<b>HORIZONTAL ALIGNMENT</b>		
<b>Minimum Stopping Sight Distance</b>	<b>Minimum Radius of Curvature</b>	
(As per current TAC GDGCR)	(As per current TAC GDGCR)	
<b>VERTICAL ALIGNMENT</b>		
<b>Maximum &amp; Minimum Grades</b>		
<ul style="list-style-type: none"> <li>Max 6%, Min 0.6%</li> </ul>		
<b>Grade at Intersections</b>		
<ul style="list-style-type: none"> <li>(As per current TAC GDGCR)</li> </ul>		
<b>Vertical Curves &amp; Super Elevation</b>		
<ul style="list-style-type: none"> <li>Vertical curve lengths in meters should not be less than speed in kilometers per hour</li> <li>Use 0.04 or 0.06 superelevation tables</li> </ul>		
<b>PAVEMENT STRUCTURE</b>	<b>REFERENCE DRAWINGS</b>	
STR 18b	City of Lethbridge Engineering Standards;	



NOTE: -SEE DEPTH ZONES OF SERVICES.  
 -HYDRANT CENTERED ON LOT LINE EXTENSION  
 -TRANSFORMER UTILITY EASEMENT 2m x 2m ON PRIVATE PROPERTY  
 -MAINS GAS ON ONE SIDE ELECTRIC ON THE OTHER

DATE	REVISION	BY
30/01	REVISED	A.D.
11/06	REVISED	R.J.K.
12/07	REVISED	R.J.K.
03/13	REVISED	R.J.K.
04/16	1.5m SIDEWALK	R.J.K.



**CITY OF**  
*Lethbridge*

INFRASTRUCTURE SERVICES

20m R.O.W. INDUSTRIAL COLLECTOR

DRAWN:	R.J.K.
DESIGN:	R.J.K.
CHECKED:	R.A.B.
APPROVED:	D.L.J.
SCALE:	N.T.S.
DATE:	15/11/2006
DWG NO:	TRAN_6.8

FILE: TRAN\_6.8.dwg



## 6.9 LOCAL

### 6.9.1 LOCAL

### *Design*

TRAFFIC VOLUME (vehicles per day)	NUMBER OF LANES	RIGHT-OF-WAY REQUIREMENT	MINIMUM INTERSECTION SPACING (Property Lines)
< 2000	1 to 2	16.5 m or 18.5 m	30 m
<b>FUNCTION</b>			
<ul style="list-style-type: none"> <li>To provide access to adjacent residential lots</li> <li>To convey local residential traffic to Collector roadways</li> <li>Local roadways include cul-de-sacs and P loops</li> <li>To serve as part of the Fire &amp; Emergency Services access route</li> </ul>			
<b>CONDITIONS</b>			
<ul style="list-style-type: none"> <li>Direct access shall be permitted to abutting residential properties</li> <li>Access shall not be permitted to commercial properties from Local roadways</li> <li>Local roadways shall intersect with Lanes, other Local roadways, Minor Collectors, Major Collectors, Community Entrance Roads, or Super Collectors</li> <li>Access shall be designed to the requirements of the Alberta Building Code (ABC) Part 3</li> <li>No dwelling shall be located more than 200 m as measured along the centreline of the roadway from a roadway intersection that provides the only access to the dwelling. This includes cul-de-sacs and multiple branch cul-de-sacs</li> <li>The length of road making up a P loop as measured along the centreline of the roadway shall not exceed 350 m</li> <li>P loop links shall be no shorter than 60 m as measured along the property line of the adjacent lots</li> <li>Additional secondary access roads are required as the number of households increase above 100 (one more) and above 600 require two more.</li> <li>Secondary access route is to be installed as remotely from the primary access as possible and cannot be used as part of the primary access.</li> </ul>			
<b>FEATURES</b>		<b>NOTES</b>	
Posted Speed (kph)	50	<ol style="list-style-type: none"> <li>Undivided roadway</li> <li>All intersections shall be as near as possible to 90 degrees</li> <li>Intersection control by right-of-way rule, yield signs or stop signs</li> <li>Parking permitted on both sides of roadway, but may be restricted under special circumstances</li> </ol>	
Parking	Yes (see note 4)		
Sidewalk	Both sides		
Traffic Signals	No		

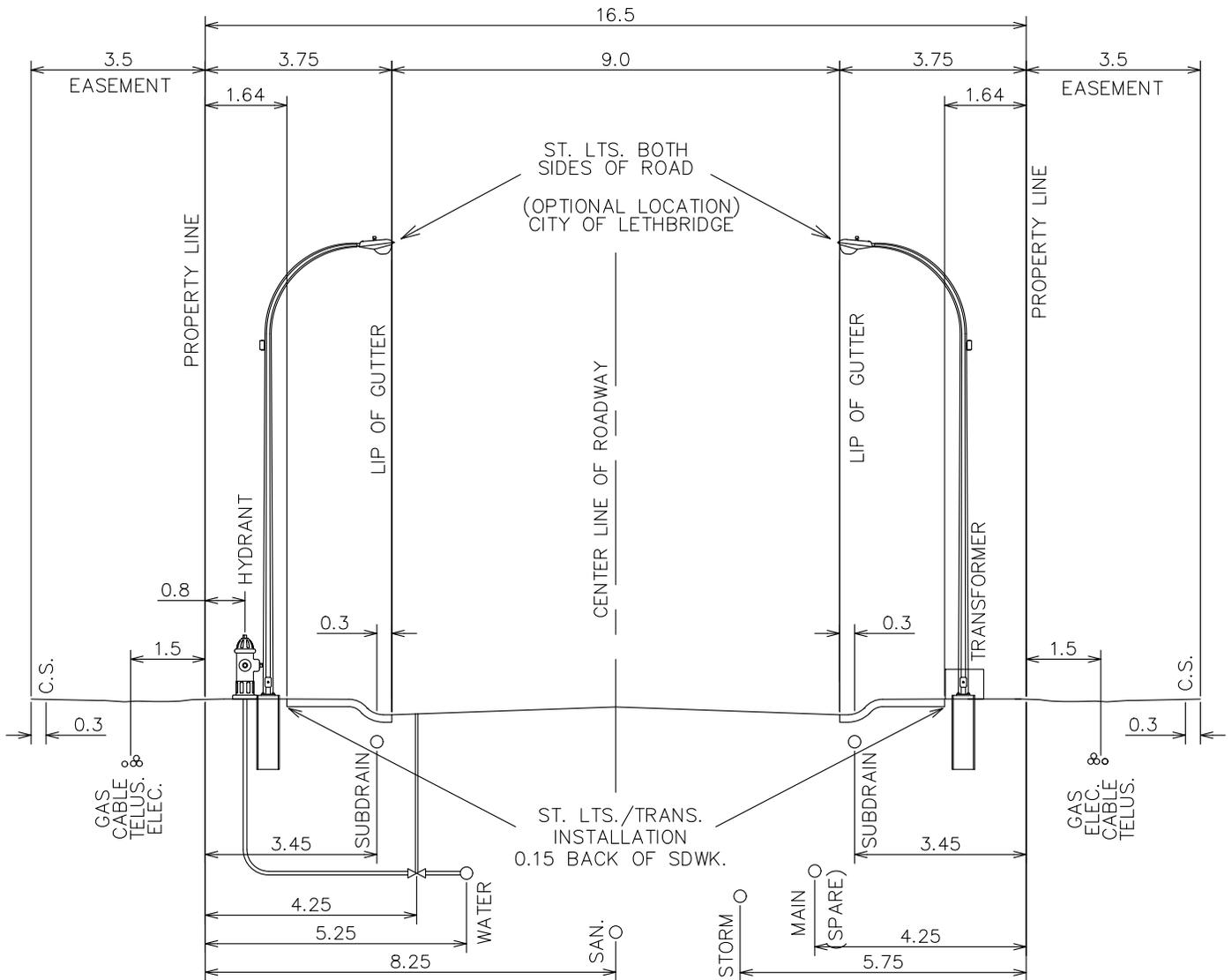


Pedestrian Crossing	At Grade Ramps required	<p>5. Parking in cul-de-sacs will be restricted for Emergency vehicle and solid waste vehicle access. No parking signs posted according to Alberta Fire Code.</p> <p>6. A Local roadway with traffic volumes in excess of 1000 vehicles per day or servicing more than 100 dwelling units shall have the asphalt surface widened to 11 m (18.5m R.O.W.) as measured from lip of gutter to lip of gutter. Transitions will occur at intersections.</p> <p>7. Traffic calming shall be considered on Local roadways with potential for transient traffic</p> <p>8. Modification of the Local standard shall be considered by the Transportation Business Unit on a case-by-case basis</p>	
Bikeway	TBD		
Transit Route	No		
Truck Route	No		
Sound Attenuation	No		
Pavement Markings	No	<b>Reference Drawings</b>	<p>SLA_02</p> <p>SLA_03</p>

## 6.9.2 LOCAL

## *Geometric*

CLASSIFICATION	DESIGN SPEED	DESIGN VEHICLE
Urban Local Undivided (ULU-50)	50 kph	WB-17 (1.0 m buffer may be required with a minimum of 0.3 m each side of vehicle)
<b>HORIZONTAL ALIGNMENT</b>		
<b>Minimum Stopping Sight Distance</b>		<b>Minimum Radius of Curvature</b>
(As per current TAC GDGCR)		(As per current TAC GDGCR)
<b>VERTICAL ALIGNMENT</b>		
<b>Maximum &amp; Minimum Grades</b>		
<ul style="list-style-type: none"> <li>Max 6%, Min 0.6%</li> </ul>		
<b>Grade at Intersections</b>		
<ul style="list-style-type: none"> <li>(As per current TAC GDGCR)</li> </ul>		
<b>Vertical Curves &amp; Super Elevation</b>		
<ul style="list-style-type: none"> <li>(As per current TAC GDGCR)</li> </ul>		
<b>PAVEMENT STRUCTURE</b>		<b>REFERENCE DRAWINGS</b>
STR 18b		City of Lethbridge Engineering Standards;



NOTE: -SEE DEPTH ZONES OF SERVICES. HYDRANT, TRANSFORMERS AND STREET LIGHTS ARE CENTERED ON LOT LINE EXTENSION

-TRANSFORMERS AND STREET LIGHTS 0.15m BACK OF SIDEWALK

-WIRE FOR ELECTRIC/TELUS AND SHAW CABLE 1.5m BACK FROM PROPERTY LINE

-SHALLOW UTILITY EASEMENT IS 3.5m 4 PARTY TRENCHING (RESIDENTIAL)

DATE	REVISION	BY
01/01	REVISED	A.D.
01/05	REVISED	W.G.C.
11/06	TO SCALE	R.J.K.
04/16	1.5m SIDEWALK	R.J.K.
FILE:	TRAN_6.9.dwg	

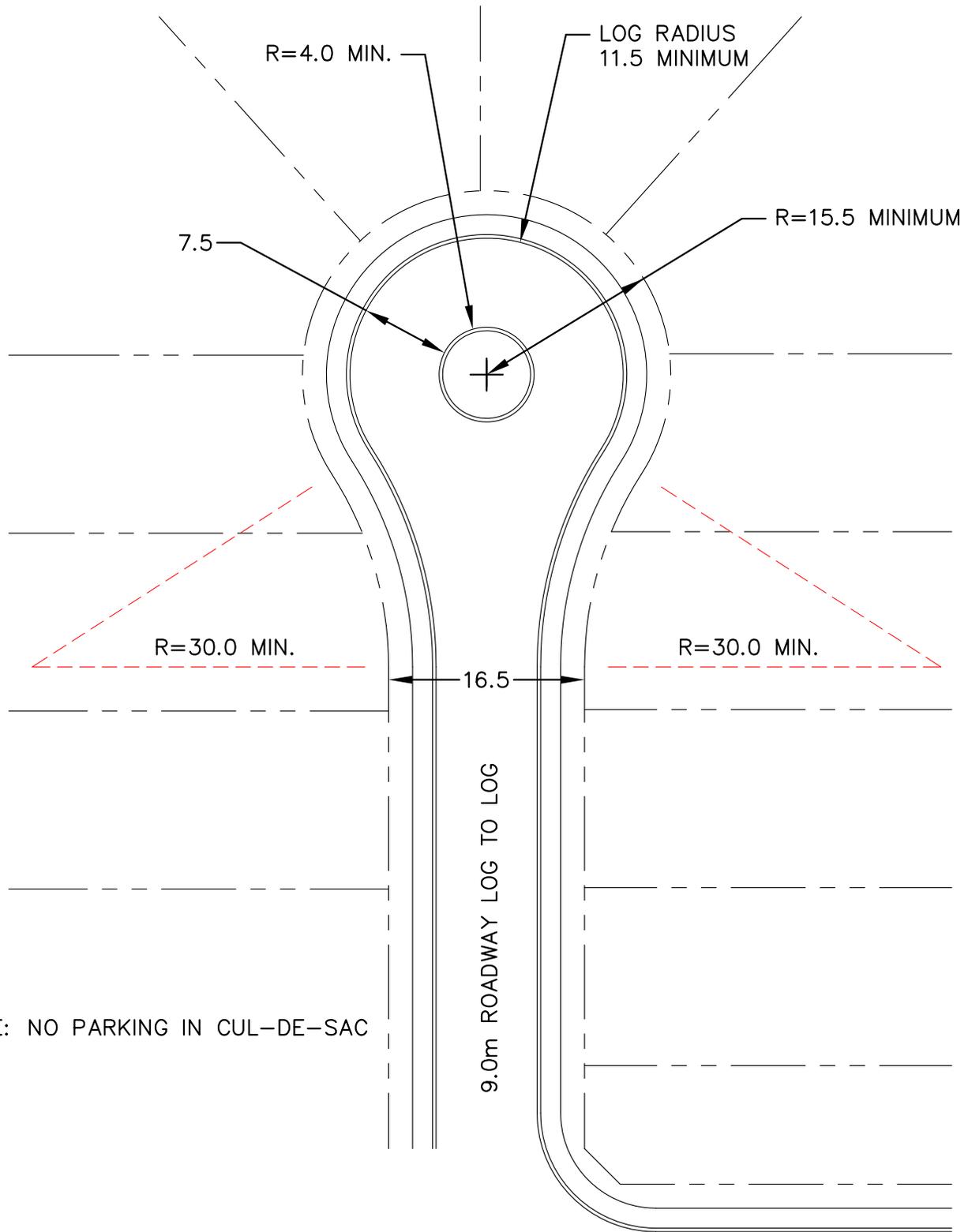


**CITY OF**  
*Lethbridge*

INFRASTRUCTURE SERVICES

16.5m R.O.W. LOCAL ROAD

DRAWN:	R.J.K.
DESIGN:	R.J.K.
CHECKED:	R.A.B.
APPROVED:	D.L.J.
SCALE:	N.T.S.
DATE:	30/01/1997
DWG NO:	TRAN_6.9



DATE	REVISION	BY
11/06	REVISION	R.J.K.
16/02	ISLAND ADDITION	R.J.K.



CITY OF  
*Lethbridge*

INFRASTRUCTURE SERVICES

TYPICAL CUL-DE-SAC DESIGN  
MINIMUM REQUIREMENTS

DRAWN:	R.J.K.
DESIGN:	R.J.K.
CHECKED:	R.A.B.
APPROVED:	D.L.J.
SCALE:	N.T.S.
DATE:	05/03/1999
DWG NO:	TRAN_6.11



## 6.10 LANES

### 6.10.1 LANES

### *Design*

TRAFFIC VOLUME (vehicles per day)	NUMBER OF LANES	RIGHT-OF-WAY REQUIREMENT	MINIMUM INTERSECTION SPACING (Property Lines)
NA	NA	7.0 m	30 m
<b>FUNCTION</b>			
<ul style="list-style-type: none"> <li>To provide rear access to the adjacent lots within the subdivision</li> <li>To provide opportunity for loading and unloading in commercial districts</li> </ul>			
<b>CONDITIONS</b>			
<ul style="list-style-type: none"> <li>Direct access is permitted to abutting properties</li> <li>Lanes shall intersect with other Lanes, Local roadways, Industrial Collectors, and Minor Collectors</li> <li>Lane intersections with Major Collector roadways are not preferred. (All efforts should be taken to eliminate the intersection)</li> <li>Lane design shall accommodate emergency services access to abutting properties</li> <li>The distance along the centreline of a lane from a property to the nearest roadway shall not exceed 300 m</li> <li>Intersection spacing on Lanes shall not be less than 30 m unless agreed to in writing by the Transportation Business Unit</li> <li>Lane connections to higher classification roadways will be treated as driveways until the traffic generates more than 250 vehicles per day. (No less than 30 m from the nearest intersection measured from property line to property line.) Lane intersections with higher classification roadways shall meet the intersection spacing requirements of the higher classification roadway.</li> <li>Accommodation of pedestrian facilities in a Lane require additional Lane width and permanent delineation of the pedestrian facility</li> <li>Pedestrian crossing points in Lanes shall include an offset pedestrian gate</li> <li>Dead end lanes shall provide a turnaround sufficient to accommodate emergency services vehicles and garbage trucks</li> </ul>			
<b>FEATURES</b>		<b>NOTES</b>	
Posted Speed (kph)	20	<ol style="list-style-type: none"> <li>All intersections shall be as near as possible to 90 degrees</li> <li>Only T intersections are permitted in lanes</li> <li>Intersection control between two lanes is by right-of-way rule</li> <li>Where lanes intersect one another a sufficient fillet shall be provided to allow fire trucks and garbage trucks to turn in a single operation (contact Fire for appropriate vehicle size)</li> </ol>	
Parking	No		
Sidewalk	No		
Traffic Signals	No		
Pedestrian Crossing	At Grade		



Bikeway	No	5. Lane design shall minimize opportunity for transient vehicle use (shortcutting) 6. All new Lanes shall be paved in accordance with the standard for paved lanes in the current version of the Engineering Standards	
Transit Route	No		
Truck Route	No		
Sound Attenuation	No		
Pavement Markings	No		
		<b>Reference Drawings</b>	SLA_01

## 6.10.2 LANE

## *Geometric*

<b>CONSTRUCTION TYPE</b>	
<b>HORIZONTAL ALIGNMENT</b>	
<b>Radius of Curvature</b>	
<ul style="list-style-type: none"> <li>Based on design vehicle</li> </ul>	
<b>RIGHT-OF-WAY</b>	
<b>LENGTH</b>	
<b>GRADE</b>	
<ul style="list-style-type: none"> <li>Max 6%, Min 1.0% (or additional storm drainage considerations)</li> <li>Last 5 m of lane at 1.5%</li> </ul>	
<b>PAVEMENT STRUCTURE</b>	<b>REFERENCE DRAWING</b>
STR_26	City of Lethbridge Engineering Standards;



## 6.11 RAIL SPUR LINES

### 6.11.1 RAIL SPUR LINES

### *Design*

TRAFFIC VOLUME (vehicles per day)	NUMBER OF LANES	RIGHT-OF-WAY REQUIREMENT	MINIMUM INTERSECTION SPACING (Property Lines)
NA	NA	15.0 m	NA
<b>FUNCTION</b>			
<ul style="list-style-type: none"> <li>To provide rail access from CP Rail to properties within industrial areas.</li> </ul>			
<b>CONDITIONS</b>			
<ul style="list-style-type: none"> <li>Direct access shall be permitted to abutting properties via sidings within easement or at termination of a Rail Spur Line.</li> <li>Rail Spur Lines intersect with other Rail Spur Lines, Lanes, Local roadways, Minor Collectors, Major Collectors, Industrial Collectors, Community Entrance Roads, Super Collectors or Arterial roadways.</li> <li>All Rail Spur Line intersections with public roadways shall be as near as possible to 90 degrees</li> <li>Driveways shall be located a minimum of 8.0m from the intersection of the closest rail of the Rail Spur Line with a Local or Collector roadway.</li> <li>Driveway flare and/or radius connection to adjacent roadway must be a minimum of 5.0m from the intersection of the closest rail of the Rail Spur Line with a Local or Collector roadway.</li> </ul>			
<b>FEATURES</b>		<b>NOTES</b>	
Posted Speed (kph)	Less than 15	1. Pavement markings to meet TAC MUTCD 2. Signage to meet TAC MUTCD 3. Signals to meet TAC MUTCD	
Parking	No		
Sidewalk	No		
Traffic Signals	As warranted		
Pedestrian Crossing	At Grade		
Bikeway	No		
Transit Route	No		
Truck Route	No		
Sound Attenuation	No		
Pavement Markings	At intersection		
		<b>Reference Drawings</b>	



## 6.11.2 RAIL SPUR LINES

## *Geometric*

CLASSIFICATION	DESIGN SPEED	DESIGN VEHICLE
Rail Spur Line	(CPR design guidelines)	(CPR design guidelines)
<b>HORIZONTAL ALIGNMENT</b>		
<b>Minimum Stopping Sight Distance</b>	<b>Minimum Radius of Curvature</b>	
(CPR design guidelines)	(CPR design guidelines)	
<b>VERTICAL ALIGNMENT</b>		
<b>Maximum &amp; Minimum Grades</b>		
<ul style="list-style-type: none"> <li>(CPR design guidelines)</li> </ul>		
<b>Grade at Intersections</b>		
<ul style="list-style-type: none"> <li>(CPR design guidelines)</li> </ul>		
<b>Vertical Curves &amp; Super Elevation</b>		
<ul style="list-style-type: none"> <li>(CPR design guidelines)</li> </ul>		
<b>RAIL STRUCTURE</b>	<b>REFERENCE DRAWINGS</b>	
(CPR design guidelines)	City of Lethbridge Engineering Standards;	



## 6.12 INTERSECTION

### 6.12.1 INTERSECTION

### *Design*

#### DESCRIPTION

An intersection is formed when two or more roadway segments converge at a point. Intersection design is a complex engineering function which considers multimodal use of the road right of way, safety considerations, sight distances, traffic control devices, channelization, pavement markings, turning movement capacity/demand, drainage, etc.

#### FUNCTION

- Intersection requirements are design dependent based on classification of intersecting roadways and traffic demand.

#### CONDITIONS

- Left turn bay storage length shall be a minimum of 60m and right turn bay shall be a minimum of 30m on Super Collector and Arterial roadways
- Storage bay length shall be determined from Trafficware Synchro analysis of 95% queue length for a future 10 year horizon Synchro analysis when storage bay is defined by pavement markings
- Storage bay length shall be determined from Trafficware Synchro analysis of 95% queue length for a future 30 year horizon Synchro analysis when storage bay is defined by permanent curbing
- Intersection designs shall consider the appropriate design vehicles for the roadway classification and the accessible land uses
- For residential approaches the design vehicle shall be a WB-17
- For commercial/industrial approaches, the design vehicle shall be a WB-20
- Alternate design vehicles shall be considered by the Transportation Business Unit on a case by case basis
- A 1.0 m buffer, with a minimum of 0.3 m each side of vehicle, shall be provided for the wheel path of the design vehicle relative to the edge of asphalt for all turning movements unless agreed to in writing by the Transportation Business Unit
- A 1.0 m buffer, with a minimum of 0.3 m each side of vehicle, shall be provided for the swept path of the design vehicle relative to signs, poles, etc. placed on islands, medians and boulevards, for all turning movements unless agreed to in writing by the Transportation Business Unit

#### FEATURES

#### NOTES

Posted Speed (kph)	Based on approach classification	1. The design of intersections shall include an evaluation of sight distance on all approaches for all relevant vehicle types expected to use the intersection 2. Sight lines shall be identified prior to landscape design
Parking	No	
Sidewalk	Match Roadway	
Traffic Signals	As Warranted	



Pedestrian Crossing	Yes	<p>3. Opposing and alternating intersection approaches may have different design speeds and posted speed limits based on the approach classification</p> <p>4. Additional travel lanes should be initiated or terminated at an intersection</p> <p>5. Minimum intersection spacing identified in the design standards is relative to the property lines at the edge of the right of way. The centerline spacing is greater than the identified minimum intersection spacing</p> <p>6. “T” intersections shall have a minimum of 3 pedestrian crossing ramps. Full intersections shall have a minimum of 4 pedestrian crossing ramps.</p> <p>7. All intersections shall be as near as possible to 90 degrees</p> <p>8. Intersection control type shall follow the following hierarchy:</p> <ul style="list-style-type: none"> <li>• Yield</li> <li>• One- or Two-Way stop control</li> <li>• Three- or Four-Way stop control when used as an interim step subject to further improvements</li> <li>• Roundabout</li> <li>• Traffic Signal</li> </ul>	
Bikeway	TBD		
Transit Route	Match Roadway		
Truck Route	Match Roadway		
Sound Attenuation	No		
Pavement Markings	Based on approach classification	<b>Reference Drawings</b>	

## 6.12.2 INTERSECTION

## *Geometric*

CLASSIFICATION	DESIGN SPEED	DESIGN VEHICLE
Adjoining Road Classification		Residential - WB-17 Commercial - WB-20 (1.0 m buffer required with a minimum of 0.3 m each side of vehicle)
<b>HORIZONTAL ALIGNMENT</b>		
<b>Minimum Stopping Sight Distance</b>	<b>Minimum Radius of Curvature</b>	
(As per current TAC GDGCR)	(As per current TAC GDGCR)	
<b>Median Left Turn Bay</b>		



- Arterial, Super Collector and Community Entrance Road
- (As per current TAC GDGCR)

**VERTICAL ALIGNMENT**

**Maximum & Minimum Grades**

**Grade at Intersections**

- (As per current TAC GDGCR)

**Vertical Curves & Super Elevation**

- Vertical curve lengths in meters should not be less than speed in kilometers per hour
- $e_{max} = 0.04$  or less

**MINIMUM PROPERTY LINE CORNER CUTS (m)**

	Arterial	Super	Community	Major	Minor	Industrial	Local	Lane
Arterial	City	15	15	NA	NA	10	NA	NA
Super Collector	15	15	10	10	10	10	NA	NA
Community Entrance	15	10	10	10	10	10	8	NA
Major Collector	NA	10	10	5	5	5	5	*
Minor Collector	NA	10	10	5	5	5	5	*
Industrial Collector	10	10	10	5	5	5	5	*
Local	NA	NA	8	5	5	5	5	*
Lane	NA	NA	NA	<i>Evaluate to provide sight distance*</i>				5

\* Sight distance shall be considered for vehicle-vehicle and vehicle-pedestrian interaction.

**PAVEMENT STRUCTURE**

**REFERENCE DRAWINGS**

**City of Lethbridge Engineering Standards;**



## 6.13 ROUNDABOUT

### 6.13.1 ROUNDABOUT

### *Design*

#### DESCRIPTION

An intersection with three or more approach legs in which the traffic streams merge and then diverge on a one-way roadway surrounding a central island. Traffic on this roadway travels counter-clockwise, and has the right-of-way over traffic entering the circulatory roadway.

Roundabout design is an iterative process that requires achieving an optimal balance between capacity and safety. The process of optimization is iterative and requires a thorough knowledge of site constraints and operating criteria. Even a minor change in geometry can have a substantial impact on safety and operational performance. In addition, designers should keep firmly in mind that the geometric elements are not independent of one another. How all the geometric elements of a roundabout interact is clearly more important than their individual impacts.

#### GUIDELINES

- Robinson, Bruce et al. “Roundabouts: An Informational Guide.” NCHRP Report FHWA-RD-00-67 1-277, Federal Highway Administration, McLean, VA: 2000 as the reference of choice for roundabout design in Lethbridge
- Projection of the centre line of each approach shall be to the left of the centre of the roundabout. Projection to the right of centre is NOT acceptable
- Approach legs should be evenly spaced around the Roundabout
- The speed differential between entering and circulating movements shall be less than 20 kph
- Manholes located within the landscaped portion of the Roundabout shall be accessible
- The curb height for a mountable truck apron shall be 75 mm
- Single lane entry and exit widths to include sufficient width for design vehicles plus 1.0 m buffer. To reduce speed the design should consider mountable areas for larger design vehicles

#### FEATURES

#### NOTES

Posted Speed (kph)	Advisory speed may be posted	<ol style="list-style-type: none"> <li>1. No raised landscaping planters</li> <li>2. The slope of the central island should not exceed 6:1</li> <li>3. Stopping sight distance and intersection sight distance must be established prior to landscape design</li> <li>4. Landscape should block sight lines through the centre of the roundabout</li> <li>5. Zebra striped crosswalks to be placed 6.0 m in advance of the yield line for single lane approaches</li> <li>6. Bicycle traffic may access pedestrian crossing via up-ramps in advance of roundabout and multi-use path</li> <li>7. Continuous involvement of the Transportation Business Unit is required during Roundabout design</li> </ol>
Parking	No	
Sidewalk	Match Roadway	
Traffic Signals	No	
Pedestrian Crossing	(see Note 5)	
Bikeway	(see Note 6)	
Transit Route	Match Roadway	



Truck Route	Match Roadway	8. Right turn bypass lanes should be used to increase capacity where high right turn volumes occur. Design shall consider safety requirements for pedestrians and bicyclists 9. The Transportation Business Unit may require a peer review of roundabout designs
Sound Attenuation	No	
Pavement Markings	Yes	<b>Reference Drawings</b>

## 6.13.2 ROUNDABOUT

## *Geometric*

CLASSIFICATION	DESIGN SPEED	DESIGN VEHICLE
Adjoining Road Classification		Residential - WB-17 Commercial - WB-20 (1.0 m buffer required with a minimum of 0.3 m each side of vehicle) SU-9 & Bus to circulate without apron
<b>HORIZONTAL ALIGNMENT</b>		
<b>Minimum Stopping Sight Distance</b>		<b>Minimum Radius of Curvature</b>
(As per current TAC GDGCR & Reference)		(see Reference)
<b>Note</b>		
<ul style="list-style-type: none"> <li>Reference: Robinson, Bruce et al. "Roundabouts: An Informational Guide." NCHRP Report FHWA-RD-00-67 1-277, Federal Highway Administration, McLean, VA: 2000.</li> </ul>		
<b>VERTICAL ALIGNMENT</b>		
Vertical design should indicate the maximum longitudinal grades at the circle (<4%), crossfall and the need for pavement elevation plans in X and Y coordinates.		
<b>PAVEMENT STRUCTURE</b>		<b>REFERENCE DRAWINGS</b>
		City of Lethbridge Engineering Standards;



## 6.14 RIGHT IN RIGHT OUT

### 6.14.1 RIGHT IN RIGHT OUT

*Design*

#### DESCRIPTION

A right in right out intersection provides vehicle access to and from one direction of travel on the adjacent roadway. Delineation at the right in right out and, in some, cases a median in the centre of the adjacent roadway, prevent left turns and through movements.

Right in right out intersections may be permitted as secondary access points to commercial developments; however, they may also be used to connect two public roadways when the roadway classification restricts full access due to intersection spacing constraints and/or safety issues.

#### GUIDELINES

- Right in right out designs shall consider the appropriate design vehicles for the roadway classification and the accessible land uses
- The intersection spacing for a Right in right out access shall be 50% of the corresponding roadway classifications intersection spacing. (e.g. Arterial RI/RO spacing of 200 m)
- A traffic impact assessment addressing safety and operational considerations shall be required for a commercial right in right out access to an Arterial, Super Collector or Community Entrance Road unless this condition is waived in writing by the Transportation Business Unit

#### FEATURES

#### NOTES

Posted Speed (kph)	NA	1. Geometric design to meet or exceed minimum requirements of adjacent roadway classification 2. Pathway / pedestrian facility crossings at right in right out accesses shall be delineated such that it is clearly apparent to drivers that they are crossing a pathway / pedestrian facility where the pathway user / pedestrian has the right of way. The pathway / pedestrian facility crossing shall be provided as (a) a concrete sidewalk (b) a raised asphalt crossing (c) permanent pavement markings in a zebra stripe pattern. Signage identifying the location of the pathway / pedestrian facility shall be provided. 3. Sight lines shall be identified prior to landscape design
Parking	No	
Sidewalk	(See Note 2)	
Traffic Signals	No	
Pedestrian Crossing	(See Note 2)	
Bikeway	NA	
Transit Route	Yes	
Truck Route	Yes	
Sound Attenuation	No	
Pavement Markings	Yes	<b>Reference Drawings</b>



## 6.14.2 RIGHT IN RIGHT OUT

## *Geometric*

CLASSIFICATION	DESIGN SPEED	DESIGN VEHICLE
Adjoining Road Classification		Residential - WB-17 Commercial - WB-20 (1.0 m buffer required with a minimum of 0.3 m each side of vehicle)
<b>HORIZONTAL ALIGNMENT</b>		
<b>Minimum Stopping Sight Distance</b>	<b>Minimum Radius of Curvature</b>	
(As per current TAC GDGCR)	(As per current TAC GDGCR)	
<b>VERTICAL ALIGNMENT</b>		
<b>Maximum &amp; Minimum Grades</b>		
<ul style="list-style-type: none"> <li>Max 6%, Min 0.6%</li> </ul>		
<b>Grade at Intersections</b>		
<ul style="list-style-type: none"> <li>(As per current TAC GDGCR)</li> </ul>		
<b>Vertical Curves &amp; Super Elevation</b>		
<ul style="list-style-type: none"> <li>Vertical curve lengths in meters should not be less than speed in kilometers per hour</li> <li><math>e_{max} = 0.04</math> or less</li> </ul>		
<b>PAVEMENT STRUCTURE</b>	<b>REFERENCE DRAWINGS</b>	
	City of Lethbridge Engineering Standards;	



## 6.15 PAVEMENT MARKINGS

### 6.15.1 PAVEMENT MARKINGS

*Design*

#### DESCRIPTION

Pavement markings include longitudinal, transverse, symbol, and word pavement markings. Pavement markings provide information to drivers. There are, however, limitations to the use of pavement markings including obstruction by snow cover, limited visibility when wet, and reduced visibility with wear. The design of pavement markings must conform to the Manual of Uniform Traffic Control Devices for Canada. The following table identifies marking material for all pavement markings on all roadway classification. Roadway design and engineering judgment will determine actual use of pavement markings and/or marking materials.

#### MATERIAL

Line Type	Pavement Marking Type
Lane Lines	Inlaid
Edge Lines	Inlaid
Centre Lines	Inlaid
Crosswalks	Inlaid
Stop Bars	Inlaid
Continuity Lines	Inlaid
Guide Lines	Inlaid
Arrows	Inlaid

#### NOTES

Surface applied pavement markings include plastic (hot or cold applied), epoxy, Methyl Methacrylate (MMA), and hot tape.

All approaches of Collector roadways to Arterials, Super Collectors and Community Entrance Roads will be treated with the same level of pavement marking as the higher classification roadway. Roadway design and engineering judgment will determine length of pavement markings required.



## **6.16 MINIMUM ROADWAY PAVEMENT REQUIREMENTS**

The following table outlines the minimum materials required for the pavement structures of roadways for the City of Lethbridge:

*Table 6.16.1 MINIMUM REQUIREMENTS FOR ROADWAY PAVEMENT STRUCTURES (mm)*

<b>Material</b>	<b>Maximum Aggregate Size (mm)</b>	<b>Arterial</b>	<b>Super Collector</b>	<b>Major &amp; Minor Collector</b>	<b>Local</b>	<b>Industrial</b>	<b>Lane</b>	<b>Local Industrial*</b>
<b>Type I Asphalt Surface</b>	16	60	60	60		60		50
<b>Type II Asphalt Base Course</b>	25	100	80	60		100		50
<b>Type III Asphalt Surface</b>	16				90		80	
<b>Granular Base Course</b>	25	100	100	100	250	100	200	250
<b>Granular Subbase</b>	75	350	350	150		250		
<b>Subgrade</b>		300	300	300	300	300	300	

\* Use of the Local Industrial road structure requires approval by the Transportation business unit on a case-by-case basis.

Specific roadway pavement structures require review by the Transportation Business Unit based on roadway use, traffic volumes, heavy vehicles, and equivalent single axle loads.

## **6.17 ENTRYWAYS, BOULEVARD, AND MEDIAN LANDSCAPING**

- i. Landscaping of boulevards and road rights of way shall be done in compliance with the Parks and Open Space Chapter of this standard, the latest version of the City Engineering Standards, and the latest version of the Arterial Roadway Landscaping Standard. Landscaping plans will be subject to the approval of the City Engineer.
- ii. Landscaping features shall be low maintenance and cost effective to maintain with existing city maintenance equipment and personal.
- iii. Trees planted in boulevards adjacent to collector roads shall be of a species with an elevated canopy to reduce line of sight conflicts and of a species approved by the City Engineer.



## **6.18 SIDEWALKS, PATHWAYS, AND CROSSWALKS**

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- i. Subdivisions shall be incorporated into the City's regional pathway and park system by providing adequate pedestrian linkages internally and to adjacent neighborhoods.
- ii. Innovative community planning which promotes pedestrian traffic for both work and pleasure is encouraged. Some characteristics which promote pedestrian traffic include short trip distances, wide well lit pathways, and safe road crossings.
- iii. Crosswalks shall be located at intersections only. Pathways and park entrances intersecting roads at mid-block shall require approval in writing from the Transportation Business Unit and Community Services.
- iv. A minimum of 100mm of gravel shall be provided under all side walks where medium to high plastic soils are present as per the City's existing standard. The Transportation Business Unit will, on a case by case basis, consider not having gravel if a detailed geotechnical report indicates;
  - i. soils are not medium to high plastic, and
  - ii. not having high swelling properties, and
  - iii. no long term performance issues without gravel for each specific location.
- v. Install white inlaid pavement markings at all Pathway crossing locations. Mid-block crossing locations and locations serviced by Rectangular Rapid Flashing Beacons shall consist of white zebra stripe pavement markings and intersection crossing locations shall consist of parallel white lines. Where the crossing is not subject to other traffic control signs, Pedestrian Crossing signs shall be installed.

## **6.19 STREET AND TRAFFIC CONTROL SIGNS**

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- i. The Municipal naming committee names streets according to prevailing city conventions when the lands are subdivided and titles created.
- ii. Costs of preparing and installing street and traffic control signs are included in the charges calculated and paid as part of the Service Agreement. The Transportation Business Unit determines the requirement for traffic control devices and street name signs during the construction drawing review.
- iii. Any other Identifying Signage must comply with the Corporate Identity Guidelines



## 6.20 MISCELLANEOUS

### 6.20.1 MISCELLANEOUS

### *Design*

#### DESCRIPTION

The Miscellaneous page presently identifies items identified by the Transportation Business Unit that have not found a permanent location elsewhere in the Design Standards document

#### Miscellaneous

1. Adequate clear zone distance shall be provided between the edge of travel lanes and roadside obstructions. This includes separation for light standards, signs, landscaping, fences, etc
2. Stopping sight distance, decision sight distance and intersection sight distance shall be considered in all designs
3. Driveway locations shall meet City of Lethbridge design standards and bylaw requirements
4. Throat lengths for Arterial and Collector roadways shall meet or exceed the throat lengths identified for specific land uses in the TAC Geometric Design Guide for Canadian Roads unless this condition is waived in writing by the Transportation Business Unit
5. Roadways shall terminate in a temporary or permanent cul-de-sac. If a temporary cul-de-sac is provided until such time that the roadway is completed, it shall be maintained by the developer to a level suitable for public use
6. Temporary construction access shall not attract shortcutting traffic to the construction access. Signage is required for all temporary construction access and the developer is responsible for construction and maintenance
7. As built drawings are required prior to Final Acceptance Certificate
8. Coordinate tree locations with street lights to minimize future tree trimming requirements. Mid-block lights should be spaced 4m from full tree canopy. At intersections, no trees shall be planted between positive contrast street lights for crosswalks and the crosswalks themselves.
9. Sidewalk and pathway grades should not exceed a maximum of 5%.
10. A portion of roadway shall not have a change of gradient more than 1 in 12.5 over a maximum distance of 15 m
11. Handicap accessible ramps shall be provided for each individual crossing and shall be directed into the crosswalk location. The ramps shall not be located such that pedestrians are directed into the middle of the intersection
12. A 5m throwaway section of pavement shall be installed beyond the end of all roads that are to be extended at a future development phase
13. Stepped pavement tie in shall be completed at all road extensions between phases as per STR\_30
14. Access shall be designed to the requirements of the Alberta Building Code (ABC) Part 3
15. Access shall be designed to support the minimum load of 38,600 Kg



## SECTION 7: PARKS

### 7.0 INTRODUCTION

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#### 7.0.1 PURPOSE

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The City of Lethbridge (City) recognizes the importance of landscape development in the environmental, cultural, social and economic viability of our city. This document contains the technical information necessary to meet the City's overall level of service standards as identified in Council approved plans.

In addition, these standards form part of the agreement for development within the City of Lethbridge with the primary purposes of:

- i. Providing guidelines and standards to ensure the level of service objectives are realized for neighbourhood developments including: Pocket, Neighbourhood, Community Core, and Linear Parks, school grounds, road right-of-ways, buffers, joint use parcels, and public facilities/amenities;
- ii. Identifying planning and design requirements for area structure and outline plans, subdivision and development permit applications; and
- iii. Offering design reference material i.e. suggested list of appropriate plant material, minimum setback requirements and specific construction details.

#### 7.0.2 CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN

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##### **7.0.2.1 *Natural Surveillance (Increases visibility)***

Seeing and being seen are important aspects of crime prevention. The idea of Natural Surveillance guides the placement of physical features such as windows, lighting and landscaping which affect how much can be seen. A criminal is unlikely to attempt a crime if they are at risk of being observed. At the same time, we are likely to feel safer when we can see and be seen.

##### **7.0.2.2 *Natural Access Control (Restricts access)***

Most criminal intruders will try to find a way into an area where they will not be easily observed. Limiting access and increasing natural surveillance keeps them out altogether or marks them as an intruder. By selectively placing entrances and exits, fencing, lighting and landscape to control the flow of or limit access, natural access control occurs.



**7.0.2.3 Natural Territorial Reinforcement (*Promotes a sense of ownership*)**

Physical design can create a sphere of territorial influence that can be perceived by, and may deter, potential offenders. Defined property lines and clear distinction between private and public spaces are examples of the application of Territorial Reinforcement. This can be created using landscaping, pavement designs, decorative gateways, signs and fences.

**7.0.2.4 Maintenance (*Deters offenders*)**

Maintenance is related to Territorial Reinforcement. A well maintained area sends the message that people care about what happens in the area. This, in turn, discourages vandalism and other criminal activities. Security practitioners refer to the 'Broken Window Theory' – the idea that one broken window will entice vandals to break another. A vandalized area then becomes more inviting to higher levels of crime. Property should be well-maintained as a matter of safety as well as pride.

**7.0.2.5 Activity Support (*Fosters community interaction*)**

Encouraging activities in public spaces that are intended for use by residents and other legitimate users discourages criminal acts.

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**7.0.3 LEVEL OF SERVICE OBJECTIVES**

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The design standards outlined in this section will ensure that:

- i. The provision of Parks and Open Space will meet present and future community needs.
- ii. Open Space is functional, safe, accessible, inclusive, and diverse.
- iii. Spatial integrity of the area is maintained.
- iv. All residents of the community can access and enjoy the Parks & Open Spaces.
- v. Cultural and recreational needs of residents are met.
- vi. Parks and Open Spaces enrich the lives of the city's residents.
- vii. The final product is 100% complete with zero (0) deficiencies.

All work performed within the corporate limits of the City of Lethbridge shall be carried out in accordance with the City of Lethbridge Parks and Open Space Design Standards valid at the time of landscape drawing approvals.

All deviations from these standards and approved construction drawings require written approval of City of Lethbridge Parks Management.



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## 7.0.4 PARK COMPONENTS

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The Developer is responsible for providing the following components in every park development:

- i. Approved construction drawings, including surveyed as-built drawings
- ii. Grading the site (grading plan, sub-grade, and topsoil), loaming 150mm of topsoil, and turf establishment
- iii. Post and chain fencing on road frontage and on walkway entrances to the park
- iv. Trees (30/Ha or as per park classification)
- v. Lighting as per approved spec
- vi. Irrigation as per park classification
- vii. Pathway construction (asphalt and/or granular as per park classification)
- viii. Water and electrical services
- ix. School sites should be treated as community parks and be designed following the developer cost share agreement standard
- x. Maintenance of the project for two full calendar years upon issuance of the CCC

**Note:** To qualify for cost sharing the Developer must approach the Parks Planning Manager in the Outline Plan stage before the Open Space Agreement, or cost sharing is no longer an option. This is to allow Parks adequate time to allocate budget for the park development. Park function must be the first priority in the park location, design and function to qualify for MR credit. Any feature purely for marketing purposes (i.e. entrance features, gazebos, pergolas, fountains, waterfalls, etc.) is 100% Developer cost.

The Cost Sharing will be negotiated with the Developer through the Open Space Agreement.

Optimum Cost Share Development Menu – Max \$75,000 per hectare

**General:** The City will cost share 10% of design fees. The rest of the max \$75,000 per hectare can be shared among the approved amenities below:

**Amenities:**

80% Play Unit

80% Alternative amenities

- Skateboard elements
- Bike parks
- Sport courts
- Natural play elements
- Community gardens
- Bark parks
- Community gathering areas
- Sports fields

**Site furniture:**



- 80% Benches & picnic tables
- 80% Trash receptacles
- 80% Bike racks

Dry ponds, overland drainage routes, trapped lows, or other storm water conveyance devices that would be required to make the area suitable for development and are located within park spaces, are the developer's responsibility at 100% cost for construction and landscaping. Example: bridges, erosion mats, weeping tiles systems, special landscape treatments such as native grass, or aquatic plantings. Parks may be willing to consider cost share in dry ponds if the space includes an appropriate amenity.

Development of multi-use facilities is permitted when park function is the first priority and amenities are provided as per park classification model and spatial integrity of useable park space is provided. Areas between the Normal Water Level (NWL) and High Water Line (HWL) should be naturalized and provide riparian benefits as well as root mass stability control. If additional land is needed for the facility, land must be allocated from the Utility Reserve or other land sources.

The Parks Department would like to see parkland in the subdivision planned to take advantage of pond water irrigation through a central pump station as well as use make-up (canal) water to top up the pond during drought conditions. Water line connections between park areas should be installed through walkways and green belts but should limit conflict areas such as within carriageways.

## **7.1 GENERAL STANDARDS & REQUIREMENTS**

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### **7.1.1 DESIGN STANDARD GUIDELINES**

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With the development of Lethbridge's MDP and Parks and Pathways Master Plans the following principles were identified as strategic objectives.

- i. Lethbridge balances the cultural, social, economic, built and natural environment dimensions of sustainability; together we are building a city that is a community – a legacy we are proud to pass on to future generations.
- ii. The parks and pathways of Lethbridge are key to the quality of life and the health of citizens of all ages and abilities and therefore should be accessible to all residents.
- iii. Provide varied levels of use/ability for recreation activity and enjoyment of the outdoors for all residents.



- iv. Offer varied 'types' of Open Spaces for diverse users, for example: special event gatherings, increase dog friendly areas, special use parks (e.g. spray parks, mountain bike parks),, and natural areas.
- v. Integrate streets, pathways, Linear Parks, and other Open Spaces to ensure a connected multi-use network.
- vi. Protect, preserve, and enhance Lethbridge's River Valley and natural areas.
- vii. Support a sustainable approach to design where infrastructure is integrated with ecological processes, while also functioning as Open Space amenities.

As adopted by Council, various Master Plans provide a developmental framework for the planning & development of the Parks and Open Space network for the City of Lethbridge. In addition, prior to any landscape development the following list of regulatory documents are to be referenced (latest editions):

- i. Municipal Development Plan (MDP)
- ii. Parks Master Plan
- iii. Bikeways and Pathways Master Plan
- iv. River Valley Area Redevelopment Plan
- v. River Valley Parks Master Plan
- vi. Area Structure/Outline Plans
- vii. Land Use Bylaw
- viii. Subdivision Service Agreement/Open Space Agreement
- ix. Urban Forestry Management Plan
- x. Other City documents related to Parks and Open Space

The following are general guidelines for community development of Parks and Open Space:

- i. Where Municipal Reserve (MR) lots accommodate drainage from adjacent parcels, engineering/design provisions must be coordinated to ensure public recreational use is not hindered, e.g. erosion control mats, swales with minimum 2% positive drainage.
- ii. In situations where utility access through MR / Municipal School Reserve (MSR) is requested by the Developer and agreed upon by the City, the utility easement or right of way may be designated as non-credit MR if not in compliance with the approved Area Structure Plan (ASP) and inspected as per MR requirements.
- iii. The Developer shall ensure that the proposed and approved underground and shallow utility locations are acknowledged when park drawings are submitted for approval.
- iv. MR parcels around a Storm Water Management Facility (SWMF) must be a minimum 15m in width from the HWL to the property line.



- v. The area between the NWL and HWL should be naturalized and create a riparian area around a wet pond.
- vi. Landscape features or public art incorporated for purely aesthetic purposes are 100% the Developer's responsibility.
- vii. All areas below the HWL are the responsibility of the Developer to build to Open Space standards and landscape at 100% Developer cost.
- viii. Reduce the opportunity for specific crimes to occur through appropriate site design and principles of Crime Prevention Through Environmental Design (CPTED).
- ix. Linear Parks are to adhere to a minimum width of 10m if shorter than 100m or 15m if longer than 100m and a maximum of 40m. Traffic islands less than 9m<sup>2</sup> must be hardscaped and traffic islands over 20m<sup>2</sup> should not be landscaped due to the negative cost benefit of the facility.
- x. Dry ponds are eligible for MR credit if they meet the minimum standard for that classification of park (must have usable amenities).

### **7.1.2 PARKS DRAWING REVIEW REQUIREMENTS**

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Landscape plan approvals are the responsibility of Parks Management. It is required that at the subdivision concept design stage the Developer acquires the professional services of a registered member of the Alberta Association of Landscape Architects (AALA) to assist with the application. All required parks drawings and requirements are identified in Appendix 'B' Outline Plan Checklist. All other plans or details pertaining to the proposed development site may be requested by Parks Management, including but not limited to:

- i. Preliminary Concept Plan
- ii. Biophysical Inventory Assessment (detailed existing site conditions and recommendations)
- iii. Tree Protection Plan
- iv. Care & Maintenance Plan to be developed prior to handover with the City (special maintenance landscaping i.e. existing vegetation, etc.)
- v. Weed Management Plan (to accompany stripping & grading application)
- vi. Utility Line Assignment – Reclamation Plan

#### **7.1.2.1 Drawing Submissions**

##### **Outline Plan:**

All conceptual landscape designs are to be included within the Outline Plan document submitted to the City of Lethbridge. To aid in the approval process, Parks recommends the following



illustrations in accordance with Appendix 'B' – Outline Plan – Neighbourhood Checklist (*This is a general checklist in which not all items may apply to each specific Outline Plan*):

- i. Overall conceptual layout for Parks and Open Space with proposed amenities (playground locations, fields, skateboard elements, biking areas, gathering areas, dog parks, etc.) and SWMF locations within MR – including area calculations.
- ii. Overall pedestrian circulation plan with pathway classifications (regional, local connector, sidewalk) illustrating connections to adjacent neighbourhoods, regional recreational amenities, and Regional Pathways (internal system & external alignment along collector and arterial roadways).

**Concept Plan:**

The Concept Plan is to be submitted to the Urban Construction Coordinator, City of Lethbridge as part of the Civil Detail Design Package. This ensures the landscape plan aligns with the proposed civil infrastructure. The Concept Plan shall include, but is not limited to:

- i. Grading Plan including HWL, overland drainage paths, and contours.
- ii. Layout Plan including amenity locations, pathways and connection points.
- iii. Planting Plan including general planting locations, irrigated or non-irrigated grass.
- iv. Cross section illustrations of residential lots and Open Space interfaces.
- v. Weed Management Plan containing:
  - a. Frequency of weed control.
  - b. Process for eradicating noxious or excessive weeds, as per best practices;
    - i. Weed seedlings are to be cut prior to 'flowering' stage
    - ii. Shall be in accordance with the Weed Control Act
- vi. Confirmation of Utility Line Assignment and major infrastructure locations (including shallow utilities and utility easements).

**Landscaping Detail Design Plans:**

Drawings to incorporate all aspects of the concept and show all details required to take the project to construction, including but not limited to:

- i. Overall site layout plan
- ii. Erosion control plan
- iii. Site grading & drainage plan
- iv. Planting plan
- v. Electrical plan
- vi. Irrigation plan
- vii. Details & cross sections



**Note:** The Concept shall be included for reference.

### **7.1.3 GENERAL GRADING, DRAINAGE AND EROSION CONTROL REQUIREMENTS**

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- i. Perimeter grades to match approved finish grade of adjacent lots.
- ii. No slope shall exceed 5:1 and must be a minimum of 2.0m in width to allow for proper maintenance, unless otherwise agreed to by Parks Management.
- iii. The preferred slope of 2% is a minimum requirement. In areas where this is not possible mitigation measures such as sub drains, weeping tile and shorter runs to catch basins will be implemented to ensure water drains properly.
- iv. In situations where designated Open Spaces such as MR, Environmental Reserves (ER), MSR, and Public Utility Lots (PUL) accommodate overland drainage from adjacent parcels, standard erosion control measures will be required in conjunction with the Engineering services requirements at time of plan review.
- v. Excessive overland drainage or point load from adjacent parcels (private land) into public Open Space is to be minimized by on-site collection and reuse, or redirection of drainage to appropriate storm water facilities.
- vi. Overland drainage into MR, ER or MSR areas that inhibits intended functionality and usage is not permitted.
- vii. Storm water infrastructure (PUL's, wet ponds & dry ponds) within Linear and Community Core Parks is acceptable, but must not inhibit the spatial integrity (i.e. function, size, connectivity) of that classification of park space (e.g. doughnuts of park space around a wet pond).
- viii. Storm water facilities:
  - a. Topsoil below the NWL to be clay based (or approved alternative) for establishment of wetland vegetation as per Engineering Services Standards.
  - b. Topsoil between the NWL and HWL to be minimum 300mm depth.
  - c. All pathways / amenities around PUL's and MR parcels to be above the HWL.
  - d. All Ponds must follow Section 3.5.4 & 3.5.5 for physical and water quality standards.

### **7.1.4 SUB-GRADE, TOPSOIL AND FINISH GRADE REQUIREMENTS**

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See Parks Construction Specifications Section 07040.



## **7.1.5 PLANTING**

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### **7.1.5.1 SOD, SEED AND GROUNDCOVERS**

- i. Seed mixes used within the City of Lethbridge are to be free of, but not limited to, the following invasive weeds: *Setaria viridis* (foxtail), *Vicia Americana* (milk vetch) and all noxious weeds in accordance with the Alberta Weed Act.
- ii. Seeding will be the first method for establishment and sod will be used in situations of high volume traffic.
- iii. Turf areas between the fence line and edge of planting beds shall be a minimum of 2.5m for maintenance access. If less than 2.5m, turf to be eliminated and planting bed to extend to fence line with tree at least 5m away from fence.
- iv. Reclamation areas within the River Valley will require a native seed mix to be used.
- v. Grass Seed Mixtures:
  - a. Park and Boulevard Seed (Mixture A):
    - 60% Fescue Varieties
    - 20% Kentucky Bluegrass
    - 20% Perennial Ryegrass
  - b. Sports Field and Free Play Area Seed (Mixture B):
    - 50% Kentucky Bluegrass
    - 40% Creeping Red Fescue
    - 10% Perennial Ryegrass
  - c. Dryland Seed (Mixture C):

30% Slender Wheat	20% Western Wheat
15% Green Needle	10% June Grass
10% Streambank Wheat	10% Blue Grama
5% Indian Rice	
  - d. Native Seed Mixture:

See Parks Construction Specifications Section 07050. Seed certificates are to be provided prior to placement.

### **7.1.5.2 TREES, SHRUBS & HERBACEOUS MATERIALS**

- i. All plant materials shall be a hardy species capable of healthy growth in Lethbridge and shall conform to standards of the Canadian Nursery Landscape Association for Nursery Stock. See Appendix 'C' – Approved List of Tree and Shrub Species.
- ii. The use of commercial mycorrhiza fungal spores as a supplement to augment soil around new plantings will help with plant establishment and water uptake and should be used.



- iii. Trees and shrubs to be primarily planted in groupings and mulched with a bark or tree chip mulch as per specification while individual specimen trees in turfed areas are acceptable as well.
- iv. All plant material to be planted a minimum of 5m away from a pathway, sidewalk or property line within a park.
- v. Shrubs shall not be planted within the 80% projected growth canopy of trees.
- vi. Shrubs shall be planted to allow for 1m of space on a minimum of 2 opposing sides of each plant for maintenance access.
- vii. There should be a minimum of 30 trees/ha on all dedicated MR.
- viii. There shall be a replaced value of three (3) new trees planted for every one (1) tree removed on any public lands.

### 7.1.5.3 MULCH

Mulch shall be provided in all planting beds and in the area immediately adjacent to, but not within 100mm of tree trunks, in order to suppress weed growth and to minimize moisture evaporation and shall be 100mm depth.

### 7.1.5.4 BOULEVARD, ROUNDABOUT & MEDIAN PLANTING

#### Wide Median

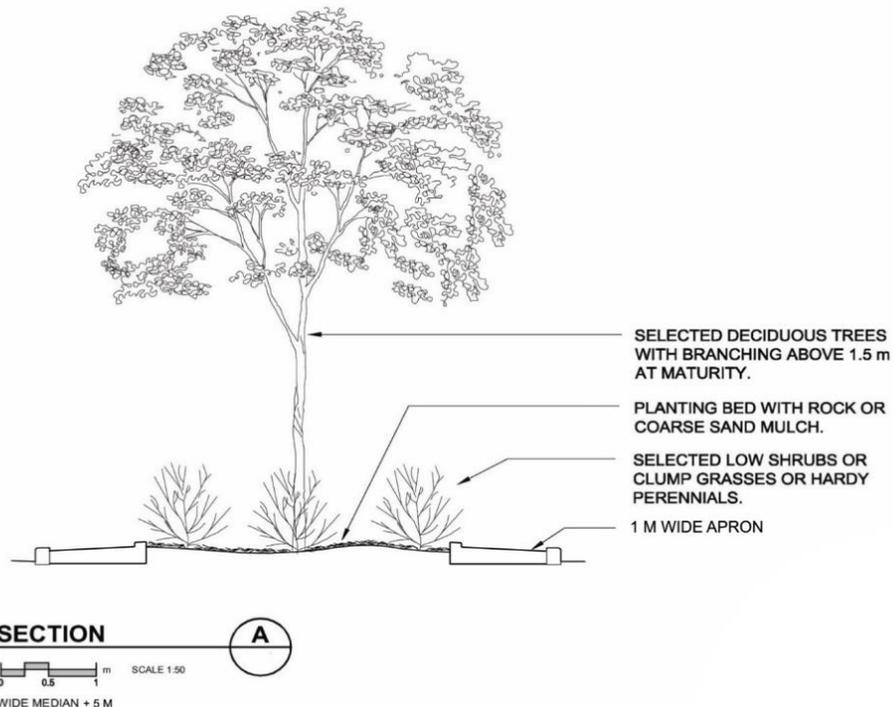
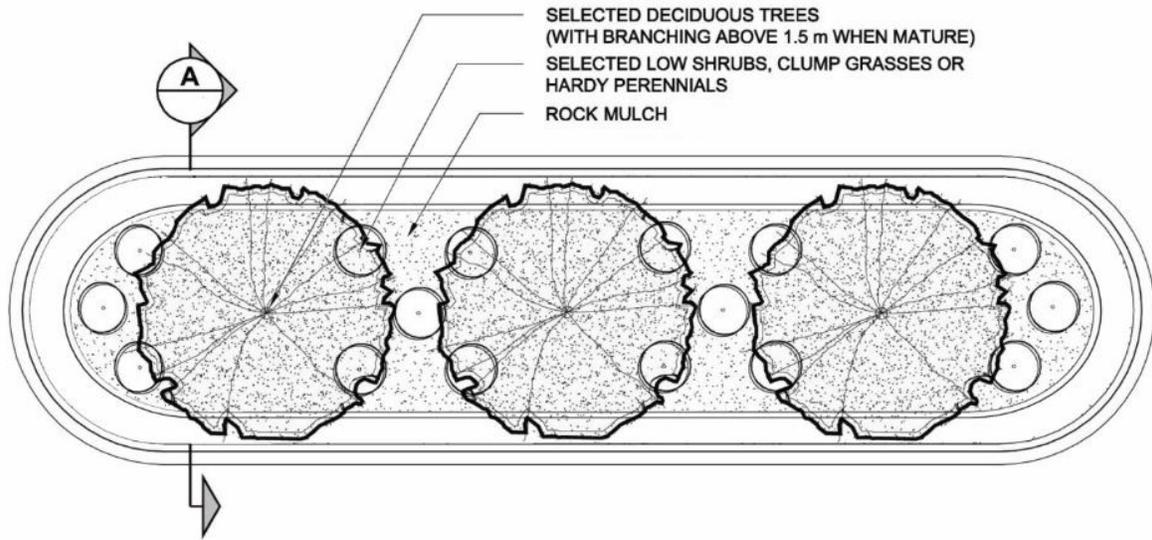


Figure 7.1.5.1 Wide Median Section



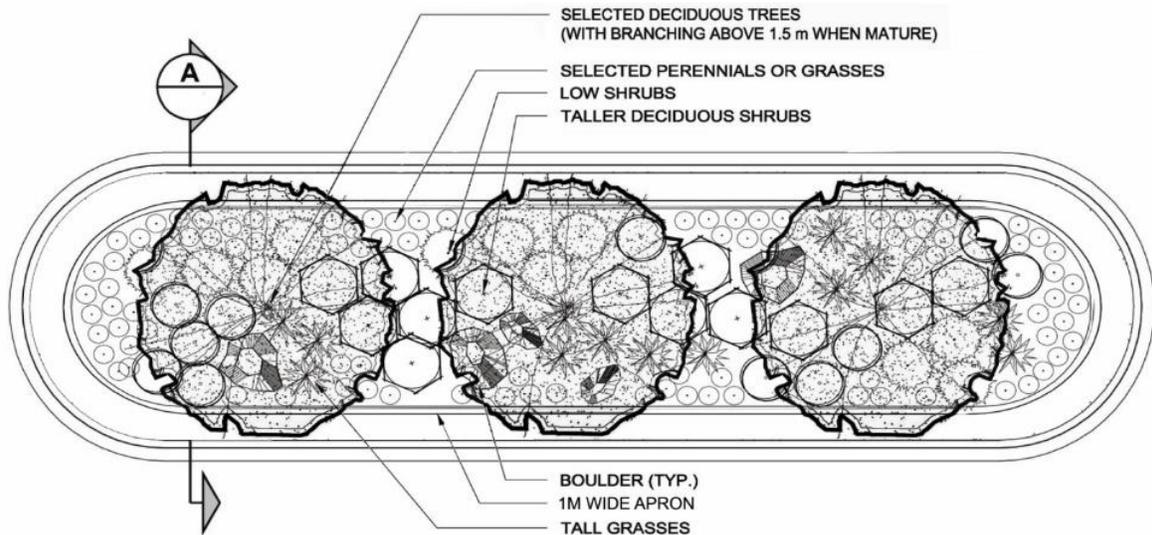
**MEDIAN TREATMENT**

0 1 2 m SCALE 1:100

WIDE MEDIAN +5 M

Figure 7.1.5.2 Wide Median Detail

**Wide Median Xeriscape**



**MEDIAN TREATMENT**

0 1 2 m SCALE 1:100

WIDE MEDIAN XERISCAPE +5M

Figure 7.1.5.3 Wide Median Xeriscape Detail

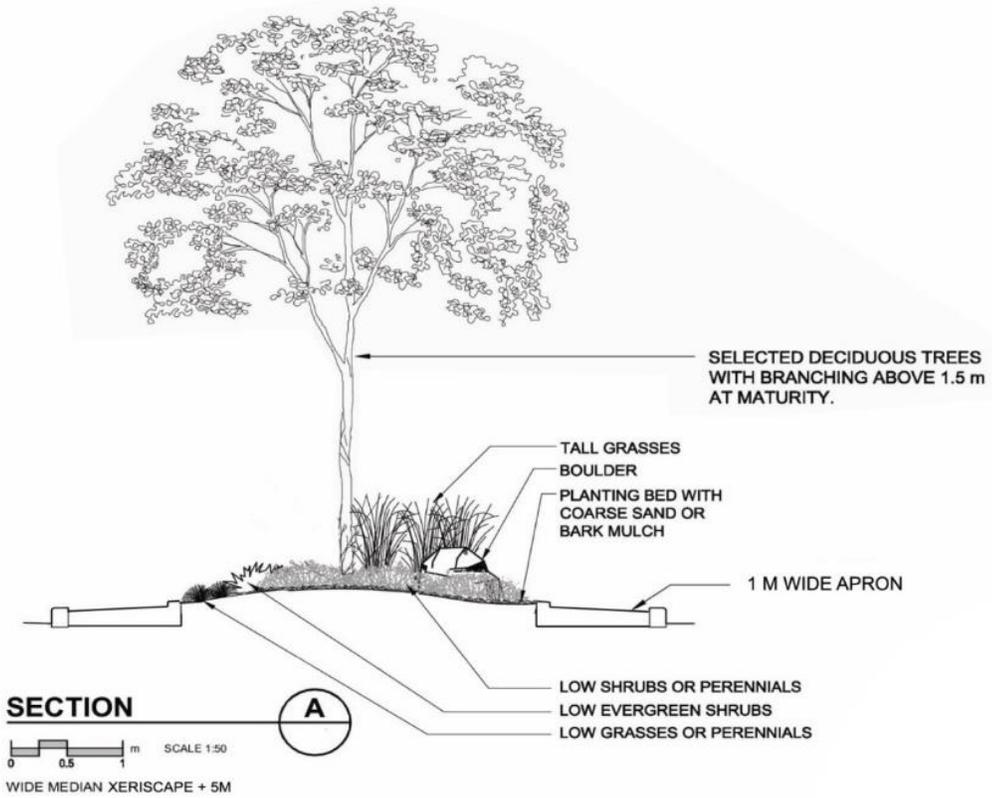


Figure 7.1.5.4 Wide Median Xeriscape Section



**Boulevard**

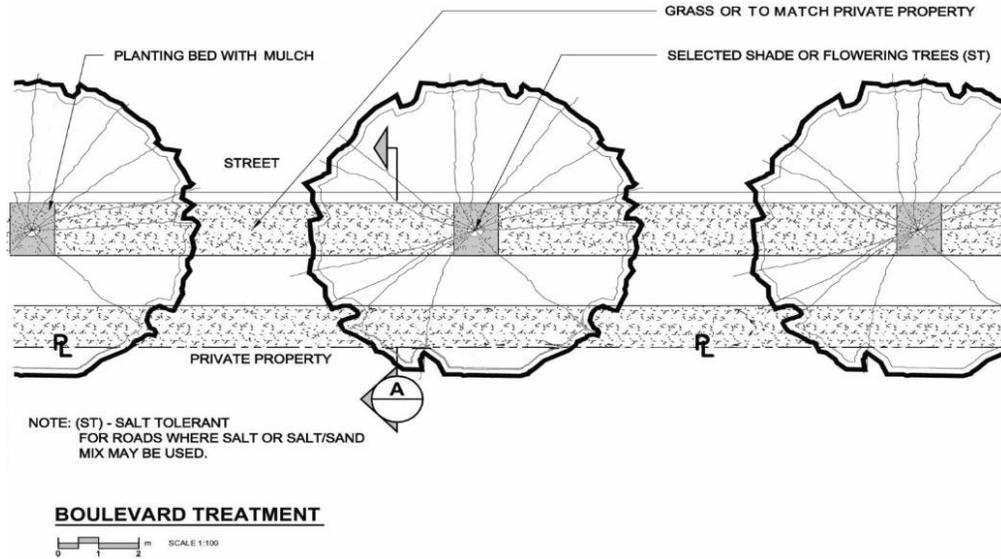


Figure 7.1.5.5 Boulevard Detail

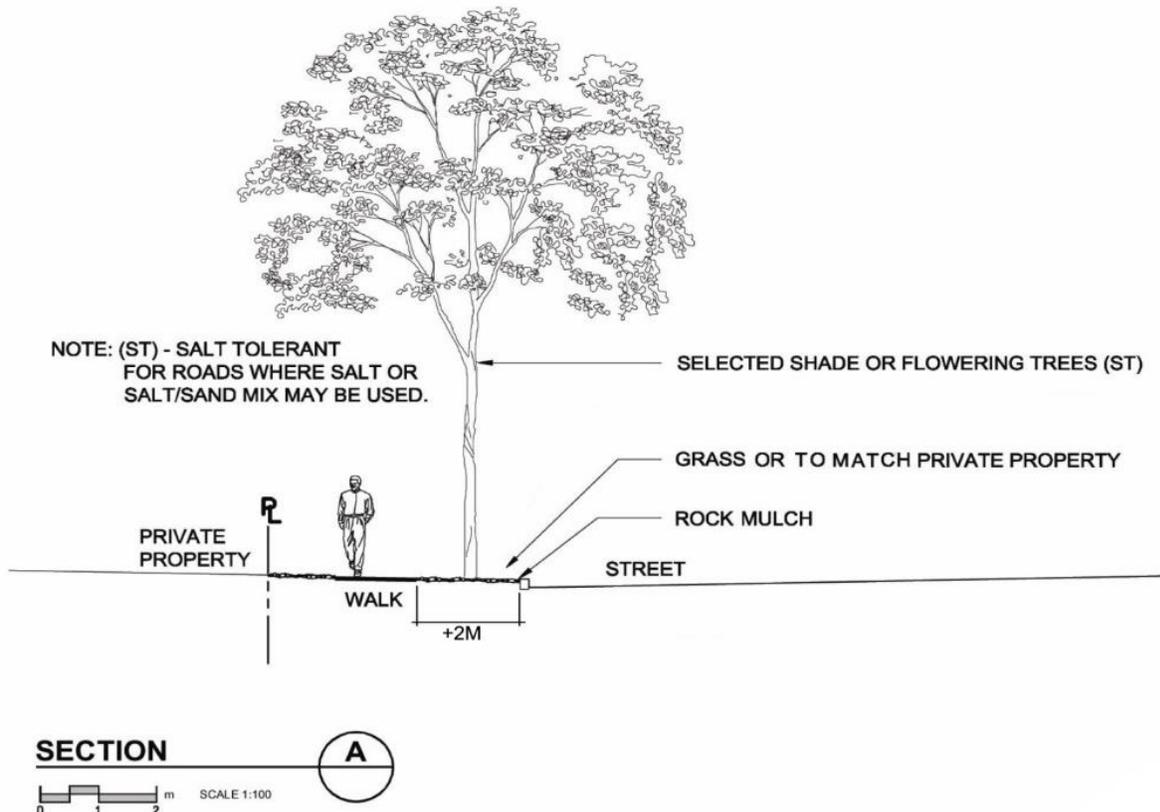
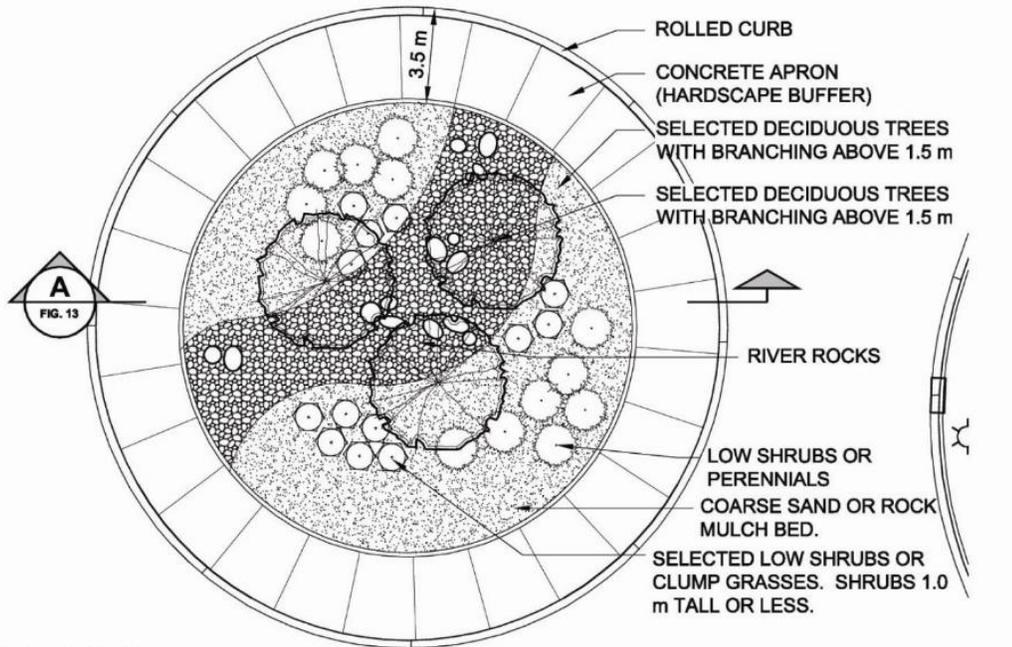


Figure 7.1.5.6 Boulevard Section



**Round-About**



**ROUND-ABOUT**

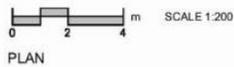


Figure 7.1.5.7 Round-About Detail



**SECTION**



Figure 7.1.5.8 Round-About Section



**Arterial Road Landscaping Standard:**

- i. Dryland grass mixture as per City Standards is the approved ground cover.
- ii. Irrigation must be provided for every plant bed and tree. Bubblers are the standard for drip style irrigation. Plant beds shall be mulched.
- iii. A minimum 40 trees/ha planted in groupings rather than straight lines to ensure a naturalized appearance.
- iv. Minimum 1 seating area with a bench and garbage receptacle every 500 meters along arterial pathway.
- v. Planting tree beds with mulch on slopes of greater than 5:1 is not recommended.

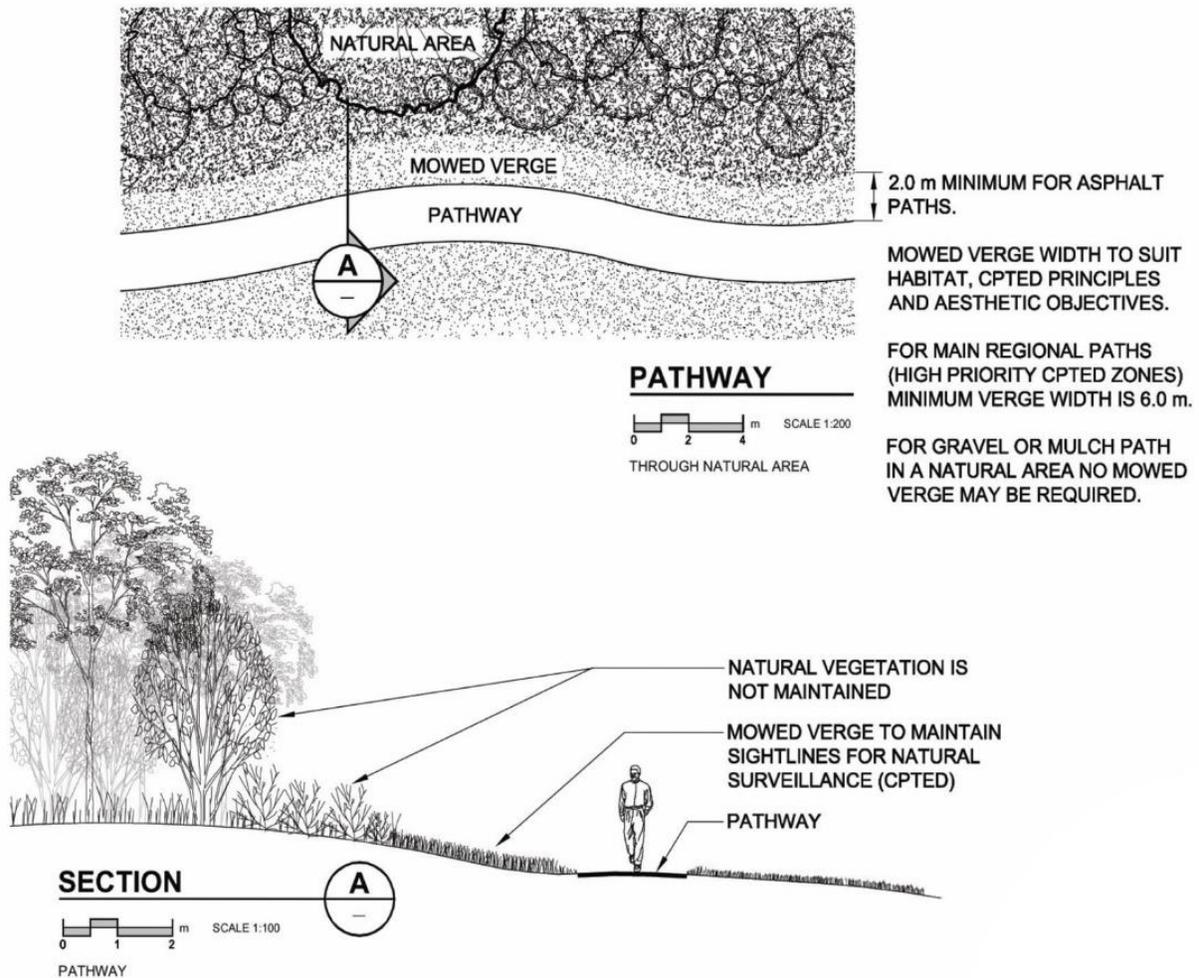


Figure 7.1.5.9 Arterial Road Landscaping



#### 7.1.5.5 URBAN FORESTRY

- i. Tree plantings throughout the subdivision to provide a diversity of tree species.
- ii. The City's urban forest benefits from planting a diversity of species, therefore monoculture planting shall be avoided.
- iii. In accordance with the Service Agreement residential tree requirement on collector roadways, one tree per lot will enhance the communities overall Urban Forest. These trees are the sole responsibility of the Developer to provide for each lot and the residential homeowner to maintain.
- iv. Elm and Ash trees can be planted as approved by Parks Management.

#### 7.1.6 PATHWAYS

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- i. Regional Pathways to be 3m wide asphalt which provides year round city wide connectivity.
- ii. Local connector pathways to be minimum 2m asphalt which provides year round community connectivity.
- iii. Alternative pathways (granular surfaces, limestone) to be implemented in ecologically sensitive areas (River Valley) and to be 1.5m width with a 0.5m safety clearance on each side.
- iv. Pathways in MR lots shall not be used as drainage conveyance along the longitudinal line of a pathway.
- v. Slope grades:
  - Paved: Grades should be maintained at 0-3%  
Acceptable Maximum Sustained gradient is 5%  
Acceptable cross slope is 2%
  - Natural: Grades should be maintained at 0-10%  
Acceptable Maximum Sustained gradient is 15%

**Note:** Grades exceeding the 'Acceptable Maximum Sustained' may require stairs or switchbacks.
- vi. All pathways adjacent storm pond facilities to be located above HWL.
- vii. All mulch beds on public lands / MR must have a 1.0m wide grass strip between the bed and the pathway to control spillover of debris onto the pathway.

#### 7.1.7 IRRIGATION

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Water service:

- i. Park service required for irrigation system in MR median and/or boulevards is to be identified on the irrigation plan and the engineering water service plans.



- ii. Size of water service line to be minimum 50mm diameter and a maximum 75mm, dependent upon site irrigation requirements and may require booster pump stations to ensure water window is a maximum of 4 hours to operate the water schedule.
- iii. Location of water service is at property line as per City specification.
- iv. Irrigation canal water use must be exhausted prior to use of potable water.
- v. The use of storm water from approved storm water pond.

Irrigation system requirements:

- i. All irrigation system pursuant to this document shall comply with the current edition of the City's Irrigation Design Standards and current approved equipment list.
- ii. Irrigation controller box and service box locations are determined for sight lines for irrigation operations and proximity to water service and power.
- iii. Landscape and irrigation designs are to be coordinated to achieve best water management practices. This may result in use of separate zones and/or revised landscape plans. Low impact development irrigation practices are encouraged.
- iv. Bubbler system for trees in shrub beds.

### **7.1.8 FENCING & BARRIERS**

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Fencing specifications are specific to fencing adjacent public lands, (i.e. residential fencing backing on to ER/MR/MSR):

- i. Bottom of fencing to be minimum 25-75mm spacing from approved final grade of adjacent lots, including public lands. This spacing is to ensure proper surface water drainage.
- ii. Fencing to be entirely located on the private property side of the property line.



## 7.1.9 PARK CLASSIFICATIONS

### 7.1.9.1 POCKET PARK

*Design*

CLASSIFICATION	SIZE	SERVICE AREA	SITE FURNISHINGS
City Developed Park	0.5 to 0.8 ha	0.5 km radius	bike racks, benches, trash receptacles, park signage, picnic tables

#### PURPOSE

- To maximize the distribution of Open Space within easy walking distance (optimally 400m or 5min) for all neighbourhood residents.
- Intended to serve residents near the periphery of a neighbourhood

#### FUNCTION

- Passive recreation for all age groups
- Play facilities intended for pre-school children age 2-5
- Specific programming for residents





FEATURES		NOTES
Location	Close to higher density	1 Maximum two per neighbourhood
Parking	No	2 30% street frontage
Amenities	• Playground (2-5 year olds)	3 Close to higher density housing and/or senior citizen housing where appropriate
	• Gathering areas	4 Should be at least 400m or 5min walk from a community core park
	• Open Space	5 Linked by trails or sidewalks to residential areas, adjacent parks, and other activity nodes
	• Alternative (community garden, etc.)	6 Located on collector streets, not arterial
Trees	30 trees per ha min.	7 Shall be easily accessible by walking and cycling for neighbourhood residents
Pathways	Local connectors	8 Should be more than 400m or 5min walk from the nearest point of neighbourhood periphery
SWMF	Must meet park function first	

### 7.1.9.2 NEIGHBOURHOOD PARK

*Design*

CLASSIFICATION	SIZE	SERVICE AREA	SITE FURNISHINGS
City Developed Park	0.8 to 5.5 ha	1 km radius	bike racks, benches, trash receptacles, park signage, picnic tables
<b>PURPOSE</b>			
<ul style="list-style-type: none"> <li>To maximize the distribution of Open Space within easy walking distance (approximately 400m or 5min) for all neighbourhood residents</li> <li>Intended to serve dwellings near the periphery of a neighbourhood</li> </ul>			
<b>FUNCTION</b>			
<ul style="list-style-type: none"> <li>Passive recreation for all age groups</li> <li>Play facilities intended for pre-school and school-aged children age 2-12</li> <li>Specific programming for residents</li> </ul>			



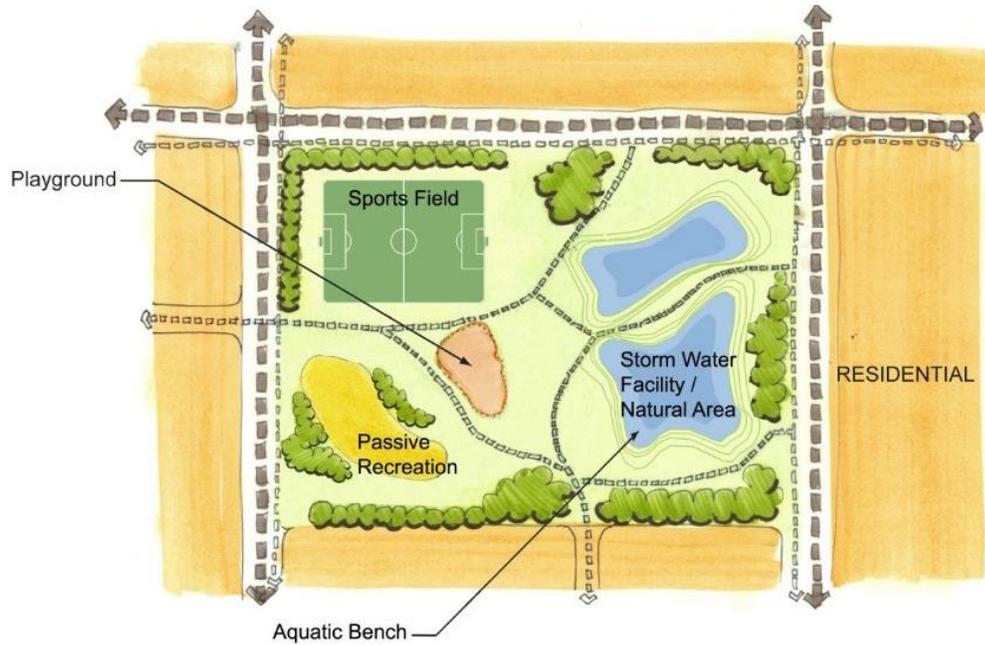
FEATURES		NOTES
Location	Centrally located	1 Maximum two per neighbourhood
Parking	No	2 30% street frontage
Amenities	• Playground (2-12 year olds)	3 Close to higher density housing and/or senior citizen housing where appropriate
	• Gathering areas	4 May be combined with elementary school
	• Open Space	5 Should be less than 400m or 5min walk from a Community Core Park
	• Alternative (skate/bike park, dog park, splash pad, etc.)	6 Linked by trails or sidewalks to residential areas, adjacent parks, and other activity nodes
Trees	30 trees per ha min.	7 Access should be uninterrupted by arterial roads or other physical barriers
Pathways	Local connectors	8 Located on collector streets, not arterial
SWMF	Must meet park function first	9 Located near safe and practical street crossings



### 7.1.9.3 COMMUNITY CORE PARK

*Design*

CLASSIFICATION	SIZE	SERVICE AREA	SITE FURNISHINGS
City Developed Park or Natural Area (SWMF)	Min. 5.5 ha	1 km radius	bike racks, benches, trash receptacles, park signage, picnic tables
<b>PURPOSE</b>			
<ul style="list-style-type: none"> <li>To meet active and passive outdoor recreational needs of neighbourhood residents.</li> <li>To provide a central gathering place for community events and a destination for residents to meet and socialize.</li> </ul>			
<b>FUNCTION</b>			
<ul style="list-style-type: none"> <li>Structured sports facilities for adults and youth</li> <li>To accommodate structures for active recreational activities not found in the neighbourhood park (e.g. basketball courts, street hockey pads, etc.)</li> <li>To incorporate storm water management facilities</li> <li>To accommodate interpretive play features for children</li> <li>Specific programming for residents</li> </ul>			



FEATURES		NOTES
Location	Centrally located	1 Maximum one per neighbourhood
Parking	Yes	2 30% street frontage 3 Easily accessible by walking and bicycling
Amenities	<ul style="list-style-type: none"> <li>• Playground (Interpretive play)</li> <li>• Gathering areas</li> <li>• Courts/fields/etc.</li> <li>• Alternative (skate/bike park, dog park, splash pad, etc.)</li> </ul>	4 Located near safe and practical street crossings 5 Linked by trails or sidewalks to residential areas 6 A small parking lot for 7-10 vehicles is required where sports are on site and other parking is not available
Trees	30 trees per ha min.	



Pathways	Local and Regional
SWMF	Must meet park function first

### 7.1.9.4 LINEAR PARKS

*Design*

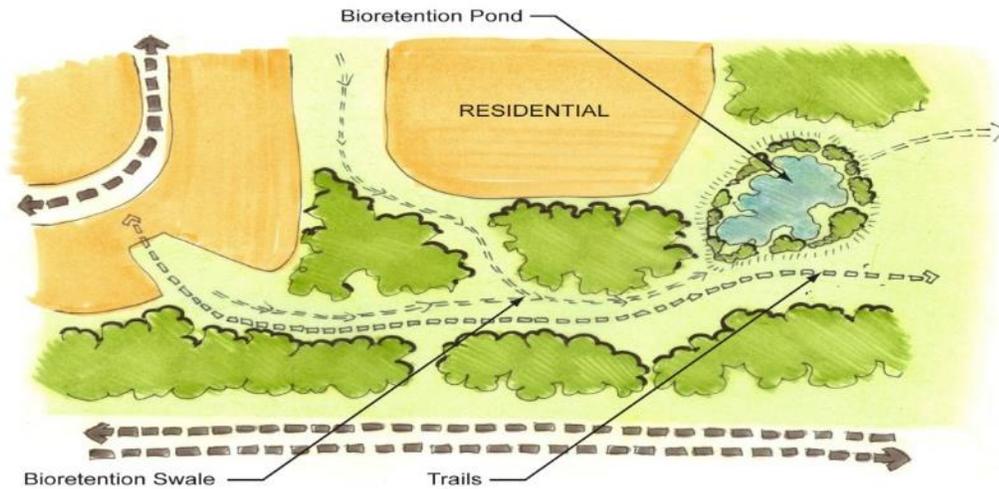
CLASSIFICATION	SIZE	SERVICE AREA	SITE FURNISHINGS
City Developed Park and/or Natural Park	10 to 40 m wide	varied	bike racks, benches, trash receptacles, park signage, picnic tables

#### PURPOSE

- To provide connections and linkages in the park system to achieve non-vehicular travel routes to neighbourhood focal points and destinations
- To act as buffers providing visual screening, noise attenuation or the separation of conflicting land uses
- Allow protection of natural and heritage features

#### FUNCTION

- To provide pathways for non-vehicular travel
- To provide opportunities for viewing and experiencing natural features
- To provide opportunities for sitting and picnicking
- Screen large parking areas
- Specific programming for residents



FEATURES		ACCESS AND CONNECTIVITY
Location	Linked to destinations	1 Where key connections and linkages are identified
Parking	No	2 All access points have a minimum width of 15m
Amenities	• Playground (based on neighbourhood need)	3 Access points to be located to discourage uncontrolled mid-block crossing of collector or arterial roads
	• Gathering areas	4 Lighting is required where Linear Parks serve as a non-vehicular commuter route
	• Open Space	5 Provide additional safeguard between developed areas, environmentally sensitive areas, and wildlife habitats
	• Alternative (skate/bike, etc.)	6 Separate residential areas from busy roadways or commercial areas



Trees	30 trees per ha min.
Pathways	Local and Regional
SWMF	Must meet park function first

### 7.1.9.5 SCHOOL GROUNDS

*Design*

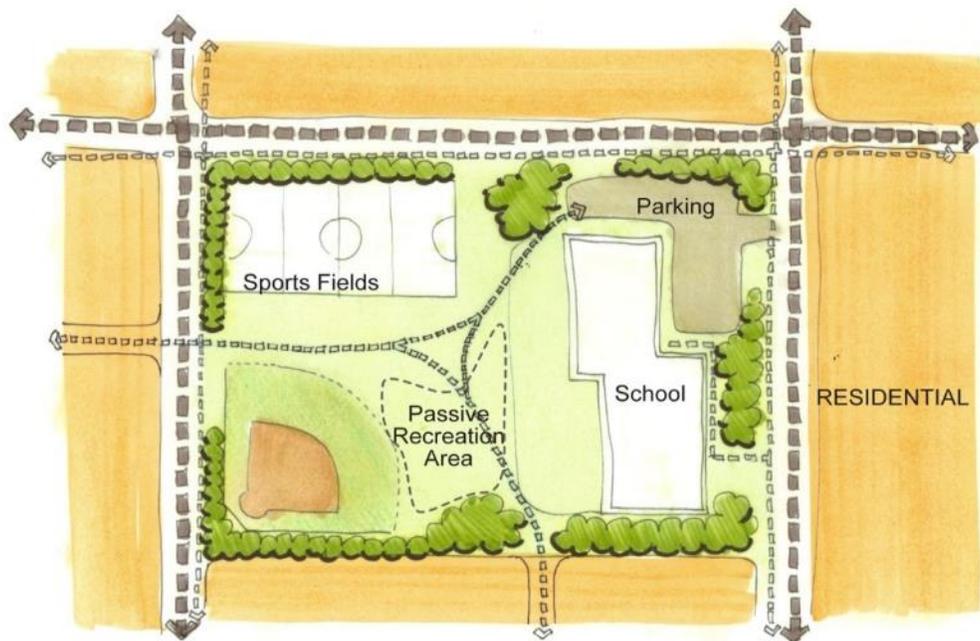
CLASSIFICATION	SIZE	SERVICE AREA	SITE FURNISHINGS
City Developed Park	Varies (based on need)	varied	bike racks, benches, trash receptacles, park signage, picnic tables

#### PURPOSE

- Meet active recreational needs for youth
- To provide expanded play area for neighbourhood schools

#### FUNCTION

- To accommodate inter-neighbourhood sports leagues for youth and adults
- To accommodate informal active recreational activities
- May be combined with neighbourhood parks
- Specific programming for residents





FEATURES		ACCESS AND CONNECTIVITY
Location	Centrally located	1 Located on arterial or collector streets with City transit service
Parking	Yes	2 50% street frontage
Amenities	• Playground (based on school classification)	3 Linked by trails or sidewalks to residential areas, adjacent parks and other activity nodes
	• Sports fields (soccer, baseball, basketball, etc.)	4 Parking to be provided, quantities according to school programming
	• Open Space	5 Easily accessible by walking and bicycling
	• Alternative (skate/bike, etc.)	6 Access from collector street
Trees	30 trees per ha min.	
Pathways	Local and Regional	
SWMF	No more than 30% of area	

### 7.1.10 PLAYGROUNDS

- i. Playground surface material to be poured-in-place recycled rubber, engineered wood fibre or 6–10mm washed round rock and must be free of fines or other contaminants. Playground surfaces will be considered on a site specific situation.
- ii. All playgrounds are to be designed and constructed to meet or exceed CSA standards (including encroachment zones).
- iii. Play unit lighting is required for all playgrounds.



- iv. Types of play equipment based on Park Classification:
  - a. Pocket Parks: Play facilities intended for pre-school children aged 2-5.
  - b. Neighbourhood Parks: Play facilities intended for pre-school children aged 2-5 and school children aged 5-12.
  - c. Community Core Parks: Structured sports facilities for adults and youth and play facilities to accommodate all age groups and/or interpretive play (unique play equipment).

### 7.1.11 SITE FURNITURE

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- i. Waste Receptacle: Canaan CAY-140
  - a. to be located a minimum of 2m away from benches and preferably down wind.
- ii. When picnic tables are installed in new parks, at least one (1) table must be designed in such a way that would allow future conversion to an accessible picnic area (i.e. easy connection to paved pathway, concrete pad large enough for accessible table).
- iii. Bench base: concrete or asphalt base with a 300mm apron beyond furniture edge and on one side with a 1200mm apron overhang for wheel chair accessibility.  
**NOTE:** this configuration is for park benches that are located adjacent and connected to asphalt pathways.
- iv. Site furniture to be in-ground or surface mounted, as approved by Parks.

### 7.1.12 BRIDGES

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- i. Bridge structures: design and construction approval process to be completed by Engineering services and Parks.
- ii. Abutments: slope treatment and/or extended hand rails are required to ensure public safety between abutment structure and pathway edges. Abutment structure to be located above HWL.
- iii. Standard bridge requirements:
  - a. Width: 2.5m minimum
  - b. Load capacity: 2270 kg (5000 lbs) minimum
  - c. Materials: to be low maintenance railings and surface
  - d. Construction: countersunk lag bolts are required
  - e. Slope: to be maximum 6% slope (length)



### **7.1.13 PARKS SIGNAGE**

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- i. Signage requirements to be determined at detailed plan approval stage. Signage will be dependent upon overall park use and subject to approval by Parks Management.
- ii. General signage requirements:
  - a. Follow the Corporate Identity Guidelines
  - b. To be located at major entrances to Open Spaces (i.e. wayfinding, bylaw, use designation signage)
  - c. Installation and maintenance of the signage is the responsibility of the Developer until FAC approval
- iii. Location and detail of signage to be indicated on landscape construction drawings for approval.
- iv. Developer signage to be removed prior to FAC.
- v. A minimum of three (3) Stormwater Facility Caution signs to be installed around new ponds. See Drawing 9.2.3 in the Parks Construction Specifications for sign details.

### **7.1.14 SITE INSPECTIONS & SUPPORTING DOCUMENTS**

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- i. In situations where road works and landscaping site improvements are immediately adjacent to each other, every effort should be made to coordinate site inspections and approvals.
- ii. Final grade survey stakes and topsoil depth test results may be required at the time of topsoil inspection, as requested by the Parks Site Inspector.
- iii. The Developer and/or Developer's consultant (landscape architect or representative) must have a set of approved drawings, a set of specifications and any final test documentation (e.g. playgrounds) on site at time of inspection.
- iv. Parks has the right to refuse inspection if multiple deficiencies are found as determined by the Parks Inspector.

### **7.1.15 MAINTENANCE PERIODS**

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- i. The maintenance period for all MR parcels is two (2) calendar years. The following is a list of Developer tasks for the maintenance period:
  - a. Snow removal on pathways: to occur per Parks Department maintenance standards.
  - b. Garbage pick-up: minimum once weekly in summer and once monthly in winter.



- c. Mowing to occur per Parks Department maintenance standards.
- ii. Third party damages remain the responsibility of the Developer.

**Note:** for a more detailed list please refer to 'Schedule D – Open Space Agreement.

## **APPENDIX “A”**

### *Abbreviations & Definitions*

**AAAL** – Alberta Landscape Architect Association

**ASP** – Area Structure Plan

**CCC** – Construction Completion Certificate

**CPTED** – Crime Prevention Through Environmental Design

**CSA** – Canadian Standards Association

**ER** – Environmental Reserve

**FAC** – Final Acceptance Certificate

**HWL** – High Water Line

**MDP** – Municipal Development Plan

**MR** – Municipal Reserve

**MSR** – Municipal School Reserve

**NWL** – Normal Water Level

**PUL** – Public Utility Lot

**SWMF** – Storm Water Management Facility

**Open Space:** Designated MR, MSR and ER areas, or combination thereof, that is used for the intent of recreational use within the community.

**Pocket Park:** Green space that provides a small, safe and attractive multi-use park for those living in close proximity that cannot easily access neighbourhood or community core parks. Park size ranges from 0.5 to 0.8 hectares (1.2 to 2.0 acres).

**Neighbourhood Park:** Open Space for local community use that serves as a common area for neighbours of all ages to gather, socialize and play. Park size ranges from 0.8 to 5.5 hectares (2.0 to 13.6 acres).

**Community Core Park:** Open Space designed to meet the recreational needs of a larger community area that permits large group activities, community events and sports tournaments. Park size is a minimum 5.5 hectares (13.6 acres).

**Linear Park:** Open Space that provides non-vehicular connections and linkage routes to neighbourhood focal points and destinations outside of the neighbourhood and acts as a buffer providing visual screening, noise attenuation or separation of conflicting land uses. (15m to 40m)

**Regional Pathway:** Pathway designed to accommodate multiple destination-oriented users and potential high volumes of use.



Local Connector: Pathway intended to connect commuter trails to adjacent communities, shopping, and employment and Open Space areas.

## APPENDIX “B”

### *Outline Plan Open Space Checklist*

#### References for OP – Open Space Planning:

- MGA, ICSP/MDP, ASP documents
- Parks & Bikeways & Pathways Master Plans

#### Outline Plan Requirements:

- Connectivity/Walkability
  - Regional & local connector pathway connectivity & overall community connectivity
  - Pedestrian friendly streetscapes (median, boulevard, roundabout planting)
- Accessibility
  - Convenient, clear access points with high visibility
  - Provide connection to amenities
- Functionality
  - Regional as well as community recreational needs are addressed (amenity, active/passive Open Space)
  - Use park classification (neighbourhood, pocket, linear, school and community parks)
- Diversity & Adaptability
  - Amenity Features:
    - Gathering areas, special use areas (skateboarding, biking, dog parks), parking, sports fields, community gardens, playgrounds, signage, public art, fencing, benches, bike racks, active/passive Open Space
  - Increase biodiversity (tree species diversification), as well as range of experiences
- Identity & Character
  - Neighbourhood theme
  - Entrance features
- Sustainability
  - Low impact development (water, air & waste quality: rain harvesting, detention cells, bioswales)
  - Sustainable planning and design practices to minimize maintenance costs and improve environment i.e. drought tolerant plantings, habitat formation and storm water irrigation.
- School Reserves
  - School site requirements (in coordination with parks and school board).



- Overall size & interface with adjacent areas
- Regional & local recreation facilities
- Connectivity with neighbourhood
- Linear Parks
  - 15m width minimum connecting to destination nodes
  - Must adhere to CPTED
  - Municipal reserve adjacent to SWMF should have larger Open Space area to support other forms of recreation not just walking.
- Storm Water Management Facilities
  - Meet minimum MR requirements
  - Riparian landscape requirements (NWL to HWL to be naturalized)
  - Maintenance access & requirements
  - Irrigation opportunities
- Additional Documents Required
  - Overall conceptual layout for Parks and Open Space with proposed amenities (playground locations, fields, skateboard elements, biking areas, gathering areas, dog parks, etc.) and SWMF locations within MR – including area calculations.
  - Overall pedestrian circulation plan with pathway classifications (regional, local connector, sidewalk) illustrating connection to adjacent neighbourhoods, regional recreational amenities, and regional trail system (internal system & external alignment along collector and arterial roadways).
  - Cross section illustrations for atypical situations (i.e. retaining walls) of residential lots, Open Space interfaces, and any low impact design proposals.
  - Preliminary Conceptual Landscape Plans (proposed amenities to be shown in plan and elevation cross-section rendered illustrations), rough grading (high spots, low spots or any overland drainage), circulation, etc.



**APPENDIX "C"**

*Open Space Agreement*



**OPEN SPACE DEVELOPMENT AGREEMENT**

**OVERALL DEVELOPMENT NAME**

**Development Name: (same as above)**

**Lot \*\* MR, Block \*\*, Plan \*\*\***

**Developer: company**



CITY OF  
*Lethbridge*

DESIGN STANDARDS  
2021



CITY OF  
*Lethbridge*

THIS AGREEMENT MADE THIS \_\_\_\_\_ DAY OF \_\_\_\_\_ 2020  
BETWEEN:

**THE CITY OF LETHBRIDGE**  
A MUNICIPAL CORPORATION  
(HEREINAFTER REFERRED TO AS "THE CITY")

**OF THE FIRST PART**

**-AND-**

**Developer Name**  
(HEREINAFTER REFERRED TO AS "THE DEVELOPER")

**OF THE SECOND PART**

**OPEN SPACE DEVELOPMENT AGREEMENT  
FOR  
PARK NAME**

**LOT \*\* MR, BLOCK \*\*, PLAN \*\*\* (\*\* Ha.)  
LOCATED IN THE:  
SE ¼ of Section \*\*, in Township \*, Range \*\*, West of the Fourth Meridian**



## OPEN SPACE DEVELOPMENT AGREEMENT

**SUBDIVISION:**

**DEVELOPER:**

Contact:

Phone:

**CONSULTANT:**

Contact:

Phone:

**DEVELOPMENT AREA:**

### PART I

#### DEVELOPMENT, ACCESS, TESTS, PRICES, TIME

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##### 1.1 AUTHORIZATION TO DEVELOP

The Developer is hereby authorized, subject to the terms and conditions of this Agreement, to develop the open space shown outlined in yellow on the Plan attached hereto as Schedule "A".

##### 1.2 WRITTEN PERMISSION REQUIRED BEFORE COMMENCING WORK



The Developer shall submit detailed drawings and specifications for all utilities and other municipal improvements they are proposing to install and construct within the open space, and no construction or development shall commence without prior written approval of the City of Lethbridge.

### **1.3 MATERIALS, WORKMANSHIP AND STANDARDS**

The Developer agrees that all materials installed and workmanship performed by the Developer under this agreement, including specific conditions required by the City of Lethbridge Parks Department, shall conform to the City's current standards, procedures and approved products. Requests for deviation from City of Lethbridge standards will be received in writing explaining the rationale and including drawings and details on alternatives.

### **1.4 ACCESS**

The Developer shall grant to the City Engineer, or its duly authorized representatives, free and uninterrupted access to any and all parts of the Development Area for the purpose of making inspections and taking samples of materials being used. If any materials, design or installation work does not conform to the City standards, the City Representative may stop any further work and order the removal of unsatisfactory materials from the area.

### **1.5 TESTS**

The Developer shall, at no expense to the City, and as and when required by the City:

1. Supply test results, from an accredited testing company, of alkalinity and soil resistivity for determining abnormal soil conditions requiring special consideration for municipal reserve development, utility installation, storm sewers and water mains;
2. Supply samples of any materials proposed to be used or installed in any improvement under this Agreement, which samples shall be suitable for testing and visual inspection by an inspection and testing company under contract with the City.

### **1.6 WORK AND MATERIALS PAID BY THE OTHER PARTY**

The parties hereto shall, before doing any work or supplying any materials for which the other is required to pay, either in whole or in part, obtain the written authorization of the other party, and that party will authorize the work to proceed and the materials to be supplied at prices agreed upon by the City Representative and the Developer.

## **PART II**



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## PLANS

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### 2.1 CITY REQUIREMENTS

The Developer shall submit to the City Engineer for approval a copy of the specifications, plans and profiles, as required, showing all the work proposed to be done. Plans and profiles submitted by the developer shall conform to the City's requirements as to size, scale and symbols

#### PLAN LIST

1. Master Plan
2. Grading Plan
3. Landscape Features Plan including hardscaping
4. Planting Plan showing location, species, size and quantities
5. Details of landscape feature(s)
6. Seed mixture and rate of seeding and fertilizing – City Specifications
7. Sprinkler System Plan (Construction Drawing Format as per Item 2.4)
8. Erosion Control Plan

#### ALL DRAWINGS SHALL DISPLAY:

- a. Plan Number
- b. Scale
- c. North Arrow
- d. Sheet Title

### 2.2 FINAL DESIGN APPROVAL BY CITY REPRESENTATIVES

Copies of the plans and specifications as amended pursuant to the requirements of the City shall be supplied to the City Representative for final approval before any construction work will be authorized. The Developer shall ensure that all contractors employed by the Developer are provided with copies of the approved plans and specifications.

### 2.3 COMMENCING CONSTRUCTION

Prior to commencing construction, the Developer shall invite the City Engineer to the Pre-construction meeting as set out in the Field Services Guidelines for the purpose of providing the City Engineer with the proposed construction schedule for distribution to relevant City departments. Should the City Engineer not be available to attend the meeting the schedule will be distributed to the City Engineer by the Consulting Engineer immediately after the meeting.



## **2.4 CHANGE IN PLANS**

If, during the progress of the work, departures from the approved plans seem to be desirable, the Developer shall first submit a shop drawing (detailed plan showing the proposed changes) and receive the written approval of the City's Representative. Approval shall be given as soon as reasonably possible so as to not unduly delay the progress of the work. The approved change will be reflected in the final drawing (as-builts) submitted for record.

## **2.5 AS-BUILT DRAWINGS AND RECORDS**

The Developer shall supply the City Representative with as-built drawings in hard copy and digital formats prior to the Construction Completion Inspection. As-built plans will be reviewed and approved prior to issuance of the City of Lethbridge Substantial Completion Certificate. Plans are to be on Digital File Format, (Intergraph DGN or AutoCad DXF) delivered by e-mail. The plan shall conform to City of Lethbridge format requirements. (Location of all utilities and improvements as through survey and GPS technology)

## **2.6 COST OF PLANS**

The cost of preparing and supplying all plans and specifications referred to herein shall be considered part of the project and are cost shareable.

# **PART III**

## **STORM SEWERS, WATERMAINS AND ELECTRICAL UTILITIES**

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### **3.1 STORM SEWERS AT THE DEVELOPERS EXPENSE**

The Developer shall install and construct all storm sewers, complete with manholes, catch basins and catch basin leads and other accessories required to provide storm water removal for the Open Space

### **3.2 WATERMAINS AT THE DEVELOPERS EXPENSE**

The Developer shall construct and install all watermains complete with Valves, Hydrants, hydrant control valves, fittings and appurtenances required as per City of Lethbridge Standards to serve the Open Space including the irrigation system water service.

### **3.3 ELECTRICAL SERVICE AT THE DEVELOPERS EXPENSE**



Electrical service to the Open space must provide service to both the pump station and irrigation controllers as well as any other features that require electricity.

## **PART IV**

### **RESERVE SITES**

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#### **4.1 RESERVE SITES FOR USED FOR STORAGE**

If an area (or areas) is to be used for storage or other purposes by the Developer, or any Contractors employed by the Development Area, the Developer shall obtain permission from the City prior to use of the site. If use of the site is granted, the Developer shall, at no expense to the City, grade and loam the damaged area or areas of the Municipal Reserve or Reserves and return them to their original condition at the date specified by the City. No Municipal Reserve shall be used as a dumping site for waste material.

## **PART V**

### **INDEMNITY CLAUSES**

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#### **5.1 DEVELOPER TO INDEMNIFY CITY UNTIL ISSUANCE OF FINAL ACCEPTANCE CERTIFICATE**

The Developer agrees that the defined Development Area or Areas where the Developer is installing utilities and constructing improvements is a private Development Area and the Developer shall indemnify and save harmless the City from any and all claims, costs which may be brought against or incurred by the City by any person or persons for any injury, loss or damage occurring to any person or property which may result from any works or construction of the Developer from the date of commencement of construction to the date of approval of the Final Acceptance Certificate (whether or not the installations are along the boundaries or outside the actual Development Area).

#### **5.2 WORKS BY THE CITY**

The City acknowledges that the indemnifications contained in Clause 5.1 above shall not apply to any work done by the City, its Agents employees, or any Contractors working under Contract by the City in the Development Area.



## PART VI

### CONSTRUCTION COMPLETION CERTIFICATE

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#### 6.1 CONSTRUCTION COMPLETION CERTIFICATE

When all utilities and improvements are substantially complete the Developer shall request an inspection of the completed work. Prior to the inspection, the following criteria shall be met:

- Notice of a completed pre-inspection by the Consulting Engineer and Contractor
- Submission of Irrigation As-built drawings

The City's Representative shall cause an inspection to be made within thirty (30) days from date of receipt of request. The Developer will be notified of the results of the inspection as soon as possible thereafter.

If defects or deficiencies in the utility or improvements are apparent during the inspection, a report of the defects and deficiencies will be submitted to the City Engineer, Developer and Contractor. Upon correction of the items listed in this report, the Consulting Engineer shall submit a minimum of two (2) copies of the Construction Completion Certificate attached as Schedule "C", duly signed and sealed by the Developers Representative.

When the City Engineer is satisfied that all identified defects have been corrected, in accordance with the approved plans and applicable specifications, the City Representative shall sign the Construction Completion Certificate and shall indicate there on the date when the Developer shall be eligible to apply for a Final Acceptance Certificate.

**If the Developer is not advised of any deficiencies within thirty (30) days of receipt of the Certificate by the City Representative, the utility or improvement shall be deemed by the Developer to be completed. The warranty period shall therefore commence on the date of issuance of the Certificate or thirty (30) days after receipt of the Certificate by the City Engineer, if the Certificate is deemed to be issued.**

#### 6.2 CONDITIONS OF COMPLETION

The Developer understands and the parties hereto both agree that the improvements shall be considered "complete" when the Open Space has been developed to the level shown on the approved plans.

By December of the year the CCC was signed the City requests an itemized breakdown of the costs associated with the construction of the Park. This information will be kept confidential and is only for use in determining the fixed asset value.



**PART VII**  
**WARRANTY AND FINAL ACCEPTANCE**

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**7.1 DEVELOPER RESPONSIBILITIES DURING THE WARRANTY**

After the issuance of the Substantial Completion Certificate, the Developer shall be responsible for any and all repairs and replacements to any utilities and/or improvements that may become necessary from any cause whatever, up to the end of the warranty periods specified in the said Construction Completion Certificate.

**7.2 DEVELOPER TO REPAIR OR REPLACE**

If, during the construction and warranty period, any defects become apparent in any of the utilities and/or improvements installed or constructed under this Agreement and the City Engineer acting reasonably requires repair or replacements to be done, the Developer shall, within the time specified by the City Engineer, cause such repairs or replacements to be done. If the Developer defaults or an emergency exists, the City may do the repairs or replacement and recover the cost from the Developer.

**7.3 CONDITIONS OF FINAL ACCEPTANCE BY CITY**

The Developer also agrees that, until all his obligations have been met under the development agreement, the warranty will remain in effect. Failure to complete all obligations will result in the withholding of final acceptance by the City.

**7.4 FINAL ACCEPTANCE CERTIFICATE**

One (1) month prior to the expiration date of the warranty period of the improvements referred to in Clause 7.1 of this Agreement, the Developer and City of Lethbridge designate shall inspect each improvement and the Developer shall correct all defects and deficiencies, due to damage and other causes. Subsequent to the correction of the said defects and deficiencies, the Developer shall submit to the City's Representative two (2) copies of the Final Acceptance Certificate, attached as Schedule "D" duly signed and sealed by a Representative of Developer.

Prior to the expiration date of the warranty period as noted on the Construction Completion Certificate, for all of the utilities or improvements, the Developer and the Contractors shall inspect each utility or improvement. The Developer shall ensure that the Contractor corrects all defects and deficiencies. Subsequent to the correction of the said defects and deficiencies, the Developer shall make a request to the City Representative for Final Acceptance for the utility or improvement.

The City Representative shall cause an inspection to be made within thirty (30) days from the date of the request.



If defects or deficiencies in the utility or improvements are apparent during the inspection, a report of the defects and deficiencies will be submitted to the City Representative, Developer and Contractor by the Developers Representative. Upon correction of the items listed in this report, the Developers Representative shall submit a minimum of two (2) copies of the Final Acceptance Certificate attached as Schedule "D", duly signed and sealed by the Engineer on Record.

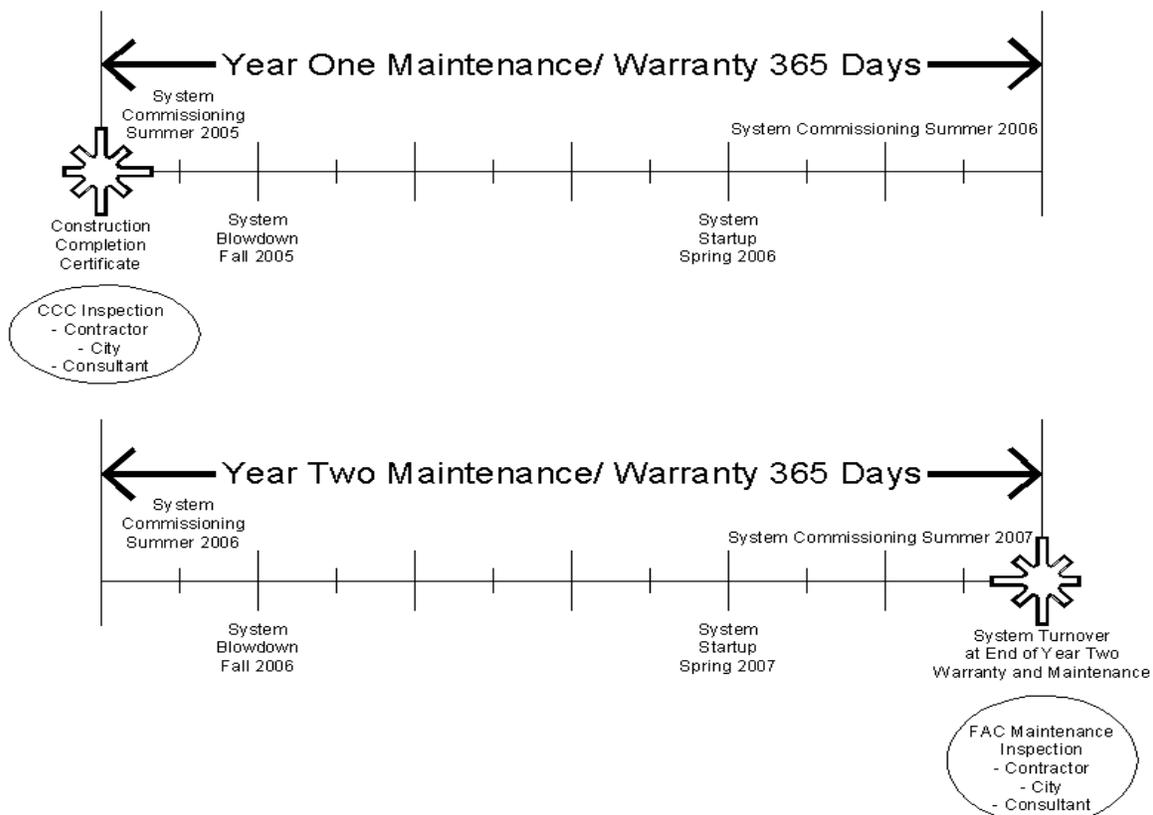
When the City Engineer is satisfied that all identified defects have been corrected, in accordance with the approved plans and applicable specifications, the City Engineer shall sign the Final Acceptance Certificate.

## 7.5 MAINTENANCE DURING THE WARRANTY PERIOD

The maintenance period will consist of two (2) complete growing seasons as per Schedule "C". The period will also include fall shut down of the park and consecutive spring startup.

The developer will be responsible for all costs associated with the operation of the park during the maintenance period until acceptance of the park by the City of Lethbridge. (Example: water, electrical and vandalism)

The maintenance will include all labour, equipment and materials required to maintain landscape development within the contract area and including, but not limited to, cleanup, pruning, weeding, fertilizing, weed and pest control including rodent and ungulates, watering of all plant materials and turf, grass cutting, routine maintenance and washing, weekly litter pickup, removal and disposal, winterizing all plant materials, equipment and the irrigation system, all in accordance with the project specifications and until a satisfactory Final Acceptance Certificate inspection has been conducted by the City of Lethbridge. Please see timeline below





**PART VIII**

**OPEN SPACE FUNDING AGREEMENT PROCESS**

**8.1 FUNDING PROCESS**

At the Outline Plan stage of community development the Developer approaches the City of Lethbridge Parks Department and proposes the park parcels within the development that are to be cost shared and which are to be developed to the minimum standards. If the park concepts meet the current City Standards then the Parks department agrees in principle to cost share.

At the time of Subdivision the Developer, in a joint effort with the Parks Planning Manager, creates and submits a park concept to the City. Once the concept is approved the Developer signs and submits the Open Space Agreement.

**8.2 THE DEVELOPER UNDERTAKES AND AGREES**

- a) To furnish all labour, material, and services together with all work incidental thereto necessary and required to perform all work described in the Contract documents, and shall forthwith, according to the instructions of the City, or such other persons as may be designated by the City, commence work and diligently perform the respective portions thereof, and deliver the said work to the City within the time specified therein.
- b) To do and fulfill everything indicated in the Agreement and the Contract documents.
- c) To complete the work on or before \_\_\_\_\_.

**8.3 THE CITY UNDERTAKES AND AGREES**

- a) To pay the Developer in Canadian funds for the performance of the Agreement. Payment to be pursuant to the Open Space Agreement Cost Share Plan A, attached hereto at Schedule "B".

LOCATION  
**PARK NAME**  
**LOT \*\* MR, BLOCK \*\*, PLAN \*\*\***  
**SE ¼ of Section \*\*, in Township \*\*, Range \*\*, West of the Fourth Meridian**

HECTARES  
**\*\* Hectares**

Payment  
**\$\*\*\*\*\***



- vi. Upon issuance of the Substantial Completion Certificate the City of Lethbridge agrees to pay the Developer 80% of the City's share of the total costs of the project. The final cost for the project to be supported by submission of a Certified Statement of expense to the City's Representative. The holdback amount will be 20% of the agreed price and will be released to the Developer after issuance of a Final Acceptance Certificate (FAC). FAC shall include copies of Statutory Declaration and Workman's Compensation Board (WCB) clearance
- b) The City may withhold on account of subsequently discovered evidence, the whole or part of the payment indicated in any Certificate to such an extent as may be necessary to protect the City from loss on account of:
  - i) Claims filed or reasonable evidence in the opinion of the City indicating probable filing of claims;
  - ii) Evidence of failure of the Developer to make payments properly to contractors for material, or for labour.

When the above conditions or situations are remedied to the satisfaction of the City, payment shall be made for the amounts withheld.

## **PART IX**

### **GENERAL MATTERS**

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#### **9.1 DEFAULT BY DEVELOPER**

Should the Developer fail to comply with a notice of default within ninety (90) days of posting the said notice to the Developer, the City shall have the right to terminate this Agreement. After termination of this Agreement, the City shall, at its sole option, have the right to complete the development. The City shall, however, be under no obligation to complete the above work.

#### **9.2 ARBITRATION**

In the case of any dispute between the parties hereto, with respect to any matter arising out of this Agreement, either party hereto shall give to the other notice of such dispute. Thereupon each party shall appoint an arbitrator, and they shall jointly select a third, and the decision of any two shall be final and binding upon the parties. Procedure shall conform to the Arbitration Act for the Province of Alberta. In case of failure of the two arbitrators appointed by the parties hereto to agree upon a third arbitrator, such arbitrator shall be appointed by a Judge of Court of Queens Bench of Alberta. The cost of arbitration shall be apportioned against the parties hereto, or against any one of them as the arbitration shall decide.



**9.3 AGREEMENT IS NOT A PERMIT**

This Agreement does not constitute a Development Permit or any other permit of the City. The Developer is responsible for obtaining all necessary permits.

**9.4 BINDING ON SUCCESSORS AND ASSIGNS**

The Developer shall not have the right to assign its interests in this Agreement without the consent, in writing, of the City which consent shall not be unreasonably withheld. This Agreement shall be binding upon all parties hereto and permitted assigns.

**9.5 AGREEMENT TO BE EFFECTIVE ONLY ON SIGNING BY BOTH PARTIES**

This Agreement shall not be in force or bind any of the parties hereto until executed by all the parties named herein.

**9.6 TIME**

Time shall be of the essence of this Agreement.



**IN WITNESS WHEREOF** the Developer and the City have caused to be hereto affixed their respective corporate seals, attested to by their respective proper officials in that behalf, the day and year first above written.

**CITY OF LETHBRIDGE**

\_\_\_\_\_  
**MAYOR**

\_\_\_\_\_  
**CITY CLERK**

\_\_\_\_\_  
**DEVELOPER NAME**  
**DEVELOPER**

**PER:** \_\_\_\_\_

**PER:** \_\_\_\_\_



**SCHEDULE A**

Overall Development Name - Park Name Open Space Area Plan 'A'



**SCHEDULE B**

Cost Share Plan 'A'



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## SECTION 8: ELECTRIC DISTRIBUTION

### 8.0 INTRODUCTION

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This section will cover the design standards of extensions to the Electric Distribution Network. These design standards include the civil and electrical distribution requirements for the extension of residential electric distribution.

#### 8.0.1 GENERAL

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This document, together with the Electric Utility Construction Standards, is intended to provide standards used by the Utility in addition to the Canadian Electrical Code (CEC) Part III (where applicable),

In all cases, the safety of the public and employees shall be taken into account when laying out the distribution extension. Professional judgment and sound engineering and construction practices shall govern.

##### *8.0.1.1 Bareland and Commercial Developments*

The provisions outlined in this document may not apply to bareland or commercial developments. The particulars of each development will be reviewed by the Electric Utility to identify any special requirements.

#### 8.0.2 LEVEL OF SERVICE OBJECTIVES

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The design standards outlined in this section will assist designers with standards that ensure the Electric Utility maintains a safe, reliable and cost effective system.

Material and construction standards also play an important role in maintaining the Utilities objectives and can be obtained from the City of Lethbridge Electric Utility.

Extensions to the electric distribution system will be designed and evaluated such that all customers, both existing and new, will not experience any lower level of service.

#### 8.0.3 REFERENCE STANDARDS

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- i. Canadian Electrical Code (CEC Part III where applicable)
- ii. City of Lethbridge Electric Utility Standards
- iii. Alberta Electrical Utility Code (AEUC)
- iv. City of Lethbridge Engineering Standards (Power Quality, Distributed Generation)



- v. City of Lethbridge Technical Terms and Conditions
- vi. Canadian Environmental Protection Act (Current edition)
- vii. Metering Guidelines
- viii. Alberta Common Ground Alliance Best Practices
- ix. CSA S250
- x. Alberta Safety Codes Act
- xi. Occupational Health Safety Codes Act

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## **8.1 ELECTRIC DISTRIBUTION PLANNING REQUIREMENTS**

See Section 2 for planning requirements.

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## **8.2 ENVIRONMENTAL CONSIDERATIONS**

Designs must take into account all current legislation. No polychlorinated biphenyls (PCB) materials or equipment, including light ballasts, shall be used.

Designers shall ensure provisions are adequate for the disposal of waste and other debris using approved containers. Under no circumstance shall waste be disposed of in trenches or pits.

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## **8.3 TECHNICAL REQUIREMENTS**

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### **8.3.1 VOLTAGE LIMITS**

The design shall take into account the service characteristics defined in the City of Lethbridge Technical Terms and Conditions for Distribution Wires Access and this document. Additional provisions may be adopted from time to time to ensure these standards are met or for special circumstances.

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### **8.3.2 MEDIUM VOLTAGE CIRCUITS**

All medium voltage systems are to be designed for loop feed. Where loop fed circuits cannot be completed because of phased development, it may be required to provide extra ducting for future loop feeds. Developments that span more than one year between phases may require temporary overhead or underground loop feeds be installed to ensure the integrity of the system.

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### **8.3.3 ALIGNMENTS, LOCATIONS AND CLEARANCES**

Line assignments for electric equipment in a street or avenue may be found in the City of Lethbridge Engineering Standards. All new development shall be street (front) serviced. The developer(s), at their expense, is responsible to provide easement where required. The City of Lethbridge's subdivision servicing – Investment Policy (DSP001) describes the Policy of the City of Lethbridge Electric Distribution utility for investing in subdivision developments. For details and the current City investment level see the latest



revision of The Investment Policy DSPool. The designer shall provide locations as soon as reasonably possible.

- i. Padmount transformers, pedestals, and streetlights are located at intersecting lot lines. A minimum of 1.0 m side clearance must be maintained for access.
- ii. Switching cubicle locations must have a 4.0 m operating clearance on the cubicle door sides and 1.0 m operating side clearance.
- iii. A minimum horizontal distance of 3.0m must be maintained between the electric centerline and water main and/or sewer centerlines.
- iv. A minimum horizontal distance of 2.0 m must be maintained between a power cable and a new tree installation.
- v. Pre-service lines on property shall extend through the utility right-of-way.
- vi. All pipelines and rail shall be done according to all relevant codes and standards as well as any additional requirements the pipeline/rail owner may have. All applications will be handled by the Electric Utility at the developers Expense.
- vii. In situations where variations may be required to these standards, prior written approval must be obtained from the Electric Utility.

#### ***8.3.3.1 Depth & Width***

- i. All cables shall be placed at a depth to the relevant LEU trench standards
- ii. In situations where variations may be required, prior written approval must be obtained from the Electric Utility.
- iii. The maximum trench width will be 1.5 meters for 4 Party Construction.

#### ***8.3.3.2 Grades***

The developed area to be serviced shall be graded to within 150 mm of final grade. Consultants shall indicate any changes to elevations proposed by the development if construction is to proceed prior to this requirement being met.

#### **8.3.4 JOINT CONSTRUCTION**

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The designer shall coordinate the design with all shallow utilities including Street Lighting. All 4 party installations shall be installed in a common trench. A conscious effort by all utilities shall be taken to reduce the number of pedestals.

#### **8.3.5 FEEDERS AND CABLES**

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### **8.3.5.1 Main Feeders**

These feeders consist of three-phase, loop-fed circuits. The underground cable used for these circuits is 15 kV, single conductor.

### **8.3.5.2 Distribution Circuits**

These feeders consist of three-phase and single phase, loop-fed circuits. The underground cable used for these circuits is 15 kV, single conductor.

### **8.3.5.3 Secondary Cables**

Secondary cables are fed from the transformers to pedestals and from pedestal to meter base using USEB cable. Secondary services shall be kept as short as possible and be designed to limit the voltage drop to less than three (3) percent. A 6 kVA load shall be used on a 100 amp service and 10 kVA on a 200 amp service for calculating voltage drop.

The default service size for all residential will be 200 amp. Under special circumstances, with the Electric Utilities approval and where justified, 100 amp service will be acceptable, i.e. smaller condominium sites.

## **8.3.6 TRANSFORMERS**

Doors and/or openings of transformers shall face the roadway. Clearances around transformers shall be as per all applicable standards in Section 8.0.3.

The following is the maximum number of single phase services that can be connected to a single phase transformer:

*Table 8.3.6.1 Single Phase Transformer*

<b>Transformer size</b>	<b>100 amp services</b>	<b>200 amp services</b>
<b>50 kVA</b>	15	10
<b>75 kVA</b>	25	15
<b>100 kVA</b>	N/A	20

## **8.3.7 ENCLOSURES**

All designs shall utilize joint use pedestals where possible. The maximum number of services shall be 7 single-phase services per pedestal, which must include any street light services.



### **8.3.8 GROUND GRIDS**

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Ground grids shall not be located under existing or proposed sidewalks, curbs, roadways, gas line right-of-ways, on private property, or other known structures. If such a conflict exists, the equipment shall be moved to allow the ground grid installation.

### **8.3.9 STREET LIGHTS**

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Where possible, streetlights shall not be installed together with transformers or pedestals.



## **SECTION 9: POST LOT DEVELOPMENT ISSUES**

### **9.0 INTRODUCTION**

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This section covers issues related to utility infrastructure constructed or installed after lot servicing takes place, including lot grading and sump pumps. This information is provided for information only, since the Alberta Building Code governs all construction within private property.

#### **9.0.1 GENERAL**

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The overall design principles described in the introduction to these standards are the basis on which all construction is undertaken in the City of Lethbridge. Often, a combination of principles will come into play when designing a particular component of the system.

#### **9.0.2 LEVEL OF SERVICE OBJECTIVES**

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Lot Grading and Drainage Control within the City of Lethbridge has evolved from the following needs:

- i. To reduce the amount of storm water inflow entering the Wastewater Collection System via foundation drains.
- ii. To ensure functional surface drainage to protect private property from flooding caused by stormwater runoff.

### **9.1 LOT GRADING AND DRAINAGE**

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#### **9.1.1 LOT GRADING DESIGN CRITERIA**

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Lot grading design is based upon the Overall Major (Overland) Drainage System Grading Plan prepared for a development area at the Outline Plan stage, and in conjunction with the Storm Water Management Plan for the area.

- i. The minimum Finish Grade Elevation at the building(s) for all lots adjacent to trapped lows is to be a minimum of 500mm above the 1:100 year ponding elevation for the trapped low.
- ii. Split-drainage is the recommended drainage arrangement for lots in the City of Lethbridge.
- iii. Lots can be dished out to a maximum of 0.5m below the highest finished lot grade elevation. The City would prefer the subgrade outside the building envelope drain away from the center of the lot.



- iv. Fixed grade control must be provided at the back of each lot. The grade control may take the following forms:
  - a. The finished lane for lots backing onto lanes.
  - b. A concrete swale for lots draining front to back, or having split drainage, except where the lots back onto a linear open space.
  - c. A fence or concrete grade beam for lots draining back to front.
- v. Positive swale drainage must be provided between lots that back onto each other. The swale must be concrete.
- vi. Design elevations must be provided at the following critical boundary locations on each lot:
  - a. All lot corners.
  - b. Points measured 8.0 m along the side property lines from the front property line.
  - c. Points measured 10.0 m along the side property lines from the back property line.
  - d. Any point along the property line where a grade change occurs.
- vii. The interior lot grading design must provide the following minimum slopes:
  - a. A 10% slope for the first 2.0 m away from the foundation. If the distance between the foundation and edge of lot is less than 2.0 m, the finish grade elevation must be a minimum of 150 mm above the edge of lot elevation.
  - b. After the first 2.0 m, the remainder of the lot is to slope at 2% to the edge of lot.
  - c. A 2% slope along sod (grassed) swales located on the common property line between lots.
  - d. A 0.6% slope along asphalt and concrete swales located on the common property lines between lots.
- viii. Interior lot grading will be constructed to the following tolerances (based on the approved design finish grade elevation = 0.0 m):
  - a. Clay grade                      -200 mm to -100 mm
  - b. Topsoil grade                   -100 mm to    0 mm
  - c. Sod or Grass grade           -50 mm to +50 mm
- ix. Reverse driveways are not permitted unless the runoff can be directed away from the structure and off the property in a controlled fashion.

### **9.1.2 LOT GRADING CONTROL**

Lot Grading Control Procedures have been developed by the City of Lethbridge, the Urban Development Institute, and the Lethbridge Home Builders Association in an attempt to control the vertical elevation and proper lot grading for buildings constructed in subdivisions.



Developers will be responsible for Lot Grade Control on Lots serviced after February 28th, 1994. The City will assign a portion of the Developers Letter of Credit (or an alternate form of credit acceptable to the City) as required by the subdivision Service Agreement as a performance bond for Lot Grade Control.

The Developer may obtain a security deposit from the Builder or Home Buyer to ensure Lot Grading is completed as per design.

The Developers Project Engineer provides the lot grading design to the City for approval. The Developers contractor then rough-grades the subdivision and constructs the underground utilities and surface features. After construction is complete, the Project Engineer then confirms any changes to the lot grading design and submits any changes to the City for approval.

The Developer provides the approved Lot Grading Design information to Builders, Home Designers, and Legal Surveyors. The Builders, Home Designers, and Legal Surveyors then prepare house and plot plans for submission to the Developer or his Representative for approval. The Builder will then submit the house and plot plans to the Development Services Department for approval.

All plot plans are required to be stamped with a Vertical Grade Control Stamp. This stamp is to ensure that the Vertical Grade Elevations placed on the plot plan are those grades approved by the Developers' Engineer and match with those elevations that have been approved for the development. It is the responsibility of the Builder to ensure that the building is constructed and the lot graded according to the specified elevations. Developers are required to arrange with the purchaser of the lot as to how the stamp is to be obtained.

### **9.1.3 DOWNSPOUT DISCHARGE**

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- i. It is recommended that downspouts discharge to a splash pad, or a surface of concrete or other impervious materials, that is positively graded to convey the runoff a minimum of 1.2 m horizontally away from the building and adjacent properties.
- ii. Splash pads are to be securely anchored to the foundation wall at the design finish grade elevation as per the Splash Pad Detail Drawing LG-1 in the City of Lethbridge Construction Specifications.
- iii. Except for commercial buildings, industrial buildings and multi-family apartment containing more than 6 units, downspouts and roof leaders shall not be connected directly to the storm sewer system but shall discharge to the surface of the ground and flow overland before entering the storm water system. Downspouts may not be connected to the Wastewater Collection (Sanitary Sewer) system by any means.



## 9.1.4 FOUNDATION DRAINAGE

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### ***9.1.4.1 Foundation Drainage (Weeping Tile) Requirements***

- i. The bottom of every exterior foundation wall shall be drained as per the Building and Plumbing Codes.
- ii. Foundation drains cannot be connected to the Wastewater Collection (Sanitary Sewer) system.

### ***9.1.4.2 Discharge of Foundation Drainage Water***

- i. All buildings are required to drain foundation water into a sump which, in turn, discharges the water to such sewers designated as *storm sewers* or *foundation drainage collectors*.
- ii. Sumps discharging to storm sewers or foundation drainage collectors shall be pumped to the main by a pressure service connection as per detail drawing *Sump with Pumped discharge to Storm Sewer or Foundation Drain Collector*, Detail Drawing LG-2 in the City of Lethbridge Construction Specifications.
- iii. Properties zoned for non-residential land uses and for medium and high density multi-family residential must retain runoff volumes in excess of the 1 in 5 year return period and up to a 1 in 100 year return period on site. The excess runoff control may take the form of parking lot, rooftop, or underground storage, as well as wet or dry ponds. Infrastructure Services shall approve runoff control designs.
- iv. Sump pump outlets and roof leaders shall discharge flows no closer than 1.0m from the property line. Where possible, drainage across property lines shall be spread to encourage sheet flow and reduce concentrated erosive flows.