



# Design Guidelines



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## Introduction

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The Design Requirements Manual provides information regarding the City of Lacombe's Standards governing the subdivision design, servicing standards, the design and construction approval process, and the as-constructed drawing submission requirements.

The primary focus of this document is to aid the Consulting Engineer in the preparation of Construction Drawings. It is the responsibility of the Consulting Engineer to ensure that the design conforms to these Requirements and to notify The City if any deviations from City Standards have been made.

The purpose of the City's review of Construction Drawings is to ensure that the Development is designed and constructed in general conformance with City Standards, such that upon acceptance of the Development by the City, the future public responsibilities for maintenance fall within normal and reasonable levels.

This Manual does not attempt to set rigid policies, but rather provides the Developer with a guide outlining The City's requirements. Where unusual or complicated design situations arise, good engineering judgment should prevail. The City reserves the right to require a deviation from these Requirements where conditions warrant same.

The Design Requirements are predominately for use in new areas. Slight modifications may be required in older areas (e.g. soft conversions of the imperial line assignments, right of way restrictions, etc.).

This Manual will be updated from time to time.

### CONTRACTUAL RELATIONSHIP

The contractual relationship of the Development Agreement is one between the City of Lacombe and the Developer. In matters of the Development Agreement the City will deal with the Developer only. As a courtesy to the Developer the City Engineer may work directly with the Developer's representatives if:

- The Developer approves the arrangement.
- The Engineer and the City representatives are able to work with the Developer's representatives in a cooperative and harmonious relationship.

The contractual relationship between the City, the Developer and the Consultant are detailed in Section 3 - Clause 2.1 of this document.

The following is an overview of the contents of each Section of this document:

### SECTION 1: GENERAL INFORMATION

Definitions, general Development Agreement information, Alberta Environmental Protection Act permits and approvals, information regarding Crossing, Proximity, Ground Disturbance and/or Encroachment Agreements, and information regarding subdivision signs.

## **SECTION 2: CONSTRUCTION DRAWING STANDARDS**

Requirements for the preparation and submission of construction drawings, as-constructed drawings, and building grade certificates. This section also includes the requirements for the preparation and submission of Digital As-constructed Plan Drawings.

## **SECTION 3: ENGINEERING SERVICES**

General requirements with respect to the services to be provided by a Consulting Engineer on behalf of the Developer, including sample Construction Completion Certificate (CCC) and Final Acceptance Certificate (FAC) inspection reports.

## **SECTION 4: OUTLINE PLAN**

General requirements for the preparation of an Outline Plan with respect to street classification and layout, noise study guidelines, traffic study guidelines, servicing boundaries and constraints, utility corridors, criteria for determining the area of a Neighbourhood (Central) School/Park site, etc.

## **SECTION 5: SERVICING STUDY**

Requirements for the preparation and approval of site grading, servicing and roadway design for the Outline Plan, and geotechnical report requirements.

## **SECTION 6: SITE CLEARING AND GRADING GUIDELINES**

Specific requirements for the design and implementation of the site clearing and grading.

## **SECTION 7: WATER DESIGN STANDARDS**

Specific requirements for the design of the water system, including fire protection requirements.

## **SECTION 8: SANITARY DESIGN STANDARDS**

Specific requirements for the design of the sanitary sewer system.

## **SECTION 9: STORM WATER MANAGEMENT STANDARDS**

Specific requirements for the design of the storm water system, including major drainage, minor drainage and detention/retention ponds.

## **SECTION 10: SERVICE CONNECTIONS STANDARDS**

Specific requirements for the design of the water, sanitary and storm service connections.

## **SECTION 11: GAS, POWER, TELEPHONE AND CABLE TELEVISION STANDARDS**

Basic information with respect to gas, power, telephone, and cable television services. Detailed information is available from each of the Utility Companies.

## **SECTION 12: ROADWAY DESIGN STANDARDS**

Specific information for the design of roadways and lanes, pavement marking and traffic control signs, post and cable fencing, emergency access, roadway landscaping, and driveways.

## **SECTION 13: LANDSCAPING STANDARDS**

Parks Department requirements with respect to development and landscaping of Municipal Reserves, Neighbourhood Park Sites, and Detention Ponds.

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## 1.0 General Information

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### 1 DEFINITIONS

Except where the context otherwise requires, the following expressions or words, when used in this document, shall have the following meanings:

- .1 **Chief Administrative Officer (CAO)** shall mean the Chief Administrative Officer, or an authorized representative of the City of Lacombe, as designated by the Chief Administrative Officer
- .2 **Construction Drawings** shall mean those Engineering Plans and Profiles prepared by the Consulting Engineer, showing the details of the installation of the various Municipal Improvements within the Development using standard engineering symbols and forms, and conforming to the Design Requirements.
- .3 **Construction Specifications** shall be the documents prepared by the Consulting Engineer specifying the legal, administrative, and technical aspects of the Municipal Improvements, all of which shall conform to the minimum requirements as outlined in The City's Design Requirements and The City's Detailed Contract Specifications.
- .4 **Consulting or Developer's Engineer** shall mean a Professional Engineer who is an authorized officer of a Consulting Engineering firm, retained by the Developer, who has designed the Municipal Improvements and/or supervised the installation of the same within the Development according to the approved plans and specifications.
- .5 **Contractor** shall mean the agent of the Developer responsible for the carrying out of the work as set out in the plans and specifications.
- .6 **Developer** shall mean the corporation or individual who is subdividing lands within the corporate boundaries of the City of Lacombe. The Developer is also the legal entity that enters into a Development Agreement with the City of Lacombe. For purposes of the Development Agreement the Developer's Engineers and Contractors are agents of the Developer.
- .7 **Development** shall mean the area to be serviced, as determined by the Developer.
- .8 **Development Agreement** shall be the document prepared by The City specifying legal, administrative, and technical requirements of the Developer for developing lands which shall become the responsibility of the City of Lacombe.
- .9 **Development Permit** shall be the document prepared by The City specifying legal, administrative, and technical requirements of the Developer for developing lands which shall not become the responsibility of the City of Lacombe.
- .10 **Engineer** shall mean the City's Engineering Services Manager, or an authorized representative of the City of Lacombe, as designated by the Chief Administrative Officer.



- .11 **Level One Landscaping** means the work included in preparing the site to specified grades, placing and levelling topsoil, seeding to grass, and establishing turf; all in accordance with the City's current Design Requirements and Standard Specifications.
- .12 **Level Two Landscaping** means the work included in planting shrubs, trees, or other plant amenities, all in accordance with the City's current Design Requirements and Standard Specifications.
- .13 **Level Three Landscaping** means the work included in supplying and installing various non-vegetative park facilities and/or amenities (e.g. Trails, trail directional signs, playground equipment, bollards, post and cable fencing, site furnishings, etc.), all in accordance with the City's current Design Requirements and Standard Specifications.
- .14 **Level Four Landscaping** means the work included in supplying and installing optional/enhanced amenities (e.g. Ornamental structures, sculptures, feature walls, water features, fountains, spray pools, enhanced plantings, etc.) all in accordance with the City's current Design Requirements and Standard Specifications.
- .15 **Municipal Improvements** shall mean all improvements within the Development, including, but not restricted to:
  - .1 paved roadways, including pavement marking;
  - .2 sidewalk, curb and gutter;
  - .3 paved or gravel lanes;
  - .4 water, sanitary, and storm sewer mains;
  - .5 water, sanitary, or storm service connections;
  - .6 shallow utilities, including electrical distribution (excluding service leads), street lighting, natural gas, telephone, and cable television;
  - .7 landscaped boulevards, medians, municipal reserves, and public utility lots;
  - .8 property line delineation (e.g. fencing, etc.);
  - .9 paved, concrete, and/or shale walkways;
  - .10 park and recreation amenities (e.g. playground equipment, benches, etc.); and;
  - .11 traffic control, street name, subdivision information (including updates) signs.
  - .12 supply of containers for the Sanitary Waste System (i.e. garbage bins)

- .16 **Professional Engineer** shall mean a licensed member of The Association of Professional Engineers, Geologists, and Geophysicists of Alberta or an equivalent Professional Engineers Society;
- .17 **TAC** refers to the Transportation Association of Canada.
- .18 **City** shall mean the City of Lacombe in the Province of Alberta.

## 2 DEVELOPMENT AGREEMENTS

### 2.1 General

The construction of Municipal Improvements within a subdivision is subject to the terms and conditions of a Development Agreement, including all financial, construction, maintenance, and security requirements of the Developer.

The sequence of development ('Phasing') is to be established within the Outline Plan. The Developer will then proceed with the Servicing Study, resolve any issues identified by the CAO, and receive approval for the Servicing Study. After this has occurred, the Municipality will enter into the Development Agreement with the Developer for the first phase of the development area. Included at the end of this Section, as Figure 1, is a flow chart that illustrates the Development Agreement process.

**Note: Development Agreements will not be issued until all Servicing Study issues, including clearing, topsoil stripping, site grading, erosion control measures and sediment control measures have been approved by the Engineer and copies of all relevant drawings and reports as listed in Section 5 have been provided to The City.**

Revisions to the Servicing Study must be provided if Outline Plan revisions (i.e. roadway realignment, land use revision, etc.) are approved. Further Development Agreements will not be issued until the revised Servicing Study drawings and/or reports are submitted and approved.

### 2.2 Development Agreement Processing Schedule

The time required to process a Development Agreement varies, depending on the number of approvals required, complexity of the Development, timely submission of documentation required for the calculation of costs, and other factors.

### 2.3 Power, Gas, Telephone and Cable TV Alignment and Utility Right of Way Approvals

The Developer is responsible for coordinating the location of the power, gas, telephone and cable TV, including obtaining alignment and utility right of way approvals.

Utility right of ways shall be kept to a minimum in subdivisions. In most instances, lanes are mandatory. If special conditions or design conditions exist which increase the merit of some laneless portions within the Subdivision, the Developer shall identify those conditions within the Outline Plan. Shallow utilities will be kept inside lanes; except as directed by the City.

Shallow utilities drawings shall be completed after a meeting chaired by Developer's Engineer with the City present to discuss.

Shallow Utility drawing requirements are included in Section 2 - Clause 3.10. **The location of the shallow utilities must be confirmed to ensure that all of the required utility right of ways are shown on the Utility Right of Way Plan before it is submitted to Land Titles for registration.** The Legal Plan and the Utility Right of Way Plan, together with the Utility Right of Way Agreements, are released for registration when the Development Agreement has been signed by Developer and the City. All rights of way are to be registered in the name of the City of Lacombe.

Shallow Utility drawing requirements are included in Section 2 - Clause 3.10. The procedure for the preparation, submission and approval of shallow utility alignments is included in Section 11.

The Developer, or the Developer's Consulting Engineer, should prepare a form letter, similar to the Sample Letter included as at the end of this Section, that could be signed by the Utility company representative.

## 2.4 Submissions

### .1 *Construction Drawings and Specifications*

The Developer shall provide the following information to the CAO for review prior to the request for a development agreement.

- .1 Construction Drawings conforming to the requirements of Section 2. The drawing review set shall include the Shallow Utilities Drawing showing all approved shallow utility alignments.
- .2 Construction Specifications meeting or exceeding the requirements of The City of Lacombe's Construction Specifications.
- .3 Geotechnical Report (three copies) providing the information listed in Section 5.

The initial review of the construction drawings will identify such cost items as cost recoveries for area, boundary and/or oversize improvements, revisions to drawings affecting pavement marking and signage costs, connections to existing mains, future cost recoveries, etc.

### .2 *Initial Development Agreement Submissions*

The Developer shall provide the following information to the CAO, along with their initial request for preparation of the Development Agreement.

- .1 Name and address of Developer,
- .2 Copy of Legal Plan (Scale 1:1000) showing the following information:
  - i Total subdivision area,
  - ii Legal description and area for each MR parcel,
  - iii Legal description and area of any non-developable lands (i.e. addition to any highway and/or arterial road right of ways, high pressure gas main right of way, power transmission right of way, environmental reserve parcels, etc.).
- .3 Letter outlining the Conditions of Subdivision, including any money due in place of reserve dedication. The land value for money in place of reserve dedication will be determined by the CAO.
- .4 Cost estimates for the following Municipal Improvements, when applicable:
  - i Cost estimates for the construction of all Municipal Improvements to be constructed by the Developer. All estimates are to include an allowance for Engineering and Contingencies,
  - ii Cost estimate for Pavement Marking and Signage,
  - iii Cost estimate for Connections to Existing Mains from the Public Works Department,
  - iv Municipal Improvement Cost Recoveries (Area, Boundary and/or Oversize improvement costs).

Note: Separate cost estimates must be provided if recoveries are to be paid to two or more previous Developers. Estimate to be based on as-constructed quantities and current contract prices.
  - v Cost estimate to construct Subdivision Entrance Sign(s),
  - vi Wall Surface Area and Estimated Construction Cost of any Sound Attenuation Walls,

- vii Cost estimate to construct Level Four Landscaping – Enhanced Amenities (i.e. decorative cairns, fencing on City Lands, etc.),
- viii Cost estimate to operate and maintain Level Four Landscaping – Enhanced Amenities, on an annual basis,
- ix The following information that will be used to calculate Storm water Retention (Wet) Pond maintenance costs:
  - .1 Permanent water surface area,
  - .2 Number of water fountains and/or any other aeration equipment,
  - .3 Source of make-up water.
- x Cost estimates for the construction of Trunk Main Facilities and/or Arterial roadways by the Developer on behalf of The City. Separate estimates for expressway and arterial roadway street lighting and pavement marking are to be provided, if applicable.
- xi Cost estimates for Future Municipal Improvement “Endeavour to Assist” Cost Recoveries (Area, Boundary and/or Oversize improvement costs).
- xii Power distribution and street lighting costs from the electrical company.

.3 *Final Development Agreement Submissions*

Following the review of the Draft Development Agreement, the Developer shall return the Draft Development Agreement with comments regarding errors and/or omissions, if any, and provide the following information to The City of Lacombe’s CAO.

- .1 Letters from the Shallow Utility Companies approving the proposed alignments and utility rights of way plan(s).
- .2 Letter from the Regional Fire Chief approving proposed hydrant locations, fire flows, and fire access.
- .3 Proposed Development Schedule,

Note: The proposed schedule should allow a minimum of 3 weeks following final development agreement submissions to allow for final document preparation, printing, submission of document to developer for signing, and return of documents by Developer.

- .4 Copy of the tentative legal plan.
- .5 Copy of each utility right of way plan.

- .6 Copies of the following Alberta Environmental Protection Act documents, submitted for the City's review and approval prior to submission to Alberta Environment:
  - i Copy of "Written Notification for Extension to a Waterworks, Wastewater or Storm Drainage System",
  - ii Copy of "Letter of Authorization for Storm Drainage Treatment Facilities", and /or
  - iii A copy of "Amendment to The City of Lacombe 's Wastewater and Storm Drainage Permit".

(See Clause 5 for additional information regarding the noted EPEA Documents)
- .7 Copies of applicable approved Crossing, Proximity, Ground Disturbance and/or Encroachment Agreements.
- .8 Water Distribution System Flushing Drawing approved and signed by the Engineer.
- .9 Electrical Servicing Plans conforming to the requirements of Section 11.
- .10 Pavement Marking and Signage Drawings approved and signed by the Engineer.
- .11 Landscape Drawings approved by the CAO.
- .12 Provide computer graphic files (in a form approved by the CAO) for tentative legal plans and approved overall construction drawings. The Drawing Submission Standards are outlined in Section 2.

## 2.5 Performance and Maintenance Security

The CAO shall determine security requirements in accordance with the Terms and Conditions of the Development Agreement.

## 2.6 Notice to Proceed with the Construction of Municipal Improvements

The CAO will issue a preliminary "Notice to Proceed" once the City has approved all applicable documents and signed the Development Agreement. **Approval to start construction is not permitted prior to the issuance of a "Notice to Proceed".**

The "Notice to Proceed" will not be issued until the Developer has completed the following:

- .1 *Sign, seal, and return the Development Agreement.*
- .2 *Pay the Developers required securities, deposits, and fees.*
- .3 *Provide an Original Irrevocable Letter of Credit in accordance with the Development Agreement.*

- .4 *Provide an Original Certificate of Insurance in accordance with the Development Agreement.*
- .5 *Two copies of the Development Agreement and the official "Notice to Proceed" will be sent to the Consultant once the Development Agreement has been signed by the City of Lacombe.*

### 3 COMMUNITY MAILBOXES

#### 3.1 General

The Consulting Engineer shall submit a copy of the Outline Plan and a copy of the current subdivision plan along with a request for mailbox locations to:

Delivery Planning  
Canada Post Prairie Region  
Suite 839, 1100 - 48 Avenue NE  
Calgary, Alberta T2E 9A9

#### 3.2 Location Criteria

Canada Post has prepared a document entitled "Postal Delivery Standards Manual, Planning for Postal Service" which is available at the following address:

Manager, Delivery Planning and Postal Code Management  
Address Management  
Suite N0813 – 2701 Riverside Drive  
Ottawa, Ontario K1A 0B1

The City of Lacombe will determine the final location of community mailboxes based on various criteria, including the affect upon the ratepayer who is immediately adjacent to the scheduled community mailbox location.

Upon receipt of the mailbox location plan from Canada Post, the Consulting Engineer shall ensure that the community mailbox locations conform to the requirements noted in the Postal Delivery Standards Manual and the following City of Lacombe criteria, wherever possible, and forward a copy of the proposed locations to the CAO for review and approval.

- .1 Along the flankage (side yard) of corner lots midway between the front and rear property lines.

**Note:** Canada Post will confirm the final location of the mailbox pad with the Developer and/or property owner prior to installation.

- .2 Next to an open space or playground.
- .3 On the predominantly homecoming side of the street, so that people can pick up their mail on the way home without crossing the street.
- .4 On the City boulevard, close to the sidewalk, to avoid creating grass areas that are difficult to cut.

- .5 Not along City major thoroughfares, since no parking is allowed on these roads.
- .6 Not closer than 10 m from a fire hydrant or bus stop.
- .7 Not closer than 2 m from streetlight standards, street name poles or any raised utility boxes such as a transformer.
- .8 The location of the boxes shall not impede the pedestrian and vehicular sight distances.
- .9 Community mailboxes are normally installed within public road rights of way. Multiple unit developments, such as townhouses or condominiums, may have the community mailboxes installed within the boundaries of said private development lands. The Developer must enter into a Delivery Services Agreement/License with Canada Post if this type of delivery is desired or required. The Developer should contact Canada Post for further information.

Once approval is received from the CAO, the Consulting Engineer shall advise Canada Post of the acceptability of the locations or suggest a revised location for consideration by Canada Post.

Following approval of the sites by both the City and Canada Post, the Developer shall prepare a dimensioned drawing, similar to the Building Grade Certificate Drawing, and forward it to the Delivery Planning Manager at the above noted address.

The community mailbox locations must also be shown on all applicable drawings and sales brochures.

#### **4 ALBERTA ENVIRONMENTAL PROTECTION - STANDARDS AND GUIDELINES FOR MUNICIPAL WATERWORKS, WASTEWATER, AND STORM DRAINAGE SYSTEMS IN ALBERTA**

The purpose of this publication is to provide Standards and Guidelines for Municipal Water Supply, Wastewater, and Storm water Drainage Systems in Alberta. Under the Environmental Protection Enhancement Act (EPEA), municipal water supply, wastewater, and storm water drainage systems must be designed to meet these Standards or to a standard required by the Director of Standards and Approvals.

The current edition of the above noted Standards is to be used in conjunction with the City's Design Requirements, and the minimum requirements of each must be met.

#### **5 ALBERTA ENVIRONMENT APPROVALS**

##### **5.1 General**

Construction of water distribution systems, wastewater collection systems and storm drainage systems, including major components, such as water pumping stations, water reservoirs, sewage lift stations, storm ponds, storm outfall structures, etc. require approval from Alberta Environmental Protection.



The following Acts govern construction activities:

- .1 Environmental Protection and Enhancement Act - Chapter E-12,
- .2 Water Act - Chapter W-3.

Alberta Environment has Codes of Practice for the operation of water, sanitary sewer and stormwater systems. Alberta Environment has also revised the notifications and approval procedures as noted in Clauses 5.2 and 5.3.

The following documents are to be submitted to Alberta Environment by the Developer once they have been reviewed and approved of in writing by the CAO:

- .1 Written Notification for Extension to a Waterworks, Wastewater or Storm Drainage System for extension to a waterworks, wastewater or storm drainage system,
- .2 A Letter of Authorization for an amendment to the City of Lacombe's Wastewater and Storm Drainage Permit.
- .3 Submission details are included in Clause 5.4 of this Section.

## 5.2 Wastewater and Storm Drainage Regulations 119/93

Wastewater and Storm Drainage Regulations 119/93 apply to the construction and operation of storm drainage treatment facilities.

"Storm drainage treatment facility", as defined in the Regulations, means any structure or thing used for the physical, chemical or biological treatment of storm drainage, and includes any of the storage or management facilities that buffer the effects of the peak runoff.

Note: The Regulations do not apply to stormwater treatment units installed upstream of a stormwater storage facility as these units are included in the Code of Practice for Wastewater (*Sanitary Sewer and Storm*) Collection Systems.

As specified in the Regulations, the Developer shall apply for a "**Letter of Authorization**" for the design and construction of storm drainage treatment facilities. A copy of the "Application for a Letter of Authorization for Storm Drainage Treatment Facilities" is appended to this Section.

The City of Lacombe will not allow construction to proceed until the required EPEA and/or Water Act approvals have been received.

## 5.3 Codes of Practice

The design and construction of water distribution systems, sanitary sewer collection systems and storm drainage systems is regulated by the following Codes of Practice:

*.1 Code of Practice for a Waterworks System Consisting Solely of a Waterworks Distribution System*

The above noted Code is made under the Environmental Protection and Enhancement Act, RSA 2000, c.E-12, as amended and the Environmental Protection and Enhancement (Miscellaneous) Regulation, AR 118/93, as amended.

The Waterworks Code states, in part, as follows:

*“3.1.3 In addition to the information required under the Act and the regulations, an application for a registration shall contain, at a minimum, the following information:*

- (a) written confirmation that the person applying for the registration has prepared, or caused to be prepared an operations program;*
- (b) engineering drawings signed and stamped by a professional engineer, for the proposed water distribution system or proposed changes to the water distribution system, including the design capacity of the proposed water distribution system or proposed change;*
- (c) a statement, signed and stamped by a professional engineer, indicating whether the design of the project complies with the design requirements of:
  - (i) this Code of Practice, and*
  - (ii) the regulations under the Act; and**
- (d) in cases in which a design requirement in clause (c) is not met, a statement, signed and stamped by a professional engineer, identifying and justifying the deviation.”*

*.2 Code of Practice for Wastewater (Storm Drainage and Sewage) Systems Consisting Solely of a Wastewater Collection System*

This above noted Code is made under the Environmental Protection and Enhancement Act, RSA 2000, c.E-12 and the Wastewater and Storm Drainage Regulation, A.R. 119/93.

The Wastewater Code states, in part, as follows:

*“3.1.1 An application for a registration of a wastewater collection system shall contain, at a minimum, all of the following information:*

- (a) engineering design drawings and specifications for the wastewater system, including the design capacity, stamped and signed by a professional engineer;*
- (b) for low pressure wastewater collection systems or vacuum wastewater collection systems, the written opinion of a professional engineer regarding*

*the adequacy of the design of the wastewater system, based, at a minimum, on the designed hydraulic capability of the wastewater system;*

- (c) *a statement, signed and sealed by a professional engineer:*
  - (i) *indicating whether the design of the project complies with all design requirements of this Code of Practice, and the regulations, and*
  - (ii) *in cases in which a design requirement is not met, identifying and justifying the deviation; and*
- (d) *any other information required by the Director in writing.”*

*.3 Water, Sanitary and Storm Code Submission Requirements*

As specified in the above noted Codes, the Developer shall submit a **“Written Notification for Extension to a Waterworks, Wastewater, or Storm Drainage System”** for the water distribution systems, sanitary sewer collection systems and storm drainage systems. A copy of the “Written Notification for Extension to a Waterworks, Wastewater, or Storm Drainage System” is appended to this Section.

Detailed submission procedures are included in Clause 5.4 of this Section.

*.4 Miscellaneous Codes of Practice*

The following Codes of Practice have specific submission and approval requirements. Copies of the Application Forms are appended to this Section.

- .1 Code of Practice for Outfall Structures on Water Bodies [made under the Water Act and the Water (Ministerial) Regulation],*
- .2 Code of Practice for Watercourse Crossings [made under the Water Act and Water (Ministerial) Regulation],*
- .3 Code of Practice for Pipelines and Telecommunications Lines Crossing Water Bodies [made under the Water Act and the Water (Ministerial) Regulation].*

*.5 Alberta Environment Web Site*

The various Acts, Regulations and Codes of Practice can be viewed and downloaded at the following website:

*[www.qp.gov.ab.ca/display\\_codes.cfm](http://www.qp.gov.ab.ca/display_codes.cfm)*

.6 *Water, Sanitary and Storm Code Submission Requirements*

As specified in the above noted Codes, once approval has been received from the CAO, the Developer shall submit a **“Written Notification for Extension to a Waterworks, Wastewater, or Storm Drainage System”** for the extension of water distribution systems, sanitary sewer collection systems and storm drainage systems. A copy of the **“Written Notification for Extension to a Waterworks, Wastewater, or Storm Drainage System”** is appended to this Section.

The City of Lacombe will not allow construction to proceed until copies of the required Code notices have been received and forwarded to Alberta Environment.

**5.4 Submission of Applicable Forms**

1 As noted in Clause 5.1, the Developer is responsible for submitting the following documentation to Alberta Environment once approval of same has been received in writing from the CAO:

- .1 Written Notification for Extension to a Waterworks, Wastewater or Storm Drainage System;
- .2 A Letter of Authorization for an amendment to the City of Lacombe’s Wastewater and Storm Drainage Permit.

.2 The following procedure is to be followed in this regard:

- .1 Submit a complete set of construction drawings to the City for review;

**Note: The City will not approve any construction drawings until all Servicing Study issues have been approved by the Engineer and copies of all relevant drawings and reports as listed in Section 5 have been provided to the City.**

- .2 Revise drawings, as required;
- .3 Resubmit revised “Issued For Review drawings;

Note: Place a signature block similar to the following example on the Cover Sheet of the Construction Drawing Set.

<b>City of Lacombe</b>	
<b>Construction Drawing Approval</b>	
These Construction Drawing have been reviewed and approved for construction of the noted Municipal Improvements.	
_____	_____
CAO	Date

- .4 Complete and submit the application letter (See Sample Application Letter) to the City; and
- .5 Submit the applicable “Written Notification for Extension to a Waterworks, Wastewater or Storm Drainage System” and/or “Letter of Authorization” form(s) to the City.
- .6 Provide an 11” x 17” (50% reduction) copy of the approved construction drawing set for submission to Alberta Environment.

## 6 CROSSING, PROXIMITY, GROUND DISTURBANCE AND ENCROACHMENT AGREEMENTS

### 6.1 General

A Crossing, Proximity, Ground Disturbance and/or Encroachment Agreement may be required if the Developer’s proposed work includes crossings of and/or construction activity adjacent to the following:

- .1 oil or gas pipelines,
- .2 overhead or underground telecommunications lines,
- .3 overhead or underground power lines,
- .4 creeks and rivers,
- .5 streets or highways,
- .6 railways, and/or
- .7 other registered rights of way.

The Developer will not be allowed to proceed with the construction of any Municipal Improvement until all approvals, if required, have been received and provided to The City for inclusion in the Development Agreement.

### 6.2 Application Preparation and Submission

The Developer shall be fully responsible for the preparation and submission of plans and application for a permit to the owners and/or proper authorities to obtain the necessary permission to enter upon, cross over, or construct under said facility or right of way.

The Developer shall be responsible for the payment of all application fees, advertising costs, extra costs, damage claims, and/or insurance costs related to the noted agreements.

The Developer shall also submit documentary evidence that such permits/approvals have been applied for at the time of his initial drawing submission to CAO.

Applications shall be prepared as specified by the various approving agencies. The applications shall be accompanied by the following:

- .1 A cover letter outlining the type of Agreement required (crossing, proximity, ground disturbance, and/or encroachment).
- .2 All applications will be made on behalf of The City of Lacombe by the Developer.
- .3 Three copies of drawings clearly marking in RED the location of the proposed crossing, proximity, ground disturbance, and/or encroachment. Plan/profile drawings are required for all crossings.
- .4 If an Encroachment Agreement is needed, then the applicant shall provide a current Certificate of Title.

### 6.3 High Pressure Gas Main Crossing

Wherever possible remove High Pressure Gas Main crossings in subdivisions. If this is not possible then where a permanent or temporary roadway or lane, water main, sanitary sewer main, and/or storm sewer main will cross a high pressure gas main right of way, the Developer will be required to obtain a Crossing Agreement prior to the start of construction.

## 7 ROAD CLOSURES AND DETOURS

### 7.1 General

The Developer must submit an application for a road closure or detour to the CAO at least three weeks prior to the start of any work.

The Developer will not be allowed to proceed with hauling across a roadway or the construction of any Municipal Improvement across a roadway until all approvals, if required, have been received.

The closure/detour must be advertised in the local paper at least 48 hours prior to the start of any work.

If deemed necessary by the CAO the Developer shall submit a Traffic Accommodation Plan to the CAO for approval. The Developer shall use the *Alberta Infrastructure and Transportation Traffic Accommodation Strategy Urban (or Rural if appropriate) Supplement* as a basis for this plan.

### 7.2 Application Preparation and Submission

The Developer shall be fully responsible for the preparation and submission of plans and application for a road closure/detour to the CAO to obtain the necessary permission to enter upon, cross over, or construct under said roadway.

The Developer shall be responsible for the payment of all application fees, advertising costs, extra costs, damage claims, and/or insurance costs related to the noted Agreement.  
surreptitiously secret

The application shall be prepared as follows:

- .1 A cover letter requesting approval to close all or part of a roadway.
- .2 Three copies of drawings clearly marking in **RED** the location of the proposed crossing or detour.

## **8 DEVELOPER'S SUBDIVISION SIGNS**

### **8.1 Subdivision Map Signs**

Subdivision Map Signs shall be installed on collector roadways at arterial/collector roadway intersections. The signs should show the total area that uses the same prefix letter (i.e. English Estates -one ¼ Section), or an area as designated and approved by the CAO. Subdivision maps (or revisions to same) shall conform to City of Lacombe's standards.

### **8.2 General Information Signs**

General Information Signs shall be installed near the entrance to each new phase of Development, indicating where the public may obtain information related to:

- .1 the existing and proposed subdivision development,
- .2 information regarding proposed school location and construction,
- .3 information regarding the Neighbourhood Park Site, and
- .4 any other amenities that would be of interest to prospective homeowners.

### **8.3 Detention Pond Warning Signs**

Detention Pond Warning Signs shall be installed near the boundary of the detention pond site indicating where the public may obtain information related to the detention pond operation.

Sign locations shall be shown on the Engineering Drawings.

### **8.4 Street Name Signs**

Streets name signs shall conform to City of Lacombe's standards.

### 8.5 Subdivision Entrance Signs

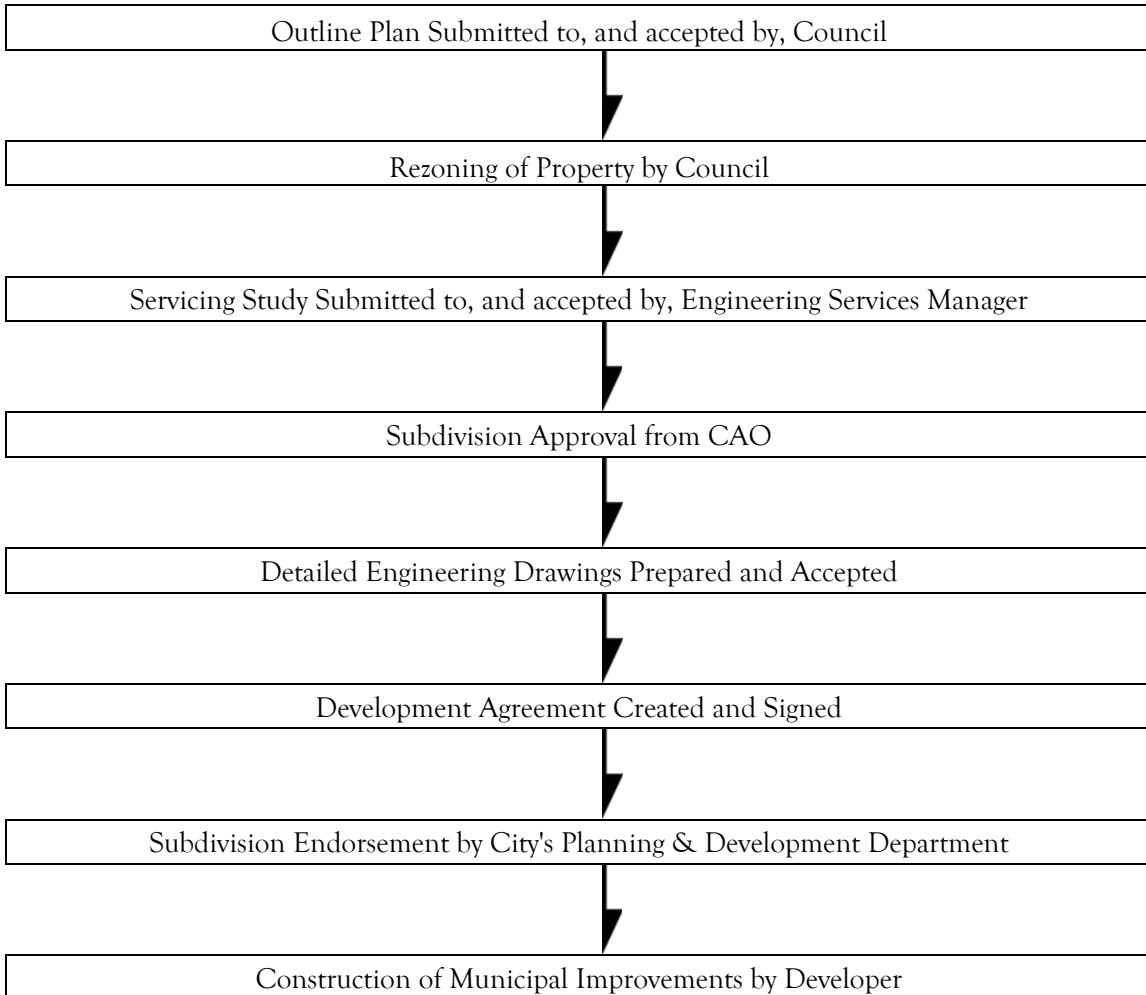
When a Developer proposes to construct entrance signs to identify the new community, the following design criteria is to be used:

- .1 The proposed entrance sign should be located on public property (e.g. municipal reserve, roadway boulevard, etc.).
- .2 A Development Permit **is not** required for the construction of any entrance signs. Entrance signs shall be included in a Development Agreement. The location of any entrance sign must be reviewed and approved by the Engineer.



FIGURE 1

DEVELOPMENT AGREEMENT PROCESS



### SAMPLE APPLICATION LETTER

**Date**

\_\_\_\_\_, (Developer or Developers Engineer)

(Company Name)

(Street Address)

(City, Province, Postal Code)

Dear Sir:

**Re: Application for Letter of Authorization for the Stormwater Drainage Treatment Facilities or Storm Outfall – Permit Number 1091,**

**AND/OR**

**Notification For Extension to a Waterworks, Wastewater, or Storm Drainage System – Permit Numbers 1091 and 1092**

For [Name of Developer]

[Name of Subdivision] Phase [00]

In [ne] ¼ Section [18] - 38 - 27 - W4 in The City of Lacombe

Please accept this letter on behalf of [Name of Developer, if letter is prepared by Developers Engineer] for the above noted project. The following outlines the requested project information.

1.	Owner's Name:	"Name of Developer"
2.	Project Name:	"Subdivision Name and Phase Number"
3.	Project Type:	Construction of water mains, sanitary sewer mains, storm sewer mains, and service connections.
4.	Confirmation of endorsement by City of Lacombe CAO	Letter of Endorsement by CAO is attached.
5.	Construction Schedule:	Construction on this project is proposed to start on _____ and to be complete by _____.

Enclosed please find approved plans for the proposed construction and signed originals of the "Application for Letter of Authorization for the Stormwater Drainage Treatment Facilities or Storm Outfall" and/or "Notification For Extension to a Waterworks, Wastewater, or Storm Drainage System".

*If applicable, add the following sentence:*

[Please note that this project does not comply with all of the Standards and Guidelines. Attached to the application is a detailed description of the deviation and, in our opinion, why the deviation is necessary.]

Yours truly,

[Consultant], P. Eng.

XX/yy

Encl.

**SAMPLE APPLICATION LETTER**

Date

\_\_\_\_\_, P. Eng. Regional Engineer  
Alberta Environmental Protection  
Environmental Protection Services  
Parkland Region  
3<sup>rd</sup> Floor, Provincial Building  
4920-51 Street  
Red Deer, AB T4N 6K8

Dear Sir:

**Re: Submission of Written Notification for Extension to a Waterworks, Wastewater or Storm Drainage System – Permit Numbers 1091 and 1092, AND/OR Application for Letter of Authorization for the Stormwater Drainage Treatment Facilities and/or Storm Outfall – Permit Number 1091**  
**For [Name of Developer]**  
**[Name of Consultant]**  
**[Name of Subdivision] Phase [00]**  
**In [ne] ¼ Section [18] - 38 - 27 - W4 in The City of Lacombe**

Please accept this letter on behalf of the City of Lacombe for the above noted project.

**A. Submission of Written Notification for Extension to a Waterworks, Wastewater or Storm Drainage System – Permit Numbers 1091 and 1092**

The City has reviewed and approved the attached construction drawing for the above noted project. Attached is a copy of their signed endorsement. We hereby confirm that the related water distribution system, wastewater (sanitary sewer) collection system and/or the stormwater drainage system construction will not exceed the design capacity of the distribution and collection systems or the capacity of the treatment facilities.

**B. Application for Letter of Authorization for the Stormwater Drainage Treatment Facilities and/or Storm Outfall – Permit Number 1091**

The City has reviewed and approved the attached construction drawing for the above noted project. Attached is a copy of their signed endorsement. We hereby confirm that the related stormwater management storage facility construction will not exceed the design capacity of the downstream stormwater minor system and receiving water body.

**C. Summary**

Enclosed please find the following:

- a. Copy of submission letter to the City of Lacombe prepared by the above noted Consultant;

- b. Copy of “Written Notification for Extension to a Waterworks, Wastewater or Storm Drainage System” signed by the above noted Consultant.
- c. Copy of “Application for a Letter of Authorization for Storm Drainage Treatment Facilities” signed by the above noted Consultant.
- d. Plans of the proposed construction approved by the City of Lacombe.
- e. Letter of endorsement of this project from the City of Lacombe.

Yours truly,

[\_\_\_\_\_,  
[Consulting Engineers name and title]

XX/yy  
Encl.

- c. CAO, City of Lacombe

**HIGH PRESSURE GAS MAIN CROSSING APPLICATION**

Date

Land and Permits, Crossings  
ATCO Gas Limited  
10035-105 Street  
Edmonton, AB T5J 2V6

Dear Sir:

**Re: Permit to Cross High Pressure Gas Main**  
**Location Description**  
**Quarter Section Legal Description in the City of Lacombe, Alberta**

In accordance with the conditions of Master facility Crossing Agreement MAA 109, we are hereby forwarding on behalf of the City of Lacombe for your approval, plans and profiles for crossing and/or working adjacent to the high pressure gas main at the location shown on the attached drawings.

We propose to start construction in the vicinity of the high pressure gas main on or about "DATE".

If any additional information is required regarding this application, please call " \_\_\_\_\_  
\_\_\_\_\_ " at 403- \_\_\_\_\_.

Yours truly,

Project Engineer

Encl.

**SAMPLE UTILITY ALIGNMENT  
AND  
UTILITY RIGHT OF WAY APPROVAL LETTER**

Company Address

Attention: Name of Company Representative

Re: Approval of Natural Gas, Power, Cable Television and/or Telephone Alignments and Utility Right of Ways For "Name of Development"

Attached is a copy of the Shallow Utility Drawing No. \_\_\_\_ showing the power distribution, streetlighting, gas, telephone and cable television alignments and utility right of ways for the above noted development. Please review the drawing for any errors and/or omissions. Please contact \_\_\_\_\_ at (403) \_\_\_\_\_ at your earliest convenience if you have any questions or comments in regards to the information provided.

Please sign a copy of this letter in the space provided if the alignments and utility right of ways for your facilities are shown correctly. If we have not received a reply to this letter by \_\_\_\_\_ (4 weeks from date of letter), we will assume that the alignments and utility right of ways are correctly shown on the Drawings and advise the City of Lacombe accordingly.

Thank you.

John Doe, P. Eng.

XX/yy

Att.

We have reviewed the drawing and hereby approve the alignments and utility right of ways provided for "Name of Company".

Name of Company Representative: (Please Print)	Signed by:	Date
---	------------	------

**NOTIFICATION FOR EXTENSION  
TO A WATERWORKS, WASTEWATER, OR STORM DRAINAGE SYSTEM**

Project Name \_\_\_\_\_

Location \_\_\_\_\_

Municipality \_\_\_\_\_

I acknowledge that I have reviewed the *Standards and Guidelines for Municipal Waterworks, Wastewater, and Storm Drainage Systems*, December 1997, and certify that the design of the above noted project complies with all of the requirements specified for the construction of the water distribution, wastewater collection and storm drainage systems.

SIGNED AND STAMPED by a professional engineer.  
NAME  
COMPANY

Designs that are found to not be in accordance with the Standards and Guidelines may result in enforcement action and/or referral to APEGGA.

For projects that do not comply with all of the Standards and Guidelines please submit a detailed explanation of the deficiency and why it is, in your professional opinion, necessary. The City of Lacombe's CAO must endorse any such non-compliance in writing. Note that projects that do not comply with all of the Standards and Guidelines will require a Letter of Authorization.



**APPLICATION FOR A LETTER OF AUTHORIZATION  
FOR  
STORM DRAINAGE TREATMENT FACILITIES**

**Project Name** \_\_\_\_\_

**Location** \_\_\_\_\_

**Municipality** \_\_\_\_\_

I acknowledge that I have reviewed the *Standards and Guidelines for Municipal Waterworks, Wastewater, and Storm Drainage Systems*, December 1997, as well as the *Stormwater Management Guidelines for the Province of Alberta*, January 1999 and certify that the design of the above noted project complies with all of the requirements specified for the construction of the stormwater management facilities.

SIGNED AND STAMPED by a professional engineer.

NAME

COMPANY

Designs that are found to not be in accordance with the Standards and Guidelines may result in enforcement action and/or referral to APEGGA.

For projects that do not comply with all of the Standards and Guidelines please submit a detailed explanation of the deficiency and why it is, in your professional opinion, necessary. The City of Lacombe's CAO must endorse any such non-compliance in writing.

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## 2.0 Construction and As-Constructed Drawing Standards

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### 1 GENERAL

This Section lists the requirements for the preparation and submission of Construction Drawings, As-constructed Drawings, Building Grade Certificates and Digital As-constructed Drawing Standards.

All drawings shall conform to the general standards noted in this Section. The Construction Drawings shall generally illustrate the information listed in Clauses 2, 3 and 4 of this Section. Specific design standards, requirements, and recommendations are provided in the following Sections:

- Section 6 - Site Clearing and Grading Guidelines
- Section 7 - Water Design Standards
- Section 8 - Sanitary Design Standards
- Section 9 - Storm water Management Drainage Systems
- Section 10 - Service Connections Standards
- Section 11 - Gas, Power, Telephone, and Cable Television Standards
- Section 12 - Roadway Design Standards
- Section 13 - Landscaping Standards
- Appendix G - Erosion and Sediment Control Measures

### 2 GENERAL CONSTRUCTION DRAWING REQUIREMENTS

#### 2.1 General

- .1 Individual Plan Drawings are to be prepared for each Municipal Improvement being constructed. The preparation of individual drawings is a requirement for the submission of "As-constructed" Drawings as noted in Clause 8 of this Section.
- .2 Street names (or unique identifiers if names have not yet been approved) shall be shown on all drawings for reference purposes.
- .3 The "Limits of Construction" shall be shown on all Plan Drawings.

## 2.2 Sheet Size

Drawing sheet sizes to be as follows:

- .1 560 mm x 864 mm (A1) preferred
- .2 610 mm x 914 mm acceptable
- .3 707 mm x 1000 mm (B1) acceptable

## 2.3 Sheet Material

Construction drawings are to be submitted using bond or vellum media.

## 2.4 Title Block

Title blocks shall be placed along the right side or bottom of the drawing.

## 2.5 North Arrow

Place the north arrow in the upper right-hand corner of sheet. The drawing should be oriented such that north faces the top of the sheet.

## 2.6 Dimensions

All dimensions on drawings are to be in SI metric units.

## 2.7 Lettering

The lettering is to be an engineering style font. Vertical lettering should represent existing information and slanted lettering for proposed information. Discretion is to be used in selection of lettering size and line weight. Plotted lettering size should be readable at a scale of 1:1000. Line weight and/or line type should differentiate between existing and proposed construction.

## 2.8 Legend

Symbols used in the legend are to be consistent throughout the entire drawing set. Standard drawing blocks are to be used whenever possible.

## 2.9 Drawing Scale

The following scales are to be used for the preparation of the construction Drawings. Exceptions will be noted for specific drawings.

- .1 A scale of 1:1000, 1:750, or 1:500 should be used for all Plan Drawings



### 2.10 Digital Drawing Format

- .1 All digital submissions, including as-built drawing sets, are to be in an editable format approved by the CAO. Unless otherwise specified, this shall mean an AutoCAD '\*.dwg' format file of the latest version of AutoCAD.

## 3 PLAN CONSTRUCTION DRAWING REQUIREMENTS

### 3.1 Cover Sheet(s)

- .1 Name of subdivision or project,
- .2 Names of Developer and Consulting Engineer (Logos optional),
- .3 City map showing project location; scale 1:25,000,
- .4 Index plan showing street names and limits of each Plan/Profile Drawing,
- .5 List of drawings.

### 3.2 Clearing and Grading Drawing(s)

- .1 *General Drawing Requirements*

Drawings must identify, at a minimum, the following items:

- .1 The owners of all lands adjacent to, or within, the clearing and grading area,
- .2 Intended clearing and grading on adjacent lands, including details of edge conditions, back sloping requirements, and areas where topsoil is to be placed and/or seeded until natural conditions are restored,
- .3 Show Phase boundaries: indicate the area expected to be developed during the current year and the type of soil stabilization and erosion control proposed for areas to be developed in following years,
- .4 Any unusual site conditions,
- .5 Existing utility rights of way (easements),
- .6 Existing survey control stations and markers,
- .7 Existing ground contours,
- .8 Proposed ground contours,
- .9 Test hole locations and original ground elevations at test hole location,
- .10 Natural features, identifying those that are to be preserved and/or removed,

- .11 Details and locations of topsoil stockpiles; including height, width, length and volumes,
- .12 Details and locations of buried topsoil stockpiles or disposal sites (i.e. ‘Snakepits’); including depth, width, length and anticipated settlement,
- .13 Location and size of all existing (e.g. water, sanitary sewers, storm sewers, gas, electrical, etc.),
- .14 The means by which all storm water in and from the subject lands will be controlled and disposed of, including:
  - i How drainage from its natural route(s) will be controlled.
  - ii What erosion and sediment control measures are to be installed.
- .15 Location of barrier fence around perimeter of current development area.

.2 *Cut/Fill Plans*

- .1 Cut/Fill Plans showing cut/fill design elevations and depth of cut or fill are required for all clearing and grading projects. Recommended grid spacing is 15 m x 15 m, maximum grid is 20 m x 20 m.
- .2 Areas with fills > 1.0 metre are to be highlighted on the drawing(s).

**3.3 Roads, Lanes, and Walkways Drawing**

Drawings must identify, at a minimum, the following items:

- .1 Street and/or Lane Name (e.g. Lane “A”),
- .2 Cross-section designation (e.g. 15-10 Local Roadway),
- .3 Carriageway widths (Face of curb to face of curb),
- .4 Sidewalk and/or curb type and width,
- .5 Boulevard widths,
- .6 Roadway Vertical Point of Intersection (V.P.I.) elevations,
- .7 Roadway centre line distance and grade between V.P.I.’s,
- .8 Direction of flow along roadways,

- .9 Vertical curve information (length and mid-ordinate difference in elevation),
- .10 Centreline and face of curb curve data (radius, length of curve, tangent length and deflection angle),
- .11 Face of curb radii for all curb returns (general note acceptable),
- .12 Lane and Public Utility Lot Point of Intersection (P.I.) elevations,
- .13 Lane and Public Utility Lot distance and property line grade between P.I.'s,
- .14 Direction of flow along lanes and utility lots,
- .15 Catchbasin manholes and catchbasins, including type and identification number,
- .16 Erosion and sedimentation control measures,
- .17 Reinforced lane and/or driveway crossings,
- .18 Location of Paraplegic ramps,
- .19 Berms complete with top and toe of berm grades,
- .20 Temporary access roads and/or turnarounds,
- .21 Walkways, including bollard locations,
- .22 Typical cross sections for all roadway designations,
- .23 Subdivision Entrance Signs,

### **3.4 Pavement Marking and Signage Drawing**

Drawings must identify, at a minimum, the following items:

- .1 Traffic Signs,
- .2 Pavement Markings,
- .3 Street Name Identification Signs,
- .4 Subdivision Information Signs,
- .5 Subdivision Map Sign,
- .6 Detention Pond Warning Signs.

**Note:** Place a signature block similar to the following example on the Traffic Control and Signage Drawing.

<b>The City of Lacombe</b>	
<b>Traffic Control and Subdivision Sign Approval</b>	
Pavement Markings	
Traffic Control Signage	
Street Name Signs	
_____	_____
CAO	Date
Subdivision Information Signs	
Subdivision Map Sign	
Detention Pond Warning Signs	
_____	_____
CAO	Date

**3.5 Water Distribution Drawing**

- .1 Invert elevation at all P.I.'s,
- .2 Distance, pipe size, pipe material (general note acceptable), and grade between P.I.'s,
- .3 Main alignments,
- .4 Hydrants and hydrant identification numbers,
- .5 Valves and valve identification numbers,
- .6 Fittings
- .7 Pipe size and material of existing system being tied into

**3.6 Water Distribution Disinfection and Flushing Drawing**

- .1 Show proposed sequence of flushing, including valve opening and closing sequence,



.2

.3 Show receiving sanitary sewer.

**Note:** Place a signature block similar to the following example on the Disinfection and Flushing drawing.

<b>The City of Lacombe</b>	
<b>Disinfection and Flushing Drawing Approval</b>	
_____	_____
CAO	Date

### 3.7 Sanitary Sewer Drawing

Drawings must identify, at a minimum, the following items:

- .1 Invert and rim elevation at all manholes,
- .2 Distance, pipe size, pipe material (general note acceptable), and grade between manholes,
- .3 Main alignments,
- .4 Direction of pipe flow,
- .5 Manholes and manhole identification numbers,
- .6 Identify Drop Manholes (interior/exterior).

### 3.8 Storm Sewer Drawing A - Major/Overland System

This drawing should be prepared at a scale of 1:2000 (copy of Servicing Study Storm Drawing) and show the entire drainage area, not just the immediate development phase. This information is available from the City of Lacombe upon request. The drawing must also identify, at a minimum, the following:

- .1 Phase/Project boundary,
- .2 Major drainage routes on development lands, as well as how drainage patterns on adjacent lands will be affected by, and protected during, the proposed development,
- .3 Location, maximum depth, and volume of trapped lows,

- .4 Minor drainage catchment areas,
- .5 Minor drainage main alignments,
- .6 If applicable, a Stage, Area, Volume and Discharge Table as described in Section 5 - Clause 3.7.6.

### 3.9 Storm Sewer Drawing B – Minor/Piped System

Drawings must identify, at a minimum, the following items:

- .1 Invert elevation at all manholes,
- .2 Distance, pipe size, pipe material (general note acceptable), and grade between manholes,
- .3 Main alignments,
- .4 Direction of pipe flow,
- .5 Manholes, catchbasin manholes, and manhole identification numbers,
- .6 Catchbasin type and identification numbers,
- .7 Catchbasin leads,
- .8 Detention Ponds, including contours, perimeter drainage facilities, outline of playing field (if applicable), etc.
- .9 Erosion and sedimentation control measures,
- .10 Stormwater Treatment Facilities.

### 3.10 Shallow Utilities Drawing

Drawings must identify, at a minimum, the following items:

- .1 All utility rights of way (easements). Shallow utilities shall be in a 4 party joint use system located adjacent to the street or front lot property line.
- .2 Alignments for all shallow utilities including power, telephone, cable television, and gas,
- .3 Location of transformers, switch gear, URD boxes, and streetlights, telephone facilities and cable television facilities (e.g. pedestals, cabinets, etc.),
- .4 Location of Community mailboxes,

### 3.11 Building Grade Drawing

- .1 The Building Grade Drawing shall be drawn at a scale of 1:500 or 1:750 to better illustrate all of the requested information,

Drawings must identify, at a minimum, the following items:

- .2 Legal description (Lot and block number) for each parcel of land,
- .3 Civic (Municipal) Address for each parcel of land,
- .4 Back of walk elevations at lot lines,
- .5 Lane/public utility lot elevations at lot lines,
- .6 Service locations and invert elevations,
- .7 Identify lots with storm service services,
- .8 Recommended lowest top of footing elevation,
- .9 Recommended ground (landscape) elevation at house,
- .10 Location of power, telephone, and television service,
- .11 Location of gas service
- .12 Location of hydrants, streetlights, transformers, switch gear cubicles, URD's, telephone pedestals, and cable television pedestals, and any other above ground installations required for servicing,
- .13 Indication of areas where depth of fill exceeds 1.0 m (bearing certificates required).

### 3.12 Landscape Drawing

Drawings must identify, at a minimum, the following items:

- .1 Show all municipal reserves, berms, parks, roadway boulevards, utility lots, and buffers, including grades where appropriate,
- .2 Show all existing and proposed Municipal Improvements located within and/or adjacent to the site,
- .3 Show existing vegetation to be retained, topography, and encumbrances,
- .4 Show adjacent land uses and roads,

- .5 Show proposed layout of park, school and recreational facilities including playgrounds, baseball diamonds, sports fields, buildings, pathways, rinks, tennis courts, etc., including appropriate grades,
- .6 Show conceptual tree and shrub planting,
- .7 Streetlights, mailboxes, and other street furniture, etc.,
- .8 All fencing shall be shown and detailed (General Note acceptable) on drawings.

**Note:** Place a signature block similar to the following example on the Landscape Drawing.

<b>The City of Lacombe</b>	
<b>Landscape Design Approval</b>	
_____	_____
CAO	Date

## 4 PLAN PROFILE CONSTRUCTION DRAWING REQUIREMENTS

### 4.1 General

The Plan Profile Drawing is divided into three parts, two plan views and one profile view.

### 4.2 Top Plan View – Surface Improvements

The following information related to surface improvements should be illustrated in the top plan view:

- .1 Street and/or Lane Name (e.g. Lane “A”),
- .2 Cross-section designation (e.g. 15-10 Local Roadway),
- .3 Carriageway widths (Face of Curb to Face of Curb),
- .4 Sidewalk and/or curb type and width,
- .5 Boulevard widths,
- .6 Roadway P.I. elevations,
- .7 Roadway centre line distance and grade between P.I.’s,
- .8 Direction of flow along roadways,
- .9 Vertical curve information (length and mid-ordinate difference in elevation),
- .10 Centreline curve data (radius, length of curve, tangent length and deflection angle),
- .11 Face of curb radii, including all curb returns,
- .12 Lip of Gutter (L.O.G.)/Edge of Pavement (E.O.P.) grades and elevations at the following locations:
  - .1 Vertical Points of Intersection (V.P.I.’s),
  - .2 Beginning of Vertical Curves (B.V.C.’s) and End of Vertical Curves (E.V.C.’s),
  - .3 Beginning of Horizontal Curves (B.H.C.), Point of Curve to Curve (P.C.C.’s) and End of Horizontal Curves (E.H.C.’s),
  - .4 Beginning (B.V.C.), Midpoint (M.P.) and End (E.V.C.) for all curb returns,
- .13 Location and rim elevation of any catch basins.
- .14 Lip of gutter grades for all curbs,

- .15 Curb return grades,
- .16 Lane and Public Utility Lot P.I. elevations,
- .17 Lane and Public Utility Lot distance and property line grade between P.I.'s,
- .18 Direction of flow along lanes and utility lots,
- .19 Catchbasin manholes and catchbasins, including type and identification number,
- .20 Reinforced lane and/or driveway crossings,
- .21 Paraplegic ramps,
- .22 Berms complete with top and toe of berm grades,
- .23 Temporary access roads and/or turnarounds,
- .24 Walkways, including bollard locations,
- .25 Reference drawing number(s) for adjacent sheets.

#### **4.3 Bottom Plan View – Underground Utilities**

The following information related to underground utilities should be illustrated in the bottom plan view:

- .1 Property lines,
- .2 Main sizes, lengths, and alignments,
- .3 Hydrant locations and identification numbers,
- .4 Valve locations and identification numbers,
- .5 Fitting sizes and locations,
- .6 Manhole and catch basin locations and identification numbers,
- .7 Catch basin lead sizes, materials, lengths, and alignment,
- .8 Direction of flow (storm and sanitary mains).

#### **4.4 Profile View**

The profile view should illustrate the following road and utility information:

- .1 Stationing for road, lane and/or utility lot centre lines,

- .2 Vertical and horizontal point of intersection (P.I.) elevations for utility mains and surface improvements,
- .3 invert and obverts of all pipes,
- .4 Length and grade between P.I.'s for utility mains and surface improvements,
- .5 Vertical curve information, if applicable,
- .6 Vertical alignments of manholes, valves, and hydrants,
- .7 Hydrant flange elevations,
- .8 Manhole rim and invert elevations,
- .9 Utility main lengths, sizes, materials, and gradients.

## 5 SUBMISSION OF PROPOSED CONSTRUCTION DRAWINGS

### 5.1 General

Three complete hard copy sets and, if requested one digital copy, of Preliminary Construction Drawings, including the Shallow Utility and Building Grade Drawings, shall be submitted to the Engineering Services Department for review and approval.

Upon receiving approval of the Preliminary Construction Drawings, the Consulting Engineer shall submit the following:

- .1 Three sets of the corrected Construction Drawings marked "Issued for Construction".
  - .1 *Digital copy of the entire set of corrected construction drawings, including Plan/Profiles, in DWG format (i.e. AutoCAD file) if requested by the CAO.*

### 1.2 Power, Gas, Telephone and Cable TV Alignment Approvals

A copy of the detailed Shallow Utility Plan is to be forwarded to each utility company for approval of their alignments. Following a review of their alignments, each utility company is required to submit an approval letter for inclusion in the Development Agreement. See Section 11 for additional information.

## 6 CHANGES (REVISIONS) TO APPROVED CONSTRUCTION DRAWINGS

The Approved Construction Drawings form an integral part of the Development Agreement between the Developer and The City.

The Consulting Engineer shall submit revised Construction Drawings (hard copies as well as updated digital files) if significant design changes are made following approval and submission of the Construction Drawings and execution of the Development Agreement. Changes include, but are

not limited to, revisions to drainage boundaries, pipe sizes, pipe or roadway grades, roadway cross-sections, pavement structures and/or other significant changes. All changes shall be identified on the original Approved Construction Drawings by crossing out the original information and adding the revised information (similar to the method used for preparing “As-constructed” Drawings). A new drawing must be submitted if significant changes are being made.

The CAO must approve any significant changes to the Approved Construction Drawing.

## 7 AS-CONSTRUCTED SUBMISSIONS

### 7.1 General Requirements for As-constructed Submissions

The Developer shall submit hard copy and digital as-constructed drawings and information as outlined in this clause.

Digital files of As-constructed Plan View Drawings must be submitted in a current AutoCAD format as specified by the CAO:

#### .1 *As-constructed Submission Timelines*

- ± As-constructed information for each applicable Municipal Improvement shall be submitted prior to the Developer requesting a CCC inspection for said Municipal Improvement.

#### .2 *CCC As-constructed Digital Submissions*

Submission of as-constructed information at the time of major CCC applications will include, but not be limited to, the following:

##### .1 Digital files of As-Constructed Drawings for:

- i Water, sanitary and storm utility,
- ii Concrete work and gravel/paved roadways,
- iii Pavement Marking and traffic control signage,
- iv Gravel and/or paved lanes,
- v Landscaping, including trail grades

- .2 Hard copies of all plan view as-constructed drawings for the associated utility and road / lane CCC application. These drawings may be printed on vellum, bond, or Mylar media.

#### .3 *Hard Copy As-constructed Submissions*



Mylar as-constructed drawings for all improvements, to form a complete drawing set, must be submitted at the time of FAC application. If Mylar hardcopy drawings have been previously submitted and accepted they will not be required for re-submission at this stage.

The hardcopy drawings should be professionally stamped, signed, and dated to indicate as-constructed information. All original information shall be crossed out and the as-constructed data written adjacent to the original information (a.k.a: red lining).

The City will not process or release any further CCC's or FAC's and/or security reductions if any of the above staged conditions have not been meet.

## 7.2 Site Clearing and Grading

Drawings must identify, at a minimum, the following items:

- .1 Extent of encroachment into adjacent lands for backsloping or other purposes, if applicable,
- .2 Existing ground contours prior to topsoil stripping,
- .3 Test hole locations and original ground elevations,
- .4 As-constructed ground contours,
- .5 Details of topsoil stockpiles; include location, height, width, length and volumes,
- .6 Cut/Fill as-constructed elevations and depth of cut or fill,
- .7 Areas with fills greater than 1.0 metre are to be highlighted on the drawing(s),
- .8 Areas used as borrow pits, or where fill is primarily material not suitable for structural bearing (i.e. material with high organics), such as 'snakepits',

## 7.3 Roadways

Drawings must identify, at a minimum, the following items:

- .1 Roadway As-constructed Drawings are to be submitted on completion of all concrete work. As-constructed elevations are to be provided at the Lip of Gutter (L.O.G.)/Edge of Pavement (E.O.P.) at the following locations and shown on the **Plan/Profile** as-constructed mylars (red lining) to confirm the as-constructed centreline grade as shown on the **Plan Drawings**:
  - .1 Vertical Points of Intersection (V.P.I.'s). (The as-constructed elevation at a vertical point of intersection on a vertical curve is to be the existing pavement elevation plus or minus mid-ordinate distance (M) to theoretical vertical point of intersection),

- .2 Beginning of Vertical Curves (B.V.C.'s) and End of Vertical Curves (E.V.C.'s),
- .3 Beginning of Horizontal Curves (B.H.C.), Point of Curve to Curve (P.C.C.'s) and End of Horizontal Curves (E.H.C.'s),
- .4 Beginning (B.V.C.), Midpoint (M.P.) and End (E.V.C.) for all curb returns,
- .5 Location and rim elevation of any catch basins.

Grade and elevation changes must be noted if the difference from design to as-constructed is greater than 10 mm.

- .2 Spot elevation checks should be completed following paving to verify grades, V.P.I. elevations and slope.
- .3 Confirm all centreline and face of curb (F.O.C.) radii.
- .4 Revisions to type of sidewalk and/or curb and gutter installed.
- .5 Revisions to pavement cross-section, including location of filter fabric.
- .6 Revisions to pavement markings.

#### 7.4 Lanes and Public Utility Lots

Drawings must identify, at a minimum, the following items:

- .1 Spot elevation checks should be completed following lane construction to verify grades, V.P.I. elevations and slope.

#### 7.5 Utilities

Drawings must identify, at a minimum, the following items:

- .1 Revisions to lengths, grades, invert elevations, alignments, and locations of vertical points of intersection for sanitary, storm, and water mains.
- .2 All hydrants, valves, fittings, manholes, catch basins, and other appurtenances shall be noted and dimensioned in two directions. Also note rim and invert elevations of manholes and catch basins and flange elevations of hydrants.
- .3 As-constructed invert of water, sanitary, and storm service stubs at property/easement line.
- .4 Location of water, sanitary, storm services, and curb stops dimensioned in two directions.

## 7.6 Building Grade Plan

Drawings must identify, at a minimum, the following items:

- .1 Revised lowest top of footing elevation (based on the higher of as-constructed sanitary or storm inverts, plus 0.85 m for lane/utility lot servicing or 0.70 m for street servicing).
- .2 Revised Back of Walk (B.O.W.) and Lane/PUL elevations if variance from design is greater than 10mm as determined in Clauses 3.3.
- .3 Complete a Service Location Report for each serviced lot.

## 7.7 Subdivision Entrance Signs

- .1 Detailed Construction Drawings of the sign(s) are to be provided. These drawing will be used for the future maintenance and repair of the Entrance Signs.
- .2 The footprint of the Subdivision Entrance Signs is to be shown on all as-constructed plan drawings to identify any conflicts with underground utilities and roadway site triangles.

## 7.8 Building Grade Certificates/Building Permits

### .1 *General*

Prior to the issuance of a Construction Completion Certificate for Underground Utilities (water, sanitary and/or storm), the Developer shall provide to The City the relevant Building Grade Certificates for each lot in the Development.

As outlined in of the Development Agreement, Building Permits will not be released until all of the conditions outlined in the Development Agreement are met.

### .2 *Building Grade Information*

The following information shall be shown on the Building Grade Certificate:

- .1 Water, sanitary, and/or storm services location and inverts,
- .2 Power, gas, telephone, and cable television service location,
- .3 Sidewalk and boulevard width,
- .4 Utility rights of way (easements),
- .5 Lot corner surface elevations,
- .6 Landscape elevation at front and rear of house,
- .7 Lot drainage pattern,

- .8 Streetlights, hydrants, transformers, telephone and/or cable television pedestals, and any other surface improvements.

#### 7.9 Completion Date

- .1 The month and year of completion of construction shall be shown on each Plan for both underground utilities and surface improvements.

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## 3.0 Engineering Services Requirements

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### 1 GENERAL

This Section describes the Engineering Services to be provided by a Consulting Engineer relative to the construction, installation, and inspection of Municipal Improvements as listed in a Development Agreement for private development projects and in an Engineering Agreement for City Projects.

The Consulting Engineer is expected to provide a professional level of inspection services culminating with the signing of the certification statement in the Construction Completion Certificate and Final Acceptance Certificate.

It shall be the responsibility of the Consulting Engineer to determine if inspections and/or testing in excess of the levels specified in the Contract Specifications are necessary, and to so advise the Developer and the CAO.

### 2 CONSULTING ENGINEER/CITY RELATIONSHIP

#### 2.1 Private Developments

There is no direct contractual relationship between the Consulting Engineer and the City for private development Projects. However, as the Consulting Engineer is the authorized representative of the Developer, the CAO has the right to request that the Developer, through the Consulting Engineer, correct deficiencies as the CAO observes them. It is understood and agreed that the Developer is and shall remain responsible to the City for full and proper performance of all obligations and Work included in the Development Agreement.

The CAO may, as specified in the Development Agreement, stop the construction and installation of the Work.

Should the Developer for any reason not fulfill the obligations of the Development Agreement, abandon the Project, not complete the works, or elect not to correct the deficiencies identified by the CAO or the Consulting Engineer, the Consulting Engineer shall not be held responsible to complete the Project. In order to complete the obligations of the Development Agreement, the City recognizes the advantages of utilizing the same Consulting Engineer and may, at its option, give priority to the said Consulting Engineer where practical.

#### 2.2 City Developments/Projects

For City Developments and Projects, there is a direct contractual relationship between the Consulting Engineer and the City as defined in an Engineering Agreement.

Any directions to the Consulting Engineer shall be as specified in the Engineering Agreement. Any directions to the Contractor will be as specified in the Contract.

### 3 DOCUMENTS AND SCHEDULES

- .1 The Consulting Engineer, prior to commencement of construction, shall be completely familiar with:
  - .1 The City of Lacombe Design Requirements.
  - .2 The City of Lacombe Contract Specifications.
  - .3 The Development Agreement for the Project.
  - .4 The Area Structure Plan.
  - .5 The Outline Plan.
  - .6 The Engineering Agreement (for City Projects).
  - .7 The City of Lacombe's Trail/Sidewalk Development Plan.
  - .8 The Municipal Development Plan for the City of Lacombe.
- .2 The Consulting Engineer shall notify the CAO when and where all Work, construction, and maintenance on underground utilities, overland drainage facilities, parks, and other surface improvements are to be performed and shall advise the CAO of all changes to the Work schedule.
- .3 Notification by the Consulting Engineer shall be by letter or fax [(403)782-5655] at least 48 hours prior to commencing construction (re-notification is required after 48 hours of construction inactivity), excluding Saturdays, Sundays, and Holidays. The notification shall include the following information:
  - .1 Name of Developer.
  - .2 Subdivision Name and Phase Number.
  - .3 Type of work to be performed (utility, subgrade, concrete structures, gravel placement, parks development, landscaping, etc.).
  - .4 Type of inspections to be performed (utility, subgrade, concrete structures, gravel placement, parks development, landscaping, etc.).
  - .5 Start-up date and time.
  - .6 Contractor's name, Superintendent's name, and phone numbers.

#### 4 PRE-CONSTRUCTION AND SITE MEETINGS

- .1 The Consulting Engineer shall schedule and attend a pre-construction site meeting with the Contractor(s) and the CAO, which meeting shall address work progress, schedule, coordination items, and safety issues as applicable.
- .2 The Consulting Engineer shall schedule regular site meetings with the Contractor and the CAO as the work is in progress for the purpose of addressing ongoing coordination items as applicable and shall maintain recorded minutes of these meetings.
- .3 The Consulting Engineer shall supply the following documentation to the CAO in a timely manner:
  - .1 Minutes of the pre-construction site meeting.
  - .2 Minutes of the site meetings.
  - .3 A copy of the Contractor's proposed schedule.
  - .4 Current copies of safety manuals from all contractors who will be performing all or part of the Work.
  - .5 Copies of change orders as applicable.

#### 5 DOCUMENTATION

##### 5.1 General

The Consulting Engineer shall prepare Construction Completion Certificates and Final Acceptance Certificates as required and have any maintenance deficiency items dealt with expeditiously.

Construction Completion and Final Acceptance Certificates for private developments are to be submitted as detailed in the Development Agreement. Copies of the Certificates are available from The City of Lacombe.

##### 5.2 Reporting of Deficiencies by the CAO

Any deficiencies observed by the CAO during construction are to be brought to the attention of the Developer and the Consulting Engineer as they are observed, in writing, as soon as possible. The Consulting Engineer will notify the CAO within a maximum 48 hour period, excepting weekends and holidays, when and how the deficiency is to be corrected.

##### 5.3 Materials Compliance

All materials supplied and installed shall be new and in good condition and shall comply in all respects to The City of Lacombe Construction Specifications.

If the Contractor proposes to use materials not approved in the current Contract Specifications, the Developer shall retain the services of an accredited testing company to conduct material compliance testing.

The Consulting Engineer shall obtain the certified results of tests conducted for submission to and approval by the CAO.

The Contractor will not be permitted to install any material not approved by the CAO.

#### 5.4 Recommended Testing Frequencies

The following is a summary table of the recommended testing frequencies on all construction projects in the City of Lacombe.

Test	Minimum Test Frequency
<b>Backfill Soil</b>	
Standard Proctor	1 per material type
Trench Field Densities - Moisture content backfill material	2 tests per 600 mm of depth per 100 m of trench
<b>Road Base/Subbase/Subgrade</b>	
Standard Proctor/Sieve for Granular	1 per material type
Field Densities - Grading Fill	1 test per 250 m <sup>3</sup>
Field Densities - Subgrade Preparation	1 test per 1000 m <sup>2</sup>
Field Densities - Subbase	1 test per 3000 m <sup>2</sup>
Field Densities - Base	1 test per 1000 m <sup>2</sup>
<b>Asphalt</b>	
Field Marshall	1 test per 1000 m <sup>2</sup>
Cores	1 core per 1000 m <sup>2</sup>



## 6 CONSTRUCTION INSPECTION

### 6.1 General

Inspections shall be carried out by the Consulting Engineer to ensure conformance with the Contract Specifications and Drawings.

Inspectors are required to be on-site during all phases of construction. The CAO has the ability to specify otherwise, as needed.

The CAO shall be given a minimum of 48 hours notice when requesting a joint inspection with the Consulting Engineer and/or Contractor.

Failure to notify the CAO may require all work to be exposed for an inspection at the Contractor's expense.

### 6.2 Inspection Check Lists

Appended at the end of this Section are Construction Inspection Checklists for various construction activities. The Check Lists provide an overview of the work to be completed by a Site Inspector in conjunction with the Work specified on the Drawings and in the Contract Specifications.

The checklists are not intended to be a complete comprehensive list, but rather are to be used as a general guideline by the Consulting Engineer prior to and during construction of the various Municipal Improvements.

Project specific requirements of the Drawings and Specifications will require additional inspections and shall take precedence over any comment included in the Check Lists.

## 7 POST CONSTRUCTION SERVICES

### 7.1 Activity Prior To Issuance of a Construction Completion Certificate

- .1 The Developers Engineer shall inspect the work with the contractor, record any deficiencies, and advise the contractor to repair any deficiencies. After the Contractor has repaired the deficiencies, the Developers Engineer shall arrange for a joint inspection with the Contractor and the Citys CAO.
- .2 As per the Development Agreement there will be three Construction Completion Certificate for each complete phase. Construction Completion Certificates will be separated into three categories: Underground Utilities, Surface Improvements, and Landscaping.
- .3 The Construction Completion Certificate applications shall be accompanied by the following documentation. Each submission will be treated as a package. All documentation must be present in the package prior to consideration by the CAO.

- .1 Underground Utilities
  - i Letter documenting completion of successful water pressure testing, flushing, and disinfections (copy of Bacteriological Water Sample Report to be submitted with Construction Completion Certificate).
  - ii As-constructed drawing.
  - iii Copy of video inspection log reporting deficiencies and corrective action taken.
  - iv Exfiltration and Infiltration testing on sanitary mains shall be done unless directed otherwise by CAO.
  - v Geotechnical testing results (i.e. trench compaction).
  - vi Concrete testing and quality assurance results – manholes, thrust blocks etc.
- .2 Surface Improvements
  - i As-constructed drawing.
  - ii Letter of compliance covering compaction and materials testing.
  - iii Documentation of any deficiencies, which will have payment reductions as per the Contract Specifications.
- .3 Landscaping
  - i As-constructed drawing.
  - ii Letter from the Parks Manager stating that the vegetation is sufficiently established.

## **7.2 Activity Subsequent to Issuance of a Construction Completion Certificate**

The Consulting Engineer shall conduct periodic checks of the subdivision during the maintenance period and note any failures, settlements, or other deficiencies in the Work, as well as respond to any “complaint” calls forwarded by The City. Complaints that are not dealt with promptly will be rectified by the City of Lacombe, at the Developers expense.

## **7.3 Activity Prior to Issuance of a Final Acceptance Certificate**

Prior to the submission of the Final Acceptance Certificate, the Consulting Engineer and the Contractor shall conduct an inspection of the Work, record, and repair all deficiencies.

Once all deficiencies have been corrected, the Consulting Engineer shall request a joint inspection with the Contractor and the CAO of the Works referred to in the Final Acceptance Certificate.

The CAO shall prepare a list of the deficiencies, if further deficiencies are noted, and submit the list to the Consulting Engineer.

When the additional deficiencies have been corrected, the Consulting Engineer shall then, within a reasonable period of time, request from the CAO, a re-inspection for only the inspection of deficient items.

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## 4.0 Outline Plan

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### 1 GENERAL

Developers are responsible for preparing a detailed Outline Plan as a pre-condition for subdivisions of larger land areas (i.e. quarter section).

The following matters must be considered when preparing the Outline Plan:

- .1 Area Structure Plan.
- .2 Municipal Development Plan
- .3 Natural, historical, and constructed features.
- .4 Existing Outline Plans that may impact, or be impacted by, the Development.
- .5 Shallow utilities shall be installed in a 4 party joint use trench utilizing as narrow an easement as possible. The easement shall be located in, or adjacent to, a lane. If this is not possible, then the easement shall be located adjacent to the street.
- .6 Street classification and layout. In accordance with City of Lacombe policy, lanes shall be present unless approved otherwise by City.
- .7 Oil wells, gas wells and pipelines.
- .8 Traffic, rail, industrial, and/or commercial noise generators.
- .9 Traffic volume, capacity, and control.
- .10 Servicing boundaries, capacities, and constraints.
- .11 Drainage routing and detention.
- .12 Erosion and sediment control.
- .13 Municipal Reserve parcels.
- .14 Development phasing.
- .15 Subdivision entrance signs.
- .16 Enhanced subdivision amenities.
- .17 Trails/Sidewalk Development Plan.
- .18 Surrounding Land Uses.

## 2 AREA STRUCTURE PLAN (ASP)

The Area Structure Plan is a generalized plan covering several quarter sections of land. As a minimum, the following items shall be identified on the ASP:

- .1 Arterial, collector, and local roadways.
- .2 General land uses, proposed neighbourhood and area commercial sites, industrial land uses, etc.
- .3 Proposed Public and Separate Schools (K - 9, middle school, high school, etc.)
- .4 Neighbourhood park sites, environmental reserves, natural features, linear parks.
- .5 Sidewalks, trails, or biking paths connecting neighbourhoods.
- .6 Large stormwater detention/retention sites.

## 3 PHYSICAL FEATURES OF THE SITE

When preparing the Outline Plan, careful consideration should be given to the following:

- .1 Soil and groundwater conditions.
- .2 Topography and major drainage routes. Careful consideration must be given to stormwater management. The City of Lacombe is committed to sustainable development, and encourages all developers to implement stormwater best management practices, as outlined in the International Stormwater BMP Database (<http://bmpdatabase.org>)
- .3 Natural features such as rivers, creeks, wooded areas, wetlands, etc. that are to be preserved and incorporated in the design. Such natural features must be considered when preparing the Outline Plan.
- .4 Man-made features such as highways, railways, major power lines and substations, high pressure gas mains and regulating stations, telecommunications facilities (e.g. fibre optics alignments), etc.
- .5 Environmental concerns such as contaminated soil or well sites.

## 4 LANE VERSUS LANELESS SUBDIVISIONS

In general, The City of Lacombe is in favour of subdivisions that have rear lanes.

Laneless subdivisions are acceptable for areas backing onto park, recreation or school sites, or backing onto major arterial roadways. There may also be small areas of land where a laned subdivision is not practical or feasible. A laneless subdivision is not recommended where the lots are

narrow or where lots are placed back to back. The side yard on one side of the dwelling unit may have to be increased in width to allow for vehicle access to the rear yard in laneless subdivisions.

## 5 STREET CLASSIFICATION AND LAYOUT

### 5.1 General

Street systems incorporate several types of roadways, each with its own particular design standards. This section will provide alignment information for the following road classifications:

- .1 Provincial Highway,
- .2 Arterial Street (Divided)
- .3 Arterial Street (Undivided)
- .4 Industrial Major Street
- .5 Primary Collector (Divided)
- .6 Primary Collector (Undivided)
- .7 Residential Collector
- .8 Local Residential Street
- .9 Industrial or Local Street
- .10 Rear Lane

Classification of the street system must be undertaken during subdivision design (commencing with the area structure plan), in order that the necessary right of way requirements can be established and approved by The City.

### 5.2 Road Characteristics

#### .1 *General*

In an ideal road system, lanes connect with locals, locals with collectors, collectors with arterial roadways, and arterial roadways with highways.

It is preferable to minimize the interconnection of lanes with collectors, locals with arterial roadways, and of collector roadways with highways. Local roadways rarely, if ever, connect with highways. Such applications are strongly discouraged, and will not likely be approved.

Connections by classification are summarized in the following Table:

Roadway Classification	Normally Connects With
Lane	Lane, Local Roadway
Local Roadway	Lane, Local Roadway, Collector Roadway
Collector Roadway	Local Roadway, Collector Roadway, Arterial Roadway, Provincial Highway
Arterial Roadway	Collector Roadway, Arterial Roadway, Provincial Highway

.2 *Urban Arterial Roadways*

Urban arterial roadways carry large volumes of all types of traffic moving at medium to high speeds. These roadways serve the major traffic flows between the principle areas of traffic generation and connect to rural highways and collectors.

Direct access to adjacent developments from arterial roads is normally prohibited. Such access should be confined to local and collector roads, frontage roads, or auxiliary lanes.

.3 *Residential Collector Roadways*

Residential collector roadways provide both traffic service and land service. The road service function for this type of roadway is to carry traffic between local and arterial roadways. Full access is generally allowed on undivided collectors.

A residential collector street should generally not collect traffic from more than 600 dwelling units before connecting to an arterial roadway.

.4 *Residential Local Roadways*

Residential local roadways provide land access and connections to residential collector roadways. They primarily carry traffic with an origin or destination along its length. They are not intended to carry through traffic. Direct access is normally allowed to all abutting properties.

An undivided residential local street should generally not collect traffic from more than 100 dwelling units before connecting to a collector roadway.

.5 *Industrial Collector Roadways*

Industrial collector roadways provide both traffic service and land service. The service function for this type of roadway is to carry traffic between arterial and local industrial roadways. Access to adjacent properties is permitted; however, the Engineer must approve all access locations and widths.

.6 *Industrial Local Roadways*

Industrial local roadways provide land access and connections to industrial collector roadways. They normally carry traffic with an origin or destination along its length and are not intended to carry through traffic. Direct access is normally allowed to all abutting properties.

.7 *Lanes*

Lanes provide access to the rear yard of residential, commercial, and/or industrial lots. Lanes are not intended to carry through traffic. The lane layout should not encourage shortcutting between streets.

**5.3 Horizontal Layout of Streets**

.1 *General*

The horizontal alignment of streets typically consists of a series of tangents and circular curves (simple, compound, and reverse curves). Transition or spiral curves may also be incorporated in the design.

.2 *Minimum Curve Radius*

Minimum radii are to be as listed in TAC Geometric Design Guide for Canadian Roads (1999 Edition), Chapter 2.1 - Alignments and Lane Configuration.

.3 *Curvilinear Designs*

Curvilinear designs are used effectively to integrate the street infrastructure with the existing topography and other subdivision features to promote slower traffic speeds, and to enhance aesthetics.

.4 *Broken Back Curves*

Broken back curves (two curves in the same direction connected by a short tangent) are to be avoided in a curvilinear design unless the distance (measured in metres) from the end of one curve to the beginning of the next curve is greater than four times the design speed (measured in kilometres per hour).

.5 *Intersection Angle*

Intersection angles less than 75° are not acceptable.

.6 *Lane/Street Intersections*

Where a lane connects to a roadway within the limits of an expanded bulb corner, the lane centreline shall intersect with the horizontal point of intersection of the two legs of the roadway.



#### 5.4 Street Intersection Spacing

##### .1 *Arterial Roadways*

The desired intersection spacing along arterials is 400 m to 800 m.

##### .2 *Collector and Local Roadways*

The minimum distance between opposing intersections along collector or local roadways in residential or industrial subdivisions is 45 m, measured from centre to centre of the respective intersections; however, spacing of less than 80 m should be avoided, if possible.

Cross (four-legged) intersections on local roadways are to be avoided.

##### .3 *Lanes*

The minimum offset distance from a lane to a street intersection along collector or local roadways in residential or industrial subdivisions is 45 m, measured from centre to centre of the respective intersections.

Cross (four-legged) lane-to-lane intersections are not permitted. Cross (four-legged) lane to street intersections (“T” roadway with lane being fourth leg) with collector or local roadways are also to be avoided.

#### 5.5 Cul-de-Sacs

The maximum length of a cul-de-sac shall be 200 m; measured along the road centerline, from the property line of the intersecting roadway to the end of the bulb. No more than 40 dwelling units may be developed on a cul-de-sac. The maximum length may be limited to less than 40 dwelling units if water is not looped through the cul-de-sac. A maximum of 30 single family lots and one hydrant may be shut down if any section of the line needs servicing. See Section 7, Clause 6.1 for further information.

An emergency access is recommended within 90 m of the end of the cul-de-sac if the lots within the cul-de-sac are serviced from the street, as there is a higher probability of road closure due to utility repairs in this situation. The emergency access should be designed as outlined in Section 12.

#### 5.6 P-Loops

The maximum length of a “P-Loop” with an undivided entrance road is 850 m, measured along the road centerline and including the length of the entrance and all internal roadways. The length of the P-Loop entrance road shall not exceed 200 m. No more than 85 dwelling units shall be developed on a P-Loop with an undivided entrance roadway. The maximum length may be limited to less than 85 dwelling units if water is not looped. A maximum of 30

single family lots and one hydrant may be shut down if any section of the line needs servicing. See Section 7, Clause 6.1 for further information.

The maximum length of a “P-Loop” with a divided entrance road is 1200 m, measured as above. No more than 150 dwelling units may be developed on a P-Loop with a divided entrance roadway. The entrance roadway must meet the divided collector roadway standard cross section (i.e. four travel lanes and no parking).

An emergency access or lane connection must be provided within the loop section if the “P-Loop” entrance road is undivided or if there are deep utilities routed along the entrance road. The emergency access must be designed as outlined in Section 13.

#### **5.7 Crescents**

The maximum length of a “Crescent” or any other local roadway with two entrance roads is 1200 m, measured along the road center line and including the length of all contributing roadways. No more than 180 dwelling units shall be developed on a crescent or other local roadway with only two collector access points. The maximum length may be limited to less than 180 dwelling units if water is not looped through the crescent. A maximum of 30 single family lots and one hydrant may be shut down if any section of the line needs servicing. See Section 7, Clause 6.1 for further information.

#### **5.8 Dead-end Lanes**

Dead-end lanes are to be kept to a minimum and used only when a looped lane design is not possible. Dead-end lanes shall end with a turnaround designed to accommodate a SU-9 vehicle (e.g. garbage truck).

#### **5.9 Curved Lanes and Public Utility Lots**

Curved lanes and public utility lots are not permitted. A series of chords should replace the curves (this will allow property owners to construct straight fences rather than curved fences).

#### **5.10 Interim Access**

Interim secondary access shall be provided for traffic on dead-end streets serving more than 85 dwelling units, or as required by the Engineer and Emergency Services Department. A gravel surface turnaround suitable for SU-9 vehicles shall be provided at the end of any temporary dead-end street or lane.

#### **5.11 Expanded Bulb Corners**

Expanded bulb corners, may be used on local streets in lieu of the minimum radius of curvature.

### 5.12 Medians

Medians should not generally be used on collector and local roadways except where required to separate or delineate traffic streams (e.g. at arterial intersections or on large P-Loop entries where two distinct roadways are required). Use of medians to create entry features is permitted. Medians should be at least 5 m wide if tree planting is to be included (see Sections 12 and 13). Medians should be predominantly low maintenance surfaces.

Avoid lots fronting onto divided sections of local or collector roadways, as front driveways will not be permitted in these areas. Where frontage cannot be avoided along divided roadways, rear access to the lots must be provided.

### 5.13 Provision of Waste Management Collection Services

Developers must provide Waste Management Collection services as outlined under the City's By-Law #316. The Developer shall provide lanes where practical to accommodate waste management.

## 6 OIL WELLS, GAS WELLS AND PIPELINES

There are a number of active, suspended and abandoned oil and gas wells, including associated pipelines, compressor stations, etc., located in future development areas. The EUB has established minimum development setbacks for the wells and pipelines. These setbacks or buffer widths are based on the type of well or pipeline, the content of the well or of the material being conveyed in the pipeline. (i.e. sweet gas, sour gas (H<sub>2</sub>S), etc.). The specific buffer widths are determined by EUB following discussions with the well and/or pipeline licensee at the time of development. Based on the well or pipeline content, the setbacks may range from strictly the pipeline right of way width to over 100 m, 400 m, or 800 m.

For abandoned wells, setbacks ranging from 5 m to 15 m are applicable. The minimum setback for abandoned pipelines is the edge to the pipeline right of way. A 100 m development setback is required from all active oil wells and all active sweet or Level 1 sour gas wells. No development setback, other than the right of way width, is required for pipelines carrying oil, sweet gas or Level 1 sour gas. Any wells or pipelines approved at a higher level than Level 1 may be required to have larger setbacks such as 100 m, 400 m, or 800 m. Additional information regarding development setbacks in the vicinity of wells and/or pipelines can be found in EUB General Bulletin GB 99-4, a copy of which is appended at the end of this Section.

Further to the preceding information, the Pipeline Act (Clause 42) states as follows:

*"No ground disturbance may be undertaken in the right of way for a pipeline without the approval of the licensee of the pipeline in accordance with the regulations, or, if approval cannot reasonably be obtained from the licensee, without the approval of the Board (EUB).*

*1981 c30 s11;2000 c12 s2(35)."*

Accordingly, the developer shall use the following offsets for adjacent development.

- .1 A minimum separation width of 2 metres shall be provided between the property line of the pipeline right of way and adjacent the lane/public utility lot where a pipeline right of way is located parallel to a lane and/or public utility lot, as illustrated on Drawing 4.01. A 1:1 slope from the right of way property line to the invert of the adjacent main shall be maintained at all times. The width of the separation shall be increased as the depth of the adjacent utility main increases.
- .2 An easement with a minimum width of 2 metres must be provided between the pipeline right of way and a building where a pipeline right of way is located parallel to the sideyard of a parcel of land.

The developer shall include the following information in the NASP submission:

- .1 *Drawing showing location and type of the well, including dimensions to ¼ lines. The location should be confirmed by filed survey,*
- .2 Drawing showing location of any pipelines, including right of way dimensions,
- .3 Copy of development approvals, including setbacks, issued by EUB and the Licensee.
- .4 Copies of any reclamation certificates.

## 7 NOISE STUDY

The maximum noise level is 60 dBA Leq (24) for new development areas adjacent to expressways and arterial roadways.

A Noise Study is required where a proposed Neighbourhood is located adjacent to Provincial primary and secondary highways, expressways, arterial roadways, railways, industrial development, commercial development, and/or other potential noise generator.

The maximum noise level of 60 dBA Leq (24) relates to the outdoor leisure area. The receiver is located 1.5 m above the ground and 3 m from the face of the building. If the location of the building is not known, the receiver should be located 4.5 m from the property line.

Noise levels are to be predicted for the 20-year traffic volume. Predicted traffic volumes for primary highways (i.e. Hwy. 2, Hwy. 2A, and Hwy. 12) should be obtained from Alberta Transportation.

Earth berms and/or development setbacks are the preferred measures for noise attenuation, although other types of sound barriers will be considered (e.g. wall or combination of wall and berm).

The Noise Study must contain the following information:

- .1 Scaled drawing(s) of the site, including the following:
  - .1 building location(s),

- .2 receiver location(s),
  - .3 road alignment,
  - .4 proposed noise barrier(s),
  - .5 coordinate grid (for FHWA method).
- .2 Scaled cross-section at each receiver location showing roadway, receiver, and ground elevation as required.
- .3 Traffic volumes and percentage trucks.
- .4 Detailed calculations used to determine noise levels and barrier heights.
- .5 A table with receiver noise levels with and without a barrier is required.

## 8 TRAFFIC STUDY

A Traffic Study may be required where a proposed Neighbourhood is located adjacent to Provincial primary and secondary highways, arterial roadways, established subdivisions, industrial development, commercial development, and/or other potential traffic generators. The CAO will make the Developer aware of this requirement if needed, at the time of Development Agreement creation.

## 1.2 Study Objective

The objective of the Traffic Study is to:

- .1 Document the existing and projected traffic flows on adjacent arterial and/or collector roadways as a result of the proposed Neighbourhood Area Structure Plan.
- .2 Recommend the access points, intersection/road geometry, and internal road layout required to meet the demand of the proposed development, and minimizing the traffic and parking impact to the neighboring subdivisions and roads.

## 1.3 Required Traffic Study Information

- .1 The following information is required for the noon and p.m. peak hours on all impacted arterial and collector intersections:
  - .1 The development generated traffic volumes.
  - .2 A drawing showing the development trip distribution pattern.
  - .3 A drawing showing the turning movement volumes of proposed intersections, as well as other impacted intersections and roadways.
- .2 The traffic volumes should be detailed as follows:
  - .1 Existing traffic.
  - .2 Projected fifth and twentieth year background traffic.
  - .3 Additional development generated traffic for both the fifth and twentieth year.
  - .4 Through traffic that shortcuts through adjacent residential roads.
  - .5 Total traffic.
- .3 Analysis showing the volume/capacity ratio of all affected roadways/intersections with and without the recommended improvements.
- .4 A drawing showing the internal and external road improvements required to accommodate the projected traffic pattern. Among other items, the drawing should identify the following:
  - .1 The internal collector street layout.
  - .2 The external access points and intersection locations.
  - .3 The number of lanes and the length of any turn bays required for each arterial and collector street intersection.

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- .4 The length of the controlled accesses inside the development area and around each major intersection.
  - .5 Any traffic control device addition, deletion, or revision required. This includes parking, pavement markings, signs, traffic signals and/or phasing, and timing revisions.
  - .6 Any intersection upgrades that will be required to accommodate the increased traffic generated by the proposed development.
  - .5 The year or development level in which the above recommended improvements are required.

#### **1.4 Issues That May Affect the Traffic Study**

The Developer should meet with the CAO to obtain background information that may have an impact on the Traffic Study.

#### **1.5 Information Available**

- .1 The most current City of Lacombe Traffic Count Map will be made available to Developers upon request.
- .2 Any traffic planning or assessment studies that the City has will be made available upon request.

#### **1.6 Review Time**

The City of Lacombe requires a minimum of three weeks for the review of traffic studies submitted.

### **9 SERVICING BOUNDARIES AND CONSTRAINTS**

The Developer is required to provide a conceptual servicing design in the Outline Plan Report. Drawings and preliminary analyses are to be included in the report supporting the following:

- .1 The available routing of water, sanitary sewer, and storm sewer mains,
- .2 Location, depth, and size of detention ponds,
- .3 Major drainage routes,
- .4 Erosion and sedimentation control,
- .5 Power, telephone, cable, and natural gas systems,
- .6 Overview of system capacities relative to the proposed development.

This conceptual servicing study is intended to demonstrate the viability of the proposed Outline Plan.

Following approval of the Outline Plan, the Developer must provide a more detailed servicing report for the Development Area. Detailed servicing study criteria are included in Section 5 of this document.

## 10 OUTLINE PLAN EROSION AND SEDIMENT CONTROL (ESC) REPORT

### 10.1 Introduction

The Outline Plan Erosion and Sediment Control Report is a *brief* description of the overall strategy for Erosion and Sediment Control (ESC). It should summarize the aspects of the project that are important for erosion and sediment control and should include:

- .1 A brief description of the proposed land-disturbing activities, existing site conditions, and adjacent areas such as creeks and buildings, that might be affected by the land disturbance.
- .2 A description of critical areas on the site – area that have the potential for serious erosion problems such as severe grades, highly erodible soils, and areas near wetlands or water bodies.
- .3 A brief description of the measures that will be used to minimize erosion and control sedimentation on the site, where they will be installed and when they will be installed.

Detailed recommendations for the Servicing Study Erosion and Sediment Control Report are included in Appendix G.

### 10.2 Outline Plan ESC Drawing

A drawing at a scale of 1:5000 illustrating the following is to be included in the Outline Plan Erosion and Sediment Control report:

- .1 Show on-site and off-site drainage basins that flow through the area.
- .2 Delineate major features such as:
  - .1 Wolf Creek,
  - .2 Whelp Creek,
  - .3 The top of bank or crest of the river and creek valleys and ravines,
  - .4 All lakes, wetlands, impoundments, intermittent streams and environmental reserves,
- .3 Indicate any existing and proposed slopes greater than 20%,



- .4 Show all buffer or setback distances,
- .5 Show proposed boundaries for each clearing and grading phase,
- .6 Schematically show all proposed protective measures for each stage of grading.

## 11 UTILITY CORRIDORS

In planning development servicing, corridors may be required for routing of utility mains, secondary emergency access, walkways, and major drainage outside of the lane or roadway rights of way.

Where the corridor is used for access, utility mains, service installations (i.e. Lift Stations), and/or major drainage, a Public Utility Lot should be provided. The Public Utility Lot is usually 6.0 m wide with a 2.0 m easement on each side of the utility lot for a total right of way width of 10.0 m .

The following conditions will apply to any easement that has deep utilities routed through them:

- .1 The property owner will not be permitted to use the easement area for any purpose other than for lawn and/or garden,
- .2 The property owner will not be permitted to place, erect, or build any concrete or asphalt driveways, pads or paths, buildings, or any permanent structure whatsoever within the boundaries of the easement,
- .3 The property owner will not be permitted to plant any tree, hedge, or other vegetation which in any way prevents or hinders The City of its rights to maintain all utilities under such lands,
- .4 If the area is to be fenced, the property owner will be required to install 5.0 m gates to allow for maintenance vehicle access,
- .5 The property owner will be permitted to park private cars, trucks, or recreation vehicles upon such land. A gravel pad may be constructed on the easement for the purpose of parking private vehicles.

The preceding conditions should be included in the information package provided to the prospective lot purchaser.

## 12 MUNICIPAL RESERVE/PARKS

### 12.1 Municipal Reserve/Detention Pond Joint Use Sites

- .1 No more than 0.5 ha of storm detention pond shall be credited towards the 10% of Municipal Reserve requirements at the discretion of the Planning and Engineering departments utilizing criteria that up to 0.5 ha would be usable for sports fields. The need for storm water management facilities shall not result in an inconvenient location for school/park sites.

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- .2 The land requirements for the various types of parks are as follows:
- .1 Multi-neighbourhood (High School) Park Sites  
These sites are designed to accommodate High School(s), and will be sized in conjunction with the affected School Division.
  - .2 Neighbourhood School/Park Sites  
These sites are designed to accommodate a K-9 or Elementary School Site, and will be sized in conjunction with the affected School Division.
  - .3 Neighbourhood Park Sites  
Neighbourhood parks (with no school development) shall be a minimum of 1/3 of an acre.
  - .4 Parkette Sites  
These sites are designed to accommodate a tot lot, active and/or passive recreational components and trail systems, and are between 0.2 and 0.8 acres.
  - .5 Linear Parks  
These sites are designed to accommodate active or passive recreation components, and trail systems. A parcel of land designated as a linear park shall have a minimum width of 10.0 meters.
- .3 Detailed design criteria for the development of the Neighbourhood School/Park sites and Neighbourhood Park sites are included in Section 13 of this document.

## 13 DEVELOPMENT PHASING

The purpose of the development phasing plan is to establish the proposed sequence of development. The proposed sequence of development should be based on the logical extension of deep utilities, shallow utilities, and roadway access. The need for construction traffic to travel through established development areas to access a new phase of development should be avoided. Construction of temporary access roadways may be required for interim access to a proposed development.

## 14 COMMUNITY MAILBOXES

The Developer shall forward copies of the proposed Outline Plan to Canada Post for comments and the tentative location of community mailboxes for the provision of postal service in the new neighbourhood. The criterion to be used to determine the mailbox locations is included in Section 1.3 - General Information, .

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## 15 ENHANCED/OPTIONAL SUBDIVISION AMENITIES

### 15.1 General

The following Enhanced/Optional Subdivision Amenities may be approved for use in proposed Neighbourhoods, subject to review and acceptance from the CAO:

- .1 Sound attenuation walls,
- .2 Subdivision Entrance Signs,
- .3 Decorative pillars at roadway intersections,
- .4 Storm retention (wet) ponds,
- .5 Enhanced municipal/environmental reserve landscaping (i.e. walking paths, benches, additional tree and shrub planting, water features, viewing platforms, etc.), that are in addition to the minimums specified by the Planning & Development Department.
- .6 Linear park lighting,
- .7 Painted streetlight poles, and/or
- .8 Distinctive “Street Name” sign blades.

Any proposed enhanced/optional features may require approval from various City departments.

Developers will be responsible for all associated construction costs. Where applicable, maintenance costs will be as calculated in the Development Agreement. The Developer may be required to provide a perpetual maintenance fund that can be drawn down over the term specified in the Development Agreement to cover annual operating and/or maintenance costs.

All proposed enhanced subdivisions amenities should be identified in the Outline Plan.

### 15.2 Specific Design Criteria

Special conditions are applicable for some of the Enhanced/Optional Subdivision Amenities, as follows:

- .1 *Sound Attenuation Walls*

The Developer will be required to construct sound attenuation walls when berms cannot be constructed to the recommended height as determined in the Noise Study.

.2 *Subdivision Entrance Signs*

If the Developer wishes to construct a Subdivision Entrance Sign at the entrance to a subdivision, the sign shall be located within the road right of way. Additional sign location design criteria is included in Section 1.

Additional subdivision signs may be permitted within the subdivision with the approval of the City.

.3 *Decorative Pillars at Roadway Intersections*

If the Developer wishes to construct Decorative Pillars at various locations throughout the subdivision, they shall be located within the road right of way. The height of the pillars cannot exceed 0.9 m in height. The pillars may be stand alone items or may be used as the base of Street Name sign posts.

.4 *Painted Streetlight Poles*

Streetlight poles are to be arranged through Fortis Power Alberta. Acceptable colours include, but are not limited to, green, black, or galvanized. There should be one colour theme of streetlight poles for the full neighbourhood. Non-standard poles will be considered, but must be approved by both Fortis and the City to avoid increased maintenance costs.

.5 *Distinctive "Street Name" Sign Blades*

The existing blade and two optional blade shapes will be allowed in subdivision. The same blade design is to be used throughout the Outline Plan area. The background colour of green (std.), or black are acceptable. The lettering will follow the current standard for font and size. Lettering type will be white.

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## 5.0 Servicing Study and Associated Reports

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### 1 GENERAL

The Developer must provide a conceptual servicing design in the Outline Plan Report. Before proceeding with a phase of development, the Developer must provide a more detailed servicing report, together with servicing drawings for the entire proposed development area.

### 2 SERVICING STUDY

The report is intended to establish the site development and servicing requirements for the staged development of the subdivision. The report will ultimately form the basis for detailed design of each phase of development.

The report should compile and summarize relevant information with respect to site grading, groundwater conditions, existing drainage patterns on both the development lands and the adjacent lands, adjacent land uses, proposed water distribution, sanitary sewage collection, storm drainage system, shallow utilities, and public roadways. The report should include discussion pertaining to the systems, such as

- .1 Existing conditions (e.g. vegetation, soils groundwater, structures, contaminants, topographic feature, erosion and sediment control measures, etc.),
- .2 Site grading, major drainage routing, permanent and/or temporary erosion and sediment control measures and detention,
- .3 Description and results of analyses and modelling completed,
- .4 Identification and description of issues/constraints related to capacity, depth, grade, operations, or other unique conditions or features.

The details of individual studies (e.g. geotechnical, ecological profile, noise, traffic, water modelling, sanitary sewer system modelling, storm water management, erosion and sediment control) may be contained in separate reports, but should be coordinated, referenced, and summarized in the Neighbourhood Servicing Study Report.

Specific requirements for the Geotechnical Report are detailed in Clause 4 of this Section.

Specific recommendations for the Erosion and Sediment Control Report are detailed in Appendix G.

**The Servicing Study, including the Clearing and Grading Plan, must be approved by the City prior to any clearing, stripping and grading work being undertaken. In addition, an executed Development Agreement must be in place prior to any clearing, stripping, or grading work being**

undertaken. The Development Agreement will not be issued until the Engineer has approved all Servicing Study issues.

Revisions to the Servicing Study, and associated reports, must be provided if the Outline Plan revisions (i.e. roadway realignment, land use revision) are approved. Development Agreements will not be issued until revised Servicing Study drawings and/or reports are submitted and approved.

### 3 SERVICING STUDY DRAWINGS

#### 3.1 General

The base plans for the Servicing Study should be in the form of a tentative legal plan at a scale of 1:1000 conforming to the approved Area Structure Plan. The following preliminary design plans are to be submitted as part of the servicing report:

- .1 Site grading plan, including erosion and sediment control measures,
- .2 Roadway grading plan,
- .3 Water distribution network,
- .4 Sanitary sewer system,
- .5 Major drainage system, including any storm water management features,
- .6 Minor storm sewer system,
- .7 Shallow utility systems (power distribution, gas, telephone, cable television), and
- .8 Conceptual landscaping plan,
- .9 Seasonally adjusted groundwater contours,

Note: Proposed phase boundaries and phasing are to be shown on all of the above noted plans.

#### 3.2 Erosion and Sediment Control Plan

##### .1 *Site Plan*

The Site Plan should show:

- .1 Existing and final site contours at a interval and scale sufficient for distinguishing runoff patterns before and after disturbance,
- .2 Existing vegetation, such as grassy areas or vegetative buffers, that may reduce erosion or off-site sedimentation,
- .3 Limits of each phase of clearing and grading,

- .4 Critical areas within or near the project area, such as streams, lakes, wetlands, highly erodible soils, public streets and residences,
- .5 Locations and types of erosion and sedimentation control measures, with dimensions,
- .6 A legend.
- .2 *Detailed Drawings*
  - .1 Detailed drawings of erosion and sedimentation control structures and measures, if appropriate,
  - .2 Provide details for all water crossings,
  - .3 Any other important details,
- .3 Erosion and Sediment Control Report

Detailed information for the Servicing Study Erosion and Sediment Control Report is included in Appendix G.

### 3.3 Site Grading Plan

The purpose of the Site Grading Plan is to provide a preliminary earth balance for the entire proposed development area, provide for a smooth, reasonable tie-in with existing boundary properties, establish the major drainage routing, establish erosion and sediment control measures and coordinate the utility and site grading designs with respect to depth of cover and grades. The following information should be shown on one or more drawings:

- .1 *Existing Contours*

Existing elevation contours of the site at a sufficient interval to determine drainage patterns.
- .2 *Preliminary and Final Contours*
  - .1 Proposed changes in existing contours for each stage of grading.
  - .2 A cut/fill plan showing existing and proposed contours.
- .3 *Natural Features*

Locate and identify trees, shrubs, grass, water bodies, streams and other natural features that are to be retained, removed and/or altered.
- .4 *Geotechnical Information*
  - .1 Test hole locations,

- .2 Boundaries of different soil types within the development,
- .3 Areas within or near the proposed development with potential for serious erosion or sediment problems.
- .5 *Existing and Final Drainage Patterns*

Show the dividing lines flow direction for the different drainage areas before and after development.
- .6 *Limits of Clearing and Grading*

Add lines defining the boundary of the area to be disturbed.
- .7 *Stockpile Data*

Stockpile locations must be approved. Consideration to include proximity to homes, watercourses, escarpments, etc.
- .8 *Erosion and Sediment Control Measures*

Location, names and dimensions of all proposed temporary and permanent erosion and sediment control measures.

Note: Once native soil has been disturbed (i.e. through stripping operations) all surface drainage must be filtered or run through sediment control features before leaving the site.
- .9 *Storm Water Management System*
  - .1 Location of permanent storm drain inlets (catchbasins), pipes, outlets, detention/retention pond, etc.
  - .2 Cross-section of swales and/or channels, including depth of flow,
  - .3 Volume, depth, overflow rates and the routes the flow will follow after overtopping the sediment basins.
- .10 *Details of Dust Control Measures To Address Wind Erosion*

Show proposed location and type of ground cover.

**The City must approve the Servicing Study prior to any clearing and grading work being undertaken.**



### 3.4 Roadway Grading Plan

The purpose of the Roadway Grading Plan is to confirm the major drainage routing along streets, lanes, and public utility lots and to evaluate the lot grading. The plan should show the following:

- .1 Proposed contours,
- .2 Proposed roadway widths,
- .3 Roadway length between P.I.'s
- .4 Proposed P.I. elevations,
- .5 Tentative road and lane centre line grades,
- .6 Typical roadway cross-sections,
- .7 Proposed Canada Post community mailbox locations,
- .8 Any proposed subdivision entrance signs should also be shown on this plan.

Detailed roadway design criteria are included in Section 12 of this document.

### 3.5 Water Distribution System

The purpose of the Water Plan is to establish the water main sizes to ensure that the proposed water system conforms to the City's network requirements, establish preliminary hydrant locations, and establish any high demand areas (i.e. schools, commercial sites, etc.). The plan should show the following:

- .1 Proposed main sizes,
- .2 Pipe sized of existing mains being connected to,
- .3 Invert elevations,
- .4 Hydrant locations, and
- .5 Location of valves.

Valve locations should be established in conjunction with proposed development phasing and the flushing sequence for each phase.

The water system design submission should include a copy of the computer modelling analysis, if one was performed.

Detailed water system design criteria are included in Section 7 of this document.

### 3.6 Sanitary Sewer System

The purpose of the sanitary sewer system plan is to establish the contributory sanitary service area(s) and discharge points to the existing system based on topographic considerations, downstream transmission capacities, and expected upstream development. This may include existing system analysis in terms of planned and projected flows, and assessment and monitoring of existing system capacities and flows. Future growth areas beyond the limits of the Outline Plan area must also be considered, and alternatives for service extensions to these areas (e.g. trunk main extension, oversize main through development, etc.) must be determined. The plan should show the following:

- .1 Proposed main sizes,
- .2 Pipe sizes of existing mains being connected to,
- .3 Manhole locations,
- .4 Pipe lengths between manholes,
- .5 Manhole invert elevations,
- .6 Grades between manholes, and
- .7 Proposed manhole depth.

The sanitary sewer system design submission should include a copy of the computer modelling analysis, if one was performed.

Detailed sanitary sewer system design criteria are included in Section 8 of this document.

### 3.7 Major Drainage System

Generally, the Outline Plan will only cover a portion of the watershed defined by natural topographic features. The watershed will, however, continue to act as a single integrated system during rainfall and snowmelt events. The urban drainage systems must be incorporated into the natural watershed in such a way as to account for flows from remaining undeveloped areas. Consequently, urban drainage must be carried out on a total watershed basis.

Planning and design for major drainage systems must include the incorporation of surface drainage and overland flow routes, ponding areas, and runoff storage facilities, and where possible escape routes to receiving watercourses.

Storm drainage systems shall be designed using the Atmospheric Environmental Services I.D.F. storm curves for the Lacombe Airport.

New development must provide storm detention to suppress surcharging in the downstream storm sewer system and to contain the major drainage within the Outline Plan area.

The major drainage plan should show the following:

- .1 Major drainage area boundaries,
- .2 Major drainage routes,
- .3 Detention pond locations and shapes (e.g. volume, depth, area, elevations),
- .4 The minor storm sewer system, including manhole locations, catchment areas for the minor system, and
- .5 The plan should also identify any major drainage flows to be intercepted from, or routed to, areas beyond the boundary of the Neighbourhood Area Structure Plan and show how this drainage is to be redirected or stored.
- .6 Include a Table, listing pond area, volume and discharge table for notable pond elevations and rainfall frequencies for each pond in the development area, as follows:

Design Parameter	Elevation	Pond/ Water Surface Area (ha)	Pond Volume (m <sup>3</sup> )	Outlet Discharge (l/sec.)	Notes
Original Ground	884.3	3.6	N/A	N/A	
Plugged Outlet (1:100)	882.2	2.8	42,000	0	Lowest Top of Footing Elevation
1:100	881.6	2.7	28,500	510 <sup>*1</sup>	Weir crest regulated
1:50	881.2	2.1	27,300	490	Orifice flow regulated
1:25	881.1	2.0	18,600	420	Orifice flow regulated
1:10	880.8	1.8	12,400	380	Orifice flow regulated
1:5	880.2	1.6	7,500	350 <sup>*2</sup>	Orifice flow regulated
Pond Bottom	880.1	1.2	500	250	Nominal pond bottom
Inlet Crest	880.0	0.001	0	245	
Invert By-pass pipe	878.0	0	0	0	
<sup>*1</sup> - equates to 0.01 L/sec/ha <sup>*2</sup> - equates to 0.001 L/sec/ha					

The major storm sewer system design submission should include a copy of the computer modelling analysis, if one was performed.

Detailed major drainage design criteria are included in Section 9 of this document.

### 3.8 Minor Storm Sewer System

Planning and design for the storm sewer system must always address provision of both the minor system of surface drainage, swales, gutters, inlets, and enclosed pipes and the major system. The purpose of the storm sewer system plan is to establish the contributory storm service area(s) and discharge points for the Outline Plan area to the existing storm water management system based on topographic considerations and downstream transmission capacities. This may include analysis of the existing minor system in terms of planned and projected flows, and assessment and monitoring of existing system capacities and flows. Future growth areas beyond the limits of the Neighbourhood Area Structure Plan area must also be considered, and alternatives for service extensions to these areas (e.g. trunk main extension, oversize main through development, etc.) must be determined.

The plan should show the following:

- .1 Minor storm sewer system, including proposed main sizes,
- .2 Catchbasin Locations,
- .3 Manhole locations,
- .4 Manhole invert elevations,
- .5 Which pipes, given final grades, will require insulation as per Section 10.4 of this document,
- .6 Grades between manholes, and
- .7 Proposed manhole depth.

The minor storm sewer system design submission should include a copy of the computer and/or rational method modelling analysis.

Detailed storm sewer system design criteria are included in Section 9 of this document.

### 3.9 Shallow Utility Systems

The purpose of the Shallow Utilities Plan is to establish the proposed system requirements. Temporary facilities (e.g. overhead power or telecommunication lines), if required due to the proposed subdivision phasing, must be shown on the plan. The shallow utility companies should be provided with a copy of the deep utility and road layout drawings to assist them in

locating surface features such as transformers, switch gear, telephone switching cabinets, etc.). Detailed design criteria are included in Section 11 of this Document.

### **3.10 Community Mailboxes**

The Developer shall forward copies of the proposed Roadway Grading Plan for approval of the Community Mailbox locations as shown on the approved Outline Plan. The criterion to be used to determine the mailbox locations is included in Section 1. The proposed mailbox locations shall be shown on the Roadway Grading Plan and Shallow Utilities Plan.

### **3.11 Conceptual Landscaping Plan**

A Conceptual Landscape Plan is to be provided to illustrate how the municipal reserve parcels will be developed, in particular the Neighbourhood Park Site(s), and trail network identified in the Outline Plan.

The plan should show the following:

- .1 Areas of existing wetlands, trees, and vegetation to be removed or retained,
- .2 Identify topographic features and drainage patterns for all municipal reserve parcels,
- .3 Proposed trail system, including connection to the trail system in adjacent developments,
- .4 Proposed tree/shrub bed locations along arterial roadways,
- .5 Roadways where collector tree planting is required,
- .6 Proposed development plan for the Neighbourhood Park site(s), including site amenities (e.g. school parcel, sports fields, playground apparatus, etc.), detention pond, water levels and structures, trails, site grading, etc.
- .7 Preliminary tree/shrub bed locations in parkette,
- .8 Special landscaping features that are being considered for incorporation in the development area.
- .9 Mailboxes and other street furniture, hydrants, etc.
- .10 All existing and proposed easements.

Detailed landscaping design criteria are included in Section 13 of this document.

### **3.12 Submission of Servicing Study Report and Drawings**

One complete set of servicing drawings shall be submitted to each of the following for review and approval:

- .1 Electrical Company,
- .2 Gas Company,
- .3 Telephone Company, and
- .4 Cable Television Company.

Three complete sets of servicing drawings shall be submitted to the CAO.

Two copies of the draft report, including individual studies (e.g. geotechnical, ecological profile, noise, traffic, water modelling, sanitary sewer system modelling, storm water management, erosion and sediment control) shall be submitted to the CAO for review and comments.

Following approval of the drawings and the report, submit two copies of the report, three complete sets of reproducible drawings and one compatible digital file copy to the CAO.

Provide one copy of the Shallow Utilities Plan to the Electric Company, Gas Company, Telephone Company, and Cable Television Company.

## 4 GEOTECHNICAL REPORT

### 4.1 General

The Developer shall engage the services of a qualified soils consultant to prepare a report prior to commencing detailed subdivision design. The report shall evaluate soil characteristics and existing groundwater conditions and be based on test holes drilled at a maximum spacing of 150 m throughout the Development. The test holes are to be of sufficient depth to indicate soil conditions for utility construction. Standard piezometers shall be installed in each test hole.

### 4.2 Required Testing

The minimum number of tests required for this report is as follows:

- .1 Soil moisture contents at 1 m intervals throughout each borehole,
- .2 A sufficient number of soil sulphate tests to represent the various soil types throughout the Development,
- .3 A sufficient number of California Bearing Ratio (CBR) tests to represent the road subgrade soils throughout the Development,
- .4 Sieve analysis for each predominant soil type,
- .5 Standard penetration tests for determination of in-situ relative soil density and consistency of the various soil strata,

- .6 Measurement of groundwater table and analysis of its influence with respect to the design of roadways, utility trenches, and foundations. Groundwater readings shall be provided on completion of drilling, 1 day after drilling, 7 days after drilling, 14 days after drilling, 1 month after drilling, and once a month thereafter for 5 additional months.

#### 4.3 Final Report

Three copies of the report shall be submitted to the CAO, including the following information:

- .1 Test hole location plan and soil logs for each test hole,
- .2 Results of the tests noted above,
- .3 Water table contour map with seasonally adjusted water table shown at 0.50 m intervals,
- .4 Recommendation on suitability of site for the proposed Development,
- .5 Comments on the soil bearing capacity and recommended setbacks from escarpments for various types of building foundations,
- .6 Recommendations with regard to trench excavation and backfill specifications, and road pavement structure requirements.

## 5 SLOPE STABILITY GEOTECHNICAL REPORTS

### 5.1 General

- .1 A Slope Stability Geotechnical Report is required for all sites where, in the opinion of the CAO slope stability is a concern. This will generally mean slopes where soil conditions warrant concern, or the slope is equal to or greater than 15%.
- .2 Geotechnical Report requirements to be applied, relative to the intended land use shall include the following:
  - .1 The assessment of the Factor of Safety (Fs) for the existing slope or the proposed design slope profile.
  - .2 The assessment of a safe set-back or buffer zone back from the crest or away from the toe of the slope.
  - .3 If the Fs for a slope or proposed setback is less than that recommended by the Geotechnical Engineer, the slope may be modified using remedial measures recommended by the Geotechnical Engineering Consultant. Any remedial measures to increase the Fs must consider the effect on adjacent man-made and natural features and be approved by the Engineer.

- .4 If the development is proposed to be constructed on a slope, the Geotechnical Engineer shall recommend a suitable  $F_s$  for the on-slope development, based on a specific risk assessment of the proposed development.
- .3 It is the responsibility of the Developer and/or builder to ensure that all development conditions identified in the Slope Stability Geotechnical Report are complied with.

## 5.2 Slope Stability Geotechnical Report Requirements

- .1 As a minimum, the scope of the report should provide setback limits or development recommendations based on the recommended Factor of Safety. The minimum recommended setback shall be shown on the final development plan.
- .2 The basis for the presented conclusions shall be clearly defined and the selected method of analysis shall be adequate relative to the ground conditions, project type and size, and public interests.
- .3 The Geotechnical Report requirements must consider the following issues, as well as other site-specific issues identified by the Geotechnical Engineer.
  - .1 Property lines and setbacks as per the Zoning By-law.
  - .2 Stability limit, established with respect to most probable adverse groundwater and loading conditions.
  - .3 Top of embankment or escarpment.
  - .4 Toe of slope (Note: Where the development at the toe of the slope is proposed, the report is to address the effect and extent of slope failure on the subject land and the adjacent properties and the protection of same).
  - .5 Erosion control and other mitigation measures (e.g. drainage works, grading, etc.) close to the slope crest.
  - .6 Appropriate recommendations pertaining to revegetation, dewatering, and slope reconfiguration (e.g. cutting, filling, regrading, retaining walls, etc.).
  - .7 Building location and foundation design.
  - .8 The effect of surcharges due to the proposed structures, retaining walls, and future site grading.

## 5.3 Verification

- .1 The Developer shall retain the Geotechnical Engineer to review the final drawings and confirm, in writing, that the plans are in accordance with the recommendations made in the Geotechnical Slope Stability Report. This documentation is required before the Foundation and/or Building Permit will be issued.



- .2 The Developer shall retain the Geotechnical Engineer to inspect slope and site improvements during and after completion of the work.
- .3 The Geotechnical Engineer shall certify, in writing, that construction procedures were conducted in accordance with design recommendations and that the completed work complies with the recommendations made in the Geotechnical Report. A copy of these certifying documents must be forwarded to the CAO.

## 6 ENVIRONMENTAL ASSESSMENT REPORTS

- .1 An Environmental Site Assessment is required for all sites where environmental issues are of concern.
- .2 An Environmental Site Assessment (ESA) is required for any situation where contamination on or adjacent to the subject site poses a current or future environmental concern to the Public. The level of ESA required will vary depending on circumstance as follows:
  - .1 Phase 1 ESA - Site Reconnaissance and Historical Review.
  - .2 Phase 2 ESA - Site Investigation and Assessment.
  - .3 Phase 3 ESA - Planning and Implementation of Remediation.
- .3 The Environmental Report for development of a site shall include but not be limited to the following:
  - .1 A definition of the scope of the assessment and the assessment criteria to be used for the study site.
  - .2 A detailed discussion of the site assessment, including a review of the chemical or biophysical data with respect to the assessment criteria.
  - .3 A clear and concise summary of the conclusions of the study and/or recommendations for further investigation/ remediation.
  - .4 A complete package of supporting documentation and appendices including, but not limited to plans, photographs, aerial photographs, borehole logs, test results, checklists, etc.
  - .5 A statement of limitations for the report.
- .4 Environmental Reports will be reviewed to the satisfaction of The City and its appointed review agencies which may include Alberta Environment, or other approved agents. The level of work required will be dependent on the situation and findings. In general:

- .1 Phase 1 ESA's are to be prepared in accordance with accepted guidelines, practices, and procedures that include, but are not limited to those outlined in the Canadian Standards Association Publication (1993) titled "Phase 1 Environmental Site Assessment - Z768-94".
- .2 If the Phase 1 ESA indicates an environmental issue, a Phase 2 ESA shall be prepared to detail the existence, type, concentration, and extent of on and off-site contamination. This report shall be prepared in accordance with accepted guidelines, practices, and procedures that include but are not limited to those outlined in the Canadian Standards Association Publication (1998) titled "Phase 2 Environmental Site Assessment - Z769-00".
- .3 If the Phase 2 ESA indicates that there is a requirement for remediation or risk management, then a Phase 3 ESA program and documentation will be required. The report(s) shall document how the site will be remedied or risk managed to a level suitable for the intended development. Final confirmation testing and reporting will be required to verify remediation has taken place

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## 6.0 Site Clearing and Grading Guidelines

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### 1 GENERAL

The Developer shall not do any fieldwork, including site clearing, stripping and/or grading prior to execution of a Development Agreement that includes Clearing and Grading construction activities.

The Clearing and Grading Plan(s) for a development phase must conform to the grading plan prepared for the Servicing Study, as detailed in Section 5. Detailed Clearing and Grading Plan are included in Section 2.

The CAO must approve the Clearing and Grading Plan, including the location of topsoil stockpiles, prior to any work being undertaken.

The Developer must implement erosion and sediment control measures in the Clearing and Grading Plan as outlined in Section 6. Recommendations for a successful erosion and sediment control plan are included in Appendix G.

All site contractors shall obtain and have on site copies of the following documents:

- .1 Approved Clearing and Grading Plan(s),
- .2 Approved Erosion and Sediment Control Plan, and

### 2 REGULATORY REQUIREMENTS

Federal, Provincial and Municipal regulatory requirements for clearing and grading are included in Appendix G - Erosion and Sediment Control Measures; Clause 3.

### 3 SUBMISSIONS

The Developer shall identify the owners of all lands adjacent to the clearing and grading area that may be affected by the clearing and grading operations.

The Developer shall provide written documentation (letters and/or agreements) from the affected property owners giving permission to access such lands, including City owned lands, used for backslipping, drainage or other purposes.

Cross sections may be required to provide more information on the impact of the proposed clearing, stripping and grading on adjacent properties. The cross-section(s) should show the existing grade of the site, proposed grade for the site, grade of adjacent sites, and grade of adjacent City, County and/or Provincial roads. Datum points are required to ensure accuracy.

## 4 SPECIAL CONDITIONS

### 4.1 Restrictions, Notices and Site Preparation

Prior to the commencement of site clearing and grading, the Developer shall:

- .1 Notify the Engineer 48 hours in advance and arrange a site meeting with the Consultant and the Contractor,
- .2 Unless previously exempted by the CAO, erect fencing and provide other measures to ensure that the clearing and grading operation does not encroach into environmental reserves and other restricted areas,
- .3 Unless previously exempted by the CAO, erect "Private Property" and "No Trespassing" signs on the perimeter of the Lands, stating the Developer's name and the telephone number of a representative.
- .4 No grading, filling or excavation is permitted within utility and road right of ways, under any overhead utility lines, or over any underground utilities, unless prior written authorization has been received from the utility agencies concerned (see Section 1 - Clause 6).
- .5 Where the Developer proposes to establish a haul route which crosses an existing roadway, the Developer shall apply for a Crossing Agreement as outlined in Section 1 - Clause 7.
- .6 When possible, clearing and grading should take place outside of the nestling/fledgling time period. If work is to occur during the nestling/fledgling time period, information regarding any restrictions should be noted in the Contract Specifications.

### 4.2 Environment Protection

- .1 All work associated with clearing and grading the work shall be completed in accordance with Sections 332219, 320190.33, and 311000 of the Contract Specifications.

### 4.3 Plant Protection

- .1 The Developer shall protect trees and plants on site and on adjacent properties where indicated on the Drawings. All clearing work is to be completed in accordance with Contract Specifications.

### 4.4 Weed and Vegetative Growth Control

The Developer shall be responsible for controlling noxious weeds and excessive vegetative growth within the clearing and grading area, as well as the entire development site.

#### 4.5 Utility Rights of Way (Easements)

Following the installation of water mains, sanitary sewer mains, storm sewer mains and service connections, the Developer shall provide an unobstructed working right of way for the installation of the electrical distribution system, street lighting, gas mains and telecommunication facilities (telephone and cable television). The utility right of ways and boulevards shall be graded to within 150 mm of final grade, for not less than 2 m on each side of the alignment of the utility alignments.

### 5 TOPSOIL STOCKPILES AND DISPOSAL

#### 5.1 General

The Developer shall strip and stockpile topsoil within the Development as necessary to facilitate development of the lands.

Where a Development is located adjacent to an Expressway and/or Arterial Roadway, the Developer may construct or complete the construction of a sound attenuation berm utilizing waste excavation material and/or surplus topsoil.

The Developer shall dispose of all topsoil that is surplus to the requirements of the Developer's Lands.

#### 5.2 Topsoil (Loam) Stockpiles

- .1 The amount of topsoil stockpiled on Municipal Reserve parcels shall be restricted to the quantity required to complete the topsoil replacement on the Park Site(s), any other Municipal Reserve parcels within the Development area, and the adjacent arterial roadway berms. Stockpile side slopes shall be no steeper than 2:1 for safety purposes and to allow for weed control.
- .2 All topsoil that is set aside for later use on residential lots shall be stockpiled on a non-reserve parcel elsewhere in the Development area as approved by the CAO.
- .3 Surplus topsoil shall not be stockpiled within undeveloped road right of ways.
- .4 The stripped loam shall be stockpiled in approved locations as shown on the Drawings. The stockpiles shall be neat in appearance, free from any hazardous conditions and treated to prevent erosion from wind and rainfall and shall be posted against dumping and designated "Private Property", "No Trespassing" and "No Unauthorized Personnel Beyond This Point".
- .5 The loam pile(s) shall be removed as development progresses. All loam piles, with the exception of the loam pile on the Neighbourhood School/Park and/or Neighbourhood Park site, must be removed prior to the last phase of development of the Developer's Lands.

- .6 Borrow pits, where high organic content 'black dirt' is used to displace suitable fill material needed for the development (i.e. 'Snakepits'), will be allowed only in Municipal Reserve parcels. Creation of these borrow pits requires written permission from the CAO. The location, depth, and area of these fills shall be indicated on all drawing sets, including preliminary drawings, and as-builts. The location, depth, and area of these fills shall be indicated on all drawing sets, including preliminary drawings, and as-builts.

## 6 STORM WATER MANAGEMENT FACILITIES

### 6.1 General

Construction of storm water management storage facilities (detention ponds, retention ponds and/or constructed wetlands), including any storm sewer mains required to drain the storm water management storage facilities, require Alberta Environmental Protection Act approvals. If a storm water management storage facility is to be constructed as part of the clearing, stripping and grading work, Alberta Environmental Protection Act approval must be received prior to any grading work proceeding. The approved Servicing Study Drawings can be used for the submission to Alberta Environment for the permit application.

### 6.2 Control of Drainage

The Developer shall, at no expense to the City, before, during and after the clearing and grading of the area, implement the drainage control measures for the control and disposal of all storm water (rainwater or snow melt) in and from the lands which may be cut off from its natural drainage route by the development, but not limited to, inlet protection to any adjacent storm sewer system.

## 7 EROSION AND SEDIMENT CONTROL MEASURES

### 7.1 General

- .1 The Developer shall prepare Erosion and Sediment Control Plans as detailed in Appendix G.
- .2 The Developer of the lands being stripped and graded shall employ appropriate measures to control dust, particularly in the vicinity of existing roadways and dwellings, to ensure traffic safety and to minimize dust nuisance complaints from the public.

### 7.2 Erosion and Sediment Control Plan Modifications

The Developer shall submit any modifications to the drainage plans and the ESC plan that may be necessary from time to time for various reasons, but not limited to, portions of the Lands becoming developed, or adjacent lands becoming developed, or drainage and erosion control facilities that may require rerouting or redesigning.

## 8 REHABILITATION OF ADJACENT LANDS

Where clearing and grading operations have encroached on adjacent lands, the Developer, at its sole expense, and to the satisfaction of the Engineer, shall rehabilitate in a timely manner, any off-site areas or operations, storm water runoff, soil erosion, soil instability, sedimentation, dust or other problems which may arise from the clearing and grading operation.

## 9 DEEP FILLS GEOTECHNICAL REPORT

A “Deep Fills” report, completed by a Professional Engineer, is required when the constructed depth of fill is greater than 1.0 metres. The report shall make general recommendations for different types of building foundations. Any areas that are identified as containing ‘deep fills’ must be clearly marked on all as-built plan sets. The type of fill contained within these areas (i.e. clay, silt, black dirt etc) must also be indicated. Prospective lot purchasers must be informed of any foundation limitations prior to any finalization of lot sales.

## 10 CONSTRUCTION COMPLETION AND FINAL ACCEPTANCE

### 10.1 General

Issuance of Construction Completion Certificates (C.C.C.’s) and Final Acceptance Certificates (F.A.C.’s) shall be subject to the following conditions being met. Failure to implement and comply with the ESC plan can result in legal action as outlined in the Navigable Water Protection Act, Fisheries Act, Environmental Protection and Enhancement Act and the Water Act.

### 10.2 Maintenance

The Developer shall promptly correct, at his own expense, all defects, damages, and deficiencies in the erosion and sediment control measures, whether related to materials, workmanship, operation, vandalism, or otherwise.

### 10.3 Maintenance Period

- .1 The Developer shall maintain temporary erosion and sediment control measures until the graded area is fully serviced and developed. Construction Completion Certificates and Final Acceptance Certificates will not be issued for temporary erosion and sediment control measures.
- .2 The Developer shall maintain permanent erosion and sediment control measures for a period of at least two years after the issuance of the Construction Completion Certificate and until a Final Acceptance Certificate is issued by the Engineer.

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## 7.0 Water Design Standards

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### 1 GENERAL

The water system consists of the reservoirs, trunk water mains, pumping stations, distribution mains, hydrants, valves, and appurtenances.

In general, water mains 350 mm and larger will be designated "Trunk Water Mains" and a portion of the cost of these mains may be recoverable if future developments utilize the extra capacity that is in excess of the immediate developments need. The determination of specific cost recovery proportions will be identified during the creation of the Development Agreement.

Water mains 150 mm -300 mm will be designated "Distribution Mains".

The design of the water system shall conform to Sections 4.7 and 4.8 of the Standards and Guidelines for Municipal Waterworks, Wastewater, and Storm Drainage Systems in Alberta, as published by Alberta Environmental Protection Services and as amended by these Requirements.

### 2 PRESSURE ZONES

The water system is divided into two pressure zones. The distribution system must be designed with consideration to the current pressure zones.

### 3 DESIGN FACTORS

#### 3.1 Hydraulic Analysis Requirements

The Developer may be required to perform a hydraulic network analysis using a method acceptable to the City for any development to ensure both domestic and fire flow requirements are met. This requirement will be at the discretion of the CAO, and will be established during the creation of the Development Agreement. A report outlining the results of the analysis shall be submitted to the City with the subdivision design drawings. It is preferable that the Developer utilizes a current copy of the City's WaterCAD model for his analysis.

#### 3.2 Design Parameters

The following parameters shall be used in the design or evaluation of the water distribution system:

.1 *Hazen-Williams Coefficient (C)*

.1 Polyvinyl Chloride (PVC)

140



- .2 Asbestos Cement (AC) 130
- .3 Ductile Iron (DI) or Cast Iron (CI) 80 to 100

.2 *Distribution Main Sizes*

The minimum size of Distribution Mains shall be as follows:

- .1 Residential = 150 mm diameter
- .2 Industrial = 200 mm diameter

Where two hydrants are to be installed on an unlooped Distribution Main the minimum size of the main shall be 200 mm diameter.

.3 *Consumption Rates*

.1 Residential per capita consumption rates:

- i Maximum Day Demand: 750 litres (165 imp. gal.) per capita per day.
- ii Peak Hour Demand: 1500 litres (330 imp. gal.) per capita per day.

.2 Non-residential consumption rates:

For non-residential developments, the minimum water consumption rate shall be equal to 0.2 litres per second per hectare. The applied peaking factor shall be  $P_F = 10Q^{0.45}$  to a maximum of 25 and a minimum of 2.5 where Q is in litres per second. In addition, water demand for large developments should be evaluated based on site specific service requirements as well as fire flow requirements.

Deviation from the above noted standards must be pre-approved by the CAO.

.4 *Design Population*

The design population shall be the ultimate population in the area under consideration based on the approved Zoning By-law requirements.

.5 *Fire Flow Requirements*

Fire flow requirements shall be in accordance with the recommendations of the Fire Underwriters Survey for the type of development being considered. The minimum fire flow used for single family residential subdivisions shall be 4,500 litres/minute (1000 igpm).

Deviation from the above noted standards must be pre-approved by the CAO.

.6 *Pressure*

.1 Minimum residual line pressure under maximum day plus fire flow conditions shall be 150 kPa at ground level of any point in the system. Minimum residual line pressure under peak hour flow conditions shall be 300 kPa.

.2 Minor pressure losses through valves and fittings must be accounted for.

Deviation from the above noted standards must be pre-approved by the CAO.

.7 *Velocity*

Main line flow velocities should not exceed 1.5 m/s during peak hour flow conditions and 2.5 m/s during maximum day plus fire flow conditions.

## 4 DISTRIBUTION MAINS

### 4.1 General

The standard grid main network required within residential subdivisions is as shown on Drawing 1.02. This will generally mean at least one 300 mm line, and one 250 mm line in each direction per quarter section. The grid mains must coincide with those in adjacent subdivisions to maintain the continuity of main sizes between subdivisions. Distribution Mains shall be continuous (looped) wherever possible. The maximum length of main permissible between ties in residential developments is 300 m. No more than 30 dwelling units shall be permitted service on an unlooped (dead end) section of water main. Water demands in industrial, commercial, and high-density areas must be analysed to determine the grid and main sizes required.

An air release valve or hydrant shall be placed at significant high points in the water main profile to allow for purging of stale water or air.

A hydrant shall be installed at the end of all dead-end water mains to facilitate flushing and disinfection of the main.

### 4.2 Alignments

A minimum separation of 2.5 m from sanitary and storm sewers shall be provided in all instances. Consistent alignments shall be used along the entire length of a street, lane, or public utility lot.

### 4.3 Depth of Cover

Water mains shall be installed with a minimum depth of cover of 2.7m from the road/lane/utility lot surface grade to the top of the main. Where existing conditions dictate that the depth of buries be less than 2.7 m, the main/service is to be insulated as specified in Drawing 1.04 of the Construction Specifications. Maximum depth of bury is 3.2m or as approved by CAO.

## 5 HYDRANTS

### 5.1 Spacing

The maximum spacing between hydrants, as measured along the centre line of the right of way, shall be 180 m in residential areas and 120 m in multiple family residential, school, and industrial/commercial areas. The distance from the primary entrance of any building to a hydrant shall not be greater than 90 m.

### 5.2 Approvals

A plan showing all proposed hydrant locations within the Development, must be submitted to The City of Lacombe's Emergency Services Department, for approval of locations and spacing prior to finalizing the design of the water distribution system.

### 5.3 Alignment and Placement

Hydrants should be placed at street intersections where possible to improve their visibility to emergency vehicles, particularly at cul-de-sac entrances. Fire hydrants shall be located at an alignment of 2 m back of face of curb or 0.5 m back of walk. Where a hydrant is installed at the corner of an intersection, it shall be installed at the beginning or end of the curb return. A flushing hydrant must be installed at the end of all mains. A hydrant at the entrance to a cul-de-sac is permitted, subject to approval from the CAO.

### 5.4 Hydrant Type

Hydrants shall have drain holes and be manufactured by an approved hydrant manufacturer listed in The City of Lacombe's Contract Specifications.

Where it is established by the Engineer that a high water table exists, plug the drain hole to prevent groundwater infiltrating through the hydrant and into the water distribution system.

### 5.5 Depth of Bury

The depth of bury is defined as the distance from the invert of the suction elbow to the underside of the grade line flange. Minimum depth of bury is 2.65 m. The underside of the grade line flange shall be set at an elevation of 100 mm above the finished back of walk elevation.

### 5.6 Hydrant Coding

Hydrants shall be colour coded as noted in the Construction Specifications to indicate potential flows from the hydrant available for fire-fighting.

## 6 VALVES AND FITTINGS

### 6.1 Alignment and Placement

Main valves shall be located such that no more than 30 single family lots and one hydrant are involved in a shut down and a maximum of four valves are required to shut down any section of line.

The design standard shall be two valves at a tee and three valves at a cross, unless approved otherwise by the Engineer. A valve and one length of pipe shall be installed at interim limits of construction.

### 6.2 Protection

Where required by the Engineer, or as indicated by soils testing, all cast iron valves and fittings shall be wrapped with Denso Anti-Corrosion Product or approved equivalent to prevent corrosion. The Developer must provide cathodic protection on all existing cast iron fittings.

### 6.3 Operation of Boundary Valves During Construction

The Consulting Engineer shall clearly identify boundary valves on the engineering design drawings. Basic procedures for operating existing valves during construction are as outlined in The City of Lacombe's Contract Specifications.

## 7 WATER MAIN FLUSHING AND DISINFECTION PROCEDURES

### 7.1 General

The following procedures will be followed when installing water mains connected to The City's water distribution system:

- .1 Basic procedures to meet the standards outlined in AWWA C651-86, "Disinfecting Water Mains" and The City of Lacombe's Contract Specifications.
- .2 Consulting Engineer to submit proposed disinfection/flushing procedures to The City for review with engineering design drawings.
- .3 All water lines to be flushed again after streets are constructed and before issuance of building permits.

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## 8.0 Sanitary Design Standards

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### 1 GENERAL

The sanitary system must be designed with consideration for the service area boundaries established by the City for each sanitary trunk system.

In general, sanitary mains 375 mm or greater, and/or smaller diameter mains installed at depths greater than 6.0 m, complete with related pumping facilities, will be designated "Trunk Sanitary Mains", and a portion of the cost of these mains may be recoverable if future developments utilize the extra capacity that is in excess of the immediate developments need. The determination of specific recovery proportions will be identified during the creation of the Development Agreement.

The design of the sanitary sewer system should conform to Sections 5.1 and 7.1 of the Standards and Guidelines for Municipal Waterworks, Wastewater, and Storm Drainage Systems in Alberta, as published by Alberta Environmental Protection Services and as amended by these Requirements.

### 2 DESIGN FLOWS

#### 2.1 Residential (Population Generated)

Residential dry weather flows are to be calculated as follows:

$$QPDW = (G \times P \times Pf) / 86.4$$

QPDW = the peak dry weather design flow rate (litres/sec)

G = 300 litres/day/person

P = the design contributing population in thousands

(Population per hectare x contributing area/1000)

(Design population = 45 people per hectare)

Pf = Harmon's Peaking Factor =  $1 + 14/(4 + P^{0.5})$

#### 2.2 Non-Residential

For detailed system design, the average wastewater flow from non-residential land use areas are to be estimated as outlined in Section 7 of the Standards and Guidelines for Municipal Water Supply, Wastewater, and Storm Drainage.

Large non-residential developments should be evaluated based on site specific service requirements. The lower limit for average dry weather flow is:

$$QAVE = 0.20 \text{ litres/sec/ha}$$

Peak dry weather flows are to be determined as follows:

Peaking Factor,  $Pf = 10 (QAVE^{-0.45})$ , but not less than 2.5 or greater than 25.

Peak Dry Weather Flow,  $QPDW = Pf \times QAVE$

### 2.3 Extraneous Flow Allowances - All Land Uses

For The City of Lacombe, a general allowance of 0.20 L/sec/ha shall be applied, irrespective of land use classification, to account for wet weather inflow to manholes and for infiltration into pipes and manholes.

An effort should be made during the design stage to locate sanitary manholes away from low points.

## 3 SANITARY SEWER MAINS

### 3.1 General

Sanitary sewers shall be designed for gravity flow unless approved otherwise by the Engineer. 'Low Pressure' sanitary sewer systems are not recommended, and may require an extension of the normal warranty period to receive approval.

### 3.2 Minimum Slope

Sanitary mains shall be laid in a straight alignment between manholes at the following minimum grades:

Pipe Diameter	Minimum Grade
200 mm	0.40 %
250 mm	0.28 %
300 mm	0.22 %
375 mm	0.15 %
450 mm	0.12 %
525 mm	0.10 %
600 mm	0.08 %

The hydraulic capacity of a gravity sanitary sewer shall be based on such factors as projected in-service roughness coefficient, slope, pipe material, and actual in-service flows. Sewers larger

than the minimum size required shall be chosen so that the minimum velocity at the peak flow is not less than 0.6m/s for self-cleaning purposes.

### 3.3 Pipe Material

All sanitary sewer pipe shall be PVC SDR 35. See Section 10 for additional information.

### 3.4 Pipe Strength

The strength of the pipe shall be sufficient to carry the loads due to trench backfill and due to wheel loads. The strength of pipe shall be calculated on the basis of the external loads, trench conditions, and class of bedding provided. Class B sand bedding is the minimum bedding requirement.

### 3.5 Curved Sewer

Although it is recommended that sanitary sewers be laid with straight alignments between manholes, curved sewers may be permitted with the following restrictions:

- .1 The sewer shall be laid as a simple curve with a radius equal to or greater than that recommended by the pipe manufacturer. Minimum radius shall not be less than 60 m.
- .2 Manholes shall be located at the beginning and end of the curve, and at intervals of not less than 90 m along the curve unless approved otherwise by the Engineer.
- .3 The curve shall run parallel to the centre line of the right of way.
- .4 The minimum grade for sewers on curves shall be 50% greater than the minimum grades noted in Clause 3.2 of this Section.
- .5 The grades resulting from the curved section does not cause undue hardship for upstream developments wishing to connect to the system.

### 3.6 Alignment

A minimum separation of 2.5 m from water mains shall be provided in all instances, unless approved otherwise by the Engineer. Consistent alignments shall be used along the entire length of a street, lane, or public utility lot.

### 3.7 Depth of Cover

All sewers shall be designed so that the top of the main is at the minimum depth required to meet the conditions of Section 10, Clause 4; but not shallower than 2.7 m, unless otherwise approved by the Engineer. Where existing conditions dictate that the depth of buries be less than 2.7 m, the main/service is to be insulated as specified in of the Construction Specifications.

### 3.8 Manholes

Manholes shall be installed at the end of each line, at all changes in sewer size, grade, or alignment, at all junctions, and at intervals of no greater than 150 m along the length of the sewer.

To maintain a continuous energy gradient through manholes, the obvert (crown) elevation of the lowest upstream pipe shall be equal to, or higher than the obvert of the downstream pipe. Where a bend in pipe alignment occurs in a manhole, the invert elevation of the downstream pipe shall be at least 50 mm below that of the lowest upstream pipe.

Sanitary sewers are to be extended 1.5 m past the last house service lead, with the exception of sanitary mains in cul-de-sacs where service leads may be connected directly to the manhole provided that the leads enter the manhole less than 0.60 m above the invert of the main.

The flow channel through manholes shall be made to conform in shape and slope to that of the sewer. The depth of the flow channel should be at least one-half the diameter of the downstream sewer.

An interior drop manhole shall be used where invert levels of inlet and outlet sewers differ by more than 750 mm.

Standard 1200 mm diameter pre-cast manholes shall be used on mains 600 mm in diameter or less. Pre-cast manhole vaults, or an oversized manhole barrel shall be used on mains 675 mm in diameter or greater. "T-Riser" manholes may be used on mains 1200 mm in diameter and larger, providing there is no deflection in alignment or grade.

Manhole bases may be cast-in-place or pre-cast complete with flow channel, benching, and pipe stubs. See manhole details in The City's Contract Specifications.

### 3.9 Oversize

Oversize may be applicable for sanitary mains. Oversize costs will be determined as outlined in the Development Agreement.



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## 9.0 Stormwater Management Drainage Systems

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### 1 STORMWATER DESIGN STANDARDS

#### 1.1 General

The storm sewer system must be designed with consideration for the existing drainage area boundaries established by the City for each storm trunk system. All pertinent data regarding the subdivision should be discussed with the Engineer prior to design proceeding.

The design of the storm sewer system should conform to Section 8.0 of the Standards and Guidelines for Municipal Waterworks, Wastewater, and Storm Drainage Systems in Alberta, as published by Alberta Environmental Protection Services and as amended by these Requirements. Detailed stormwater management standards and guidelines are described in the Alberta Environmental Protection publication entitled “Stormwater Management Guidelines for The Province of Alberta”.

This Section provides a brief summary of the design standards and Requirements for storm drainage systems in The City of Lacombe.

#### 1.2 Stormwater Management

These Guidelines have been established pursuant to City Council's Stormwater Management Policy and are the basis for stormwater management in all developable land, including land upstream of existing pipe systems.

The main objectives of stormwater management are as follows:

- .1 Ensure that the hydraulic capacities of existing pipe systems and/or watercourses are not exceeded.
- .2 Reduce to acceptable levels (1:100 year probability of occurrence, where reasonably attainable), the potential risk of property damage from flooding within new development areas, and in existing downstream developments.
- .3 Reduce to acceptable levels (1:5 year probability of occurrence, where reasonably attainable), the inconvenience caused by surface ponding within development areas.

Based on the preceding criteria, stormwater management is to be implemented for all developable land unless approved otherwise by the Engineer.

### 1.3 Major/Minor System

The storm drainage system shall be designed using a dual drainage concept consisting of a minor system and a major system.

The minor system, comprised of pipes, manholes, catch basins, overland swales, stormwater storage facilities, and outfall structures, shall convey run-off from snowmelt and rainfall events to an adequate receiving stream or pond without causing unacceptable inconvenience or excessive surface flows for events up to a 1 in 5 year return period, where reasonably attainable in the opinion of the Engineer.

The major system comprises the street system, stormwater storage facilities, parkland, and any other routes required to convey run-off during rainfall events up to a 1 in 100 year return period, to the receiving water body. The major system shall be evaluated in a manner sufficient to determine that no flooding that may cause significant property damage (e.g. flooding of buildings) occurs during the 100-year storm event, where reasonably attainable in the opinion of the Engineer.

### 1.4 Rainfall Intensity-Duration-Frequency

The following formulas define the Intensity-Duration-Frequency Curves (IDF Curves) developed by Atmospheric Environment Services of Environment Canada for the Red Deer Industrial Airport.

2002 Extrapolated IDF Formulas (1964 - 1999 Data)		
Frequency	Average Intensity (mm/hr.)	
	(5 Minute - 2 Hour Time Interval)	(2 - 24 Hour Time Interval)
3 months	$61 (t+11.2)^{-0.55} **$	$3052 (t+140.2)^{-1.18} **$
6 months	$144 (t+4.2)^{-0.67} **$	$446 (t+64.6)^{-0.83} **$
1 year	$270 (t+3.9)^{-0.76} **$	$252 (t+37.3)^{-0.70} **$
2 year	$408 (t \pm 4.3)^{-0.81}$	$175 (t \pm 13.3)^{-0.62}$
5 year	$667 (t \pm 4.4)^{-0.86}$	$165 (t \pm 6.1)^{-0.57}$
10 year	$873 (t \pm 4.7)^{-0.89}$	$169 (t \pm 4.4)^{-0.55}$
25 year	$1120 (t \pm 4.8)^{-0.91}$	$176 (t \pm 1.8)^{-0.53}$
50 year	$1320 (t \pm 4.9)^{-0.92}$	$182 (t \pm 1.0)^{-0.52}$
100 year	$1477 (t \pm 4.8)^{-0.93} **$	$187 (t - 1.6)^{-0.51}$

t = storm duration in minutes

\*\* Use with discretion

These IDF formulas shall be used for all new storm basins. For established basins, the current three-year intensity curve may be used at the discretion of the Engineer. Rainfall intensity (mm/hr) for the three-year storm is defined by the following formula:

$$i_3 = 1372 / (t + 15)$$

### 1.5 Rational Method Design

The Rational Method of analysis shall be used to determine design flows for piped storm sewer systems of predominantly residential, commercial, and/or industrial land up to 65 ha (160 ac) in area. Alternatively, computer modelling may be used (see Clause 1.6 of this Section). The Rational Method formula is:

$$Q = (CiA) / 360$$

Where: "Q" is the design peak flow rate (m<sup>3</sup>/sec)

"C" is the run-off coefficient

"i" is the rainfall intensity (mm/hr) corresponding to the time of concentration

"A" is the area of contributing run-off surface (ha)

#### .1 Run-off Coefficients (C)

Minimum recommended run-off coefficient (C) values to be used in the Rational Method are as follows:

Land Use or Surface Characteristics	Storm Frequency	
	5 Year	100 Year
Residential	0.35	0.60
Apartments	0.70	0.80
Downtown Commercial	0.85	0.90
Neighbourhood Commercial	0.65	0.80
Lawns, Parks, Playgrounds	0.20	0.30
Undeveloped Land (Farmland)	0.10	0.20
Paved Streets	0.90	0.95
Gravel Streets	0.25	0.65

In development areas where a mixture of land uses or surface characteristics are proposed, the weighted average of pervious and impervious area run-off coefficients shall be used.

.2 *Storm Duration*

The storm duration used to determine the rainfall intensity for the Rational Method is equal to the time of concentration for the catchment (which equals the inlet time plus the time of travel in the sewer). The inlet time is the time taken for run-off from the furthest reach of the catchment to flow overland to the first inlet; and normally should not exceed 10 minutes. The time of travel is the time taken for flow from the furthest inlet to reach the point of design; based on full flow pipe velocities.

**1.6 Computer Modelling**

- .1 Computer models shall be used to determine design flow conditions in sewer systems with drainage areas larger than 65 ha (160 ac). They may be used for smaller systems as an alternative to the Rational Method.
- .2 Computer models may be used to determine design flows and the sizing of systems that contain non-pipe stormwater management facilities (e.g. detention ponds) or systems that include a significant amount of undeveloped land.
- .3 When large parcels (quarter section or larger) are being developed and will connect to the existing stormwater facilities, the Consulting Engineer shall prepare a stormwater model that simulates both major and minor systems. As a general rule, this model will have sub-basins no larger than 5 ha. The modelling shall be generated utilizing software that is input/output compatible with XP-SWMM.

The selection of an appropriate computer model shall be based on an understanding of their principles, assumptions, and limitations in relation to the system being designed. Acceptable computer models are USEPA SWMM, OTTSWM, XP-SWMM, EXTRAN, and OTTHYMO. The City currently maintains their infrastructure modelling utilizing XP-SWMM.

Wherever possible, the computer model shall be calibrated. In all analyses, the parameters used, the drainage boundaries, the pipe network and its connectivity shall be clearly identified on an overall drawing, and submitted to the City along with computer model input and output and a design summary report.

The design storm hyetograph shall be developed using the Chicago Method, unless otherwise approved by the Engineer.

The storm duration used for modelling simulations will depend on the type of system being analysed. Depending on basin characteristics and outlet rates, short duration storms (1 - 4 hours) will generally govern the design of the storm sewer systems and the longer duration storms (6 - 24 hours) will generally govern the design of detention ponds and major system components. Therefore, several design storms should be evaluated to determine the worst run-off result for the system being designed.

Historical, continuous rainfall data in one-hour increments, over the past 25 or more years, may be routed through the storm run-off model to provide statistical frequency analysis of various flow and storage characteristics of the catchment in question.

### 1.7 Service Connections

Effluent from sanitary sewers or surface drainage from industrial, agricultural, or commercial operations that may be contaminated shall not be discharged to the storm sewer.

Connections from roof leaders shall be made to the storm sewer system, but must include an airbreak to prevent surcharging. Roof drainage from residential housing units, apartments, commercial, and industrial buildings may discharge to grassed or pervious areas except where building density makes this impractical (e.g. central business district).

Weeping tile connections to the storm sewer shall be provided for all buildings in which the seasonally adjusted groundwater elevation is within 1.0 meters of the lowest top of footing. Where the storm sewer service will be higher than the footing elevation, the connection shall be made using a sump pump where deemed necessary by the Engineer.

#### .1 *Site Drainage and Storm Sewer Service Restrictions*

All developments are required to provide a detailed site grading drawing(s) identifying storm drainage patterns, on-site detention, storm sewers, manholes, and catch basins.

Where a storm sewer exists adjacent to a property and the site is larger than 0.2 ha (0.5 acres) in size, the installation of on-site catch basins and connection to The City's storm sewer system are generally required.

If the site is between 0.2 ha and 0.4 ha and a large portion of the site is landscaped, on-site catch basins and storm sewer connection requirements may not be required at the discretion of the Engineering Services Department.

Calculations for storm sewer and detention sizing must be provided for sites larger than 0.4 ha.

.2 *Weeping Tile Connection to Storm Sewer Main*

In all instances where the groundwater table, seasonally adjusted, is within 2.10 m of the lowest top of footing of any residence, such residence must have a weeping tile system connected to the storm sewer system where a storm sewer is or can be made available.

To determine the water table, the Developer shall engage the services of a qualified soils consultant and a report shall be submitted prior to commencing detailed subdivision design. The report shall evaluate soil characteristics and existing groundwater conditions to determine groundwater table and weeping tile flow.

To be acceptable, the test results must be based on the following:

- (a) Test holes to be located on 150 m grid.
- (b) Test holes to be of sufficient depth to indicate soil conditions for utility construction.
- (c) Plastic standpipe, 50 mm in diameter and with lower 3 m slotted, shall be installed.
- (d) Groundwater readings shall be required as follows:
  - a. On completion of drilling
  - b. One day after drilling
  - c. Seven days after drilling
  - d. Fourteen days after drilling
  - e. One month after drilling
  - f. Once a month after drilling for a total period of six months after drilling.

Based on the test results, the Developer shall submit the following to the CAO.

1. One copy of the soils report.
2. Preliminary site grading plan.
3. Water table contour map with seasonally adjusted water table shown at 0.5 m intervals.
4. Plan showing proposed footing elevations.

The CAO shall review the report and plans, and respond to the Developer within three weeks.

.3 *Storm Service Design Criteria*

The storm service size is to be determined based on the following, depending on the capacity of the downstream storm sewer system:

.1 Redevelopment Areas

Where the new service is being connected to an existing main in an older area of the City, the allowable capacity for the development will be based on the following formula:

$$\text{Allowable Capacity} = \frac{\text{Development Area} \times \text{Capacity of Main}}{\text{Upstream Catchment Area}}$$

The calculated capacity of the service will likely be less than a 1:5 year storm discharge, but the allowable discharge shall not be greater than the 1:5 year discharge as calculated for new development areas.

.2 New Development Areas

Where the new service is being connected to an existing main in a recently developed area of the City service, the allowable capacity for the development will be determined using the 1:5 year rainfall IDF curve and the appropriate run-off coefficient.

.3 Major Drainage Ponding

The 1:25 year storm is to be detained on site with an emergency drainage route for the 1:100 year event being provided. The 1:100 year storm must be detained on site if an emergency route cannot be provided.

Information regarding the Intensity-Duration-Frequency Curves (IDF Curves), Run-off Coefficients (C), and design methods to be used to determine the storm service size is included in The City of Lacombe Design Guidelines.

## 1.8 Length of Run

Surface water should not be permitted to run a distance greater than 400 m in streets or 300 m in lanes and swales without interception by a catch basin.

## 1.9 Back of Lot Drainage

The following will apply to back of lot drainage in laneless subdivisions:

- .1 For back-to-back lots, a concrete swale is to be constructed along the rear property lines within a City easement to direct the drainage to a street. Concrete swales are to be constructed with continuous grade lines with a minimum 0.8% slope to convey rear lot drainage to a catch basin located in a street or utility right of way.
- .2 For lots backing onto a park or reserve area, a grass swale is to be provided within the park or reserve area adjacent to the rear lot line. Grass swales are to be constructed with continuous grade lines with a minimum 0.5% slope to convey rear lot drainage to a catch basin located in a street or utility right of way.

The flow from rear lot swales should not be allowed to cross a sidewalk in order to prevent ice build-up and dirt accumulation on the sidewalk. A catch basin may be required at back of walk to intercept these flows.

On back to front lot drainage, the back of lot finished grade elevation must be a minimum of 200 mm above the adjacent lane.

## 2 STORM SEWER MAINS (MINOR SYSTEM)

### 2.1 General

Storm sewer mains shall be designed for gravity flow unless approved otherwise by the Engineer.

### 2.2 Flow Capacity

Sewer hydraulics shall be calculated using Manning's equation. Manning's n value shall be 0.013 for concrete and P.V.C. For other pipes and open channels, the values suggested in "Modern Sewer Design" (AISI, 1980) shall be used, but shall not be less than 0.013.

### 2.3 Pipe Material

All 375 mm or smaller storm sewer pipe shall be PVC SDR 35. See Section 9 for additional information.

### 2.4 Pipe Strength

The strength of the pipe shall be sufficient to carry the loads due to trench backfill and live loads. The strength of pipe shall be calculated on the basis of the external loads, trench conditions, and bedding class provided. Class B sand bedding is the minimum bedding requirement.



## 2.5 Depth of Cover

All sewers shall be designed so that the top of the main shall be located at the minimum depth required to meet the conditions of Section 10, Clause 4, but not shallower than 1.5 m, unless otherwise approved by the Engineer.

## 2.6 Minimum Sizes

The minimum size of a storm sewer main shall be 300 mm in diameter. Mains installed for weeping tile connections only shall be 200 mm in diameter with a minimum grade of 0.40%.

## 2.7 Minimum Slopes

Sewer velocities shall not be less than 0.60 m/sec when flowing full. Flow velocities of less than 0.9 m/sec are not recommended. When the flow velocity exceeds 3.0 m/sec, special consideration shall be given to the design of junctions and bends in the system. See Minimum Design Slopes for Storm Sewer (Table 8.1) in Alberta Environmental Protection's publication titled "Standards and Guidelines for Municipal Waterworks, Wastewater, and Storm Drainage Systems in Alberta".

## 2.8 Curved Sewers

Although it is recommended that storm sewers be laid with straight alignments between manholes, curved sewers will be permitted with the following restrictions:

- .1 The sewer shall be laid as a simple curve with a radius equal to or greater than that recommended by the pipe manufacturer. Minimum radius shall not be less than 60 m.
- .2 Manholes shall be located at the beginning and end of curves, and at intervals not greater than 90 m along the curve unless approved otherwise by the Engineer.
- .3 The curve shall run parallel to the street centre line.
- .4 The minimum grade for sewers on curves shall be 50% greater than the minimum grade required for straight runs of sewer.

## 2.9 Alignment

Storm sewers shall be located on the standard alignment throughout the subdivision whenever possible. A minimum separation of 2.5 m from water mains shall be provided. Consistent alignments shall be used along the entire length of a street, lane, or public utility lot.

## 2.10 Manholes

Manholes shall be installed at the end of each line, at all changes in size, grade, or alignment, at all junctions, and at a spacing of no greater than 150 m along the length of the sewer.

To maintain a continuous energy gradient through manholes, the obvert (crown) elevation of the lowest upstream pipe shall be equal to or higher than the obvert of the downstream pipe. Where a bend in pipe alignment occurs in a manhole, the invert elevation of the downstream pipe shall be at least 50 mm below that of the lowest upstream pipe.

Storm sewers for weeping tile connections are to be extended 1.5 m past the last house service lead, with the exception of storm mains in cul-de-sacs where service leads may be connected directly to the end of the line manhole provided that the lead enters the manhole less than 0.60 m above the invert of the main.

The flow channel through manholes shall be made to conform in shape and slope to that of the sewer. The depth of the flow channel should be at least one-half the diameter of the downstream sewer.

Standard 1200 mm diameter precast manhole shall be used on mains 600 mm in diameter or less. Precast manhole vaults or an oversized manhole barrel shall be used on mains of 675 mm in diameter or greater. A "T-Riser" manhole may be used on mains 1200 mm in diameter and larger, providing there is no deflection in alignment or grade.

## 2.11 Catch Basins and Catch Basin Manholes

### .1 *General*

Catch basins at street intersections shall normally be located at beginning or end of the curb return. Catch basins are not to be located within the limits of a paraplegic ramp. Invert crossings of streets (swales) are not permitted.

### .2 *Catch Basin Leads*

Catch basin leads shall connect directly to a manhole. If a twin catch basin is required to drain an area, the twinned unit shall consist of a catch basin and a catch basin manhole interconnected by means of 250 mm pipe. The lead from the catch basin manhole to main line manhole shall be a 300 mm pipe. Single catch basins require 250 mm leads. All leads shall have a minimum grade of 2.0%.

The length of catch basin leads shall not exceed 30 m. If it is required to extend a lead more than 30 m, a catch basin manhole shall be used.

.3 *Design Capacity*

For design purposes, catch basin capacities in litres/second are approximately as follows:

Norwood Model	Sump Condition *	Continuous Slope **	
		Capture	Overflow
F-51 (with side inlet)	190	30	95
F-51 (grate only)	155	35	85
F-33	75	10	30
F-39	80	15	40
F-49	105	20	50

\* based on 100 mm depth of ponding

\*\* based on 50 mm depth on 1% slope

.4 *Types of Catch Basins and Catch Basin Manholes*

Catch basins shall be built with a 900 mm barrel. Catch basin manholes shall be built with a 1200 mm barrel. Catch basins and catch basin manholes shall be built with a 250 mm deep sump.

The type of inlet assembly, as illustrated in the Contract Specifications, to be used for catch basins and catch basin manholes shall be as follows:

- .1 Type K-1 catch basin assembly is to be used in conjunction with standard curb and gutter, and standard monolithic sidewalk construction,
- .2 Type K-3 catch basin assembly is to be used in conjunction with lane construction,
- .3 Type K-4 catch basin is to be used in conjunction with rolled monolithic sidewalk construction,
- .4 Type K-6 catch basin assemblies may be used to drain landscape areas and swales,
- .5 Type SK-7 and Type DK-7 catch basin assemblies are to be used for expressways and arterial roadways, and
- .6 CRD trash grate may be used to drain ditches.

### 2.12 Culverts

Culvert design should consider flow capacity and back water effects over a range of flows. The design capacity of the culvert requires assessment of both its nominal design and its performance during the 100-year storm event. For maintenance purposes, the minimum nominal diameter for any culvert is 400mm.

## 3 MAJOR DRAINAGE SYSTEM

### 3.1 General

The grading of streets and the layout of the major drainage system shall be assessed, relative to the following guidelines, during the 100-year storm event:

- .1 No building shall be inundated at its ground line.
- .2 Continuity of the overland flow routes between adjacent developments shall be maintained.
- .3 The depth of water at curbside should be less than 400 mm for all roadways. Depths greater than 300 mm are not recommended. Maximum depths of trapped lows during 1:100 year storm events shall be 0.5 m.
- .4 The velocities and depths of flow in the major drainage system shall not exceed the following values:

Depth of Flow (m)	Maximum Water Velocity (m/s)
0.8	0.5
0.3	1.0
0.2	2.0
0.1	3.0

- .5 Trapped low storage should be implemented to offset peak flows where necessary to keep water velocities and depths below those noted above.
- .6 The Developer shall recommend a building elevation to the lot purchaser that is above trapped low ponding elevations and designed to drain surface run-off to the street or lane/utility right of way.

## 4 STORMWATER MANAGEMENT (SWM) FACILITIES

### 4.1 Design Requirements Common to Stormwater Management Storage Facilities

#### .1 *General*

The use of stormwater storage facilities may be required to reduce peak flow rates to downstream sewer systems and/or watercourses, or to provide a temporary receiving area for peak major drainage flows. Their approximate location and size must be identified at the time of the Subdivision Outline Plan approval to avoid conflicts with adjacent land uses. The effects of the maximum pond water levels shall be considered in the design of the minor system and lot grading. If possible, the crown elevations of the pipes in the first manhole upstream of a pond shall be at or above the maximum pond level during the five-year storm event.

#### .2 *Minimum Stormwater Quality Standards*

The following is an excerpt from the Wastewater and Storm Drainage Regulations published by Alberta Environment:

*Storm outfalls without due consideration for water quality will not be allowed. Stormwater management techniques to improve water quality shall be included to effect a minimum of 85% removal of sediments of particle size 75 microns or greater. Additional quality measures shall be required, based on site-specific conditions.*

Based on the preceding statement, the Developer shall incorporate stormwater treatment measures (i.e. installation of stormwater treatment units) in the design of any stormwater storage facility.

#### .3 *Erosion and Sediment Control*

An erosion and sediment control plan, as detailed in Appendix G is required as part of the Stormwater Management Study to define measures which must be undertaken for the control of sediment into the stormwater storage facility and into the receiving stream.

#### .4 *SWM Facilities in a Flood Plain*

Where a Floodway has been established for a natural stream or watercourse, storm ponds may be located within the Floodway provided there are no berms or dykes constructed above the natural ground which would otherwise cause higher upstream water levels during flood conditions. If a Floodway has not been determined then this shall apply to the floodplain of a natural stream or watercourse, in which the floodplain is defined as the land inundated by the flood waters associated with a 100 year event. Storm ponds are to be constructed "off stream", unless otherwise approved by Alberta Environment and Fisheries and Oceans Canada.

.5 *Storage Alternates*

.1 General

The review of the stormwater management alternatives for application to a specific area should consider the storage methods listed.

.2 Dry Pond (Detention) Storage

Dry pond (detention) storage is the stormwater management method where the storm run-off is collected and the excess runoff is temporarily detained for a short period of time, and released after the storm run-off from the contributing area has ended. Generally, low flows do not enter the pond.

.3 Wet Pond (Retention) Storage

Wet pond (retention) storage functions the same as dry pond detention except that a portion of the storm water is permanently retained.

.6 *Outflow Control*

The outlet from a stormwater management storage system must incorporate appropriate means for the control of outflow and to limit the rate of discharge. Preliminary release rates have been determined for the various drainage areas in the City. These release rates have been determined based on preliminary studies and are as shown on the Drawing 3.01. The proposed release rates are to be confirmed by detailed modelling of the existing storm sewer system and are to be based on any proposed changes in the release rate to the receiving water body and revisions to the basin boundaries.

.7 *Emergency Spillway Provisions*

The feasibility of an emergency overflow spillway is to be evaluated for each storage facility (wet or dry) design, and where feasible, such provisions are to be incorporated in the pond design.

As part of the pond design process, the probable frequency of operation of the spillway should be determined. Where it is not possible to provide an emergency spillway route, the design is to include an analysis of the impact of over-topping the pond and a significant freeboard above the 100-year level.

The functional requirements of the spillway, and the impact analysis for the absence of one, are to consider the possible consequences of blockage of the system outlet or overloading due to the run-off events, such that the storage capacity of the facility may be partially or completely unavailable at the beginning of a run-off event.

.8 *Landscaping Requirements*

Detention pond landscaping requirements are detailed in Section 13.

.9 *Signage for Safety*

The design of stormwater management facilities shall include adequate provisions for the installation of signage to warn of anticipated water level fluctuations, with demarcation of maximum water levels to be expected for design conditions. Warning signs will be designed by the Developer and approved by the Engineer.

**4.2 Dry Detention Ponds**

.1 *General*

Dry ponds should have gentle side slopes and be aesthetically contoured and landscaped to provide an attractive feature for the subdivision. Where possible, and as agreed by the Director of Community Services, they should be associated with municipal reserve areas to take advantage of the joint use ability of the facilities (e.g. extension of sports fields into the detention pond). Active park uses should not be located adjacent to the inlet/outlet facilities nor in areas that flood frequently (more than twice per year on average). The Recreation, Parks, and Culture Department should be contacted to provide input to the design of detention facilities from the concept stage through to detailed design and construction.

.2 *Safety Provisions at Inlets and Outlets*

All inlet and outlet structures associated with dry ponds shall have grates provided over their openings to restrict access and prevent entry into the sewers by unauthorized persons. A maximum clear bar space of 100 mm shall be used for gratings.

Grated outlet structures are to be designed with a hydraulic capacity of at least twice the required capacity to allow for possible plugging. Further, the velocity of the flow passing through the grating should not exceed 1.0 m/sec. Appropriate fencing and guardrails are to be provided to restrict access and reduce the hazard presented by the structure head and wingwalls.

.3 *Design Parameters*

The following general design parameters should be considered for a dry pond in a residential subdivision:

- .1 Storage capacity for up to the 100-year storm event.
- .2 Detention time to be determined based on downstream capacity, recommended maximum detention time is 24 hours.

- .3 Maximum active retention storage depth of 1.5 m. The maximum water level should be below adjacent house basement footings (a greater freeboard may be required if an emergency overflow route cannot be provided).
- .4 Maximum interior side slopes of 5:1 (7:1 is recommended).
- .5 Minimum freeboard of 0.6 m above 1:100 year high water levels.
- .6 Provision of an emergency overland flow route. If an emergency overland route cannot be provided, the minimum freeboard shall be raised to the higher water level generated by the 1:100 year storm under a plugged outlet scenario.
- .7 Maximum 4:1 ratio of effective length to effective width measured at 100-year high water level.
- .8 Dimensions must be acceptable to The City of Lacombe Parks Department when the bottom of the pond is to be used for recreation facilities.
- .9 Minimum lateral slope in the bottom of the pond of 1.0% (2.0% is preferred) and minimum longitudinal slope of 0.5% (1.0% is preferred).
- .10 Low flow bypass for flows from minor events to be provided.
- .11 French drains are to be provided within pond bottom where water table is near pond bottom.
- .12 Address all safety issues (particularly during operation).

#### 4.3 Wet Detention Ponds (Residential Subdivision)

Design of a wet pond is to be in accordance with the Alberta Environmental Protection publication entitled "Stormwater Management Guidelines for The Province of Alberta". Some general design parameters to consider are:

- .1 0.5 ha minimum water surface area.
- .2 Maximum side slopes of 7:1 between the high water level and 1.0 m below normal water level.
- .3 Minimum permanent pool depth of 2.0 m.
- .4 Maximum 1:100 year storage depth of 1.5 m.
- .5 Sediment forebays required at each inlet.
- .6 Hard edge treatment required along lake perimeter.



- .7 Minimum freeboard depth of 0.6 m. House footings must be above freeboard elevation.
- .8 Water recirculation and make-up system required.
- .9 Provide access for maintenance and emergency equipment.
- .10 Design of outlet control structure to be capable of maintaining permanent pool depth and capable of draining the permanent pool for maintenance purposes.
- .11 When possible, preserve existing wetlands by incorporating them into the stormwater management plan.
- .12 Must be designed to minimize long term maintenance and operations cost for the City of Lacombe. Approval of the final design will be up to the CAO's discretion.

**4.4 Sediment (Grit) Separation Stormwater Treatment Units**

.1 *Purpose*

Sediment separators are a variation of traditional settling tanks. They are designed to capture sediment suspended in stormwater runoff as the runoff is conveyed through a storm sewer system. The separator is a belowground structure that takes the place of a conventional manhole or catch basin in a storm sewer system. The separator uses a permanent pool of water in the removal of sediment from stormwater run-off before discharging into the receiving water body.

.2 *Design Criteria*

Alberta Environment Protection guidelines state “Treatment units are to be sized based on a minimum treatment flow rate of 75 l/s per hectare of development area and must be capable of conveying at least 150 l/s per hectare of flow through the treatment unit without re-suspending sediments or floatable materials within the treatment unit. The treatment unit shall remove at least 85% of all sediments of a 75-micrometer particle size or larger.”

.3 *Suppliers*

The following oil/grit separator units are acceptable for use in The City of Lacombe.

Stormwater Treatment System	Supplier
CDS <sup>®</sup> Technologies	Inland Pipe Limited (Calgary) 1-403-279-5531
Stormceptor <sup>®</sup>	Lafarge Canada Inc. (Calgary) 1-800-LAFARGE (523-2743)
Vortechnics <sup>®</sup>	Proform Concrete Services Inc. (Red Deer) 363-6099

The City is prepared to consider other systems that may be available for this application; however, detailed engineering information must be provided to support use of the proposed product.

## 5 MISCELLANEOUS DESIGN CONCERNS

### 5.1 Outfalls

Obverts of outfall pipes shall be above the five-year flood level in the receiving stream. Inverts of outfall pipes shall be above winter ice level. Outfalls shall be located to avoid damage from moving ice during break-up. Drop structures and energy dissipaters shall be used where necessary to prevent erosion. Trash bars shall be installed which will prevent entry or access by children.

Inlet/outlet structures in detention ponds are to be aesthetically blended into the landscape design, include adequate erosion protection, require low maintenance, and have trash bars to preclude access by children. Outlet velocities should be kept below those noted in Clause 3.1 of this Section.

### 5.2 Temporary Drainage System

Temporary drainage systems to intercept agricultural drainage and snowmelt shall be provided adjacent to new development. The temporary system may involve berming and/or ditching to detain or redirect the run-off to the storm system.

### 5.3 Receiving Waters

Measures such as detention ponds should be incorporated in new developments to prevent any increase in the amount of erosion and downstream flooding to existing receiving streams. Where erosion control or bank stability work must be done, preservation of watercourse aesthetics and wildlife habitat must be considered.

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## 10.0 Service Connection Standards

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### 1 GENERAL

This guideline pertains to that portion of the service connection installed from the main to the property/easement line.

### 2 SERVICE SIZES AND LOCATIONS

Minimum service sizes for single family and duplexes shall be as follows:

Water	20 mm
Sanitary	100 mm
Storm	75 mm

The sanitary and storm services shall have a plug installed at property/easement line.

Services of a size larger than those indicated will be required where, in the opinion of the Engineer, the lengths of service pipe or other conditions warrant these.

The location of services for residential lots shall be as shown in drawing 4.01.

The sizes and locations of services to non-residential buildings shall be subject to the approval of the Engineer.

### 3 SANITARY AND STORM SEWER CONNECTIONS TO MAIN

Sanitary and storm sewer services to the main may be made as follows:

1. In-line tees, and/or
2. Inserta tees.

### 4 DEPTH OF BURY

Water services inverts at property/easement line shall be a minimum depth of 2.7 m. and a maximum depth of 3.5 m below finished grade.

Sanitary and storm service inverts at property/easement line shall be set at an elevation at least 2.7 m below finished grade and deep enough to be extended below the anticipated building footing elevation. Sanitary and storm inverts at property/easement line should be set at the same elevation and no deeper than 3.5 m if possible.

Where existing conditions dictate that the depth of bury be less than 2.7 m, the main/service is to be insulated as specified in the Contract Specifications.

## 5 ALIGNMENT

The sanitary, water, and storm services shall be laid in a single trench. When facing the lot being serviced, the water service shall be laid along the centre of the service alignment, the sanitary service 0.30 m to the left of the water service, and the storm service 0.30 m to the right of the water service. The services shall intersect the property line at an angle as near to 90 degrees as possible unless otherwise approved by the Engineer.

The curb stop and standpipe shall be located 0.3 m from the property line, within the road right of way.

To aid in locating the service, temporary markers shall be installed at the end of the service stub as shown in the Design Guideline drawing.

## 6 WATER CURB STOP AND SERVICE BOX

The service box is to be installed at the time of service installation. The service should extend approximately 4 m beyond the property line.

## 7 RISERS

Vertical risers shall not be used unless otherwise approved by the Engineer. Instead, the service shall be installed on a continuous grade from the main to the service stub at property/easement line. A vertical long radius bend shall be installed immediately prior to the reduction fitting/plug to reduce the pipe slope to approximately 2%. Alternatively, the riser section may be placed at a 45° angle (1:1 slope), with the vertical long radius bend installed in an appropriate location between.

## 8 SERVICE CONNECTION RESTRICTIONS

Large sanitary and storm service connections may require the installation of a manhole at the main.

## 9 BENDS

No horizontal bends shall be allowed on sanitary and storm service connections. A maximum of two vertical bends will be allowed; one at the main and one at the property/easement line.

## 10 INSPECTION MANHOLES/CHAMBERS

All commercial, industrial, and institutional developments shall have an inspection manhole or chamber installed on their sanitary sewer service connection. Where possible, a service should connect to an existing or proposed manhole constructed on the sanitary sewer main alignment. Where a direct connection is made to the sanitary sewer main, an inspection manhole or chamber is to be located at the property line or within the easement.

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## 11.0 Gas, Power, Telephone, and Cable Television Standards

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### 1 GENERAL

Utility companies are strongly encouraged to work together as much as possible in utilizing common trench installations. The Consulting Engineer shall co-ordinate a meeting with the shallow utility companies, the City, and the Developer to co-ordinate utility alignments.

#### 1.1 Area Structure Plan Servicing Study

The Developer must prepare a preliminary Shallow Utilities Plan as part of the Servicing Study as outlined in Section 5. The tentative alignments for each utility are schematically shown.

#### 1.2 Detailed Design Drawings

The Developer is required to prepare a detailed Shallow Utility Plan for each phase of development. The Developer shall make arrangements for the provision of natural gas, power, telephone, and cable television service for each phase of development as follows:

- .1 The Developer shall make arrangements with ATCO Gas Ltd. for the supply of natural gas by contacting the District Engineer in the Red Deer office at the following address:

District Engineer  
ATCO Gas  
7950 Edgar Industrial Drive  
Red Deer, Alberta T4P 3R2

- .2 The Developer shall make arrangements with Telus Communication Inc. for the supply of telephone service by contacting Telus at the following address:

TELUS Communications Inc.  
3<sup>rd</sup> Floor, Telus Tower  
4831 - 51 Street  
Red Deer, Alberta T4N 2A6

- .3 The Developer shall make arrangements with Shaw Cable for the supply of cable television service by contacting the Technical Manager at the Red Deer office at the following address:

Shaw Cable Systems Ltd.  
4761 - 62 Street  
Red Deer, AB T4N 2R4

- .4 The Developer shall make arrangements with Fortis Alberta Ltd. for the supply of primary power, secondary power, and street lighting by contacting the Engineering Department at the following address:

Fortis Alberta Ltd.  
320 - 17 Avenue SW  
Calgary, Alberta T25 2V1

### 1.3 Power Distribution and Streetlight Design

- .1 Residential Development

The Developer shall retain the services of an Electrical Engineering Consultant to design the power distribution and streetlighting system. The Electrical Consultant shall contact Fortis to make arrangements for the design of the power distribution and streetlighting system.

- .2 Commercial / Industrial Development

The Developer Shall contact Fortis to make arrangements for the design of the power distribution and streetlighting system.

### 1.4 Review and Approval of Detailed Shallow Utilities Plan

As noted in Section 1 - Clause 2.3, the Developer is responsible for coordinating the location of the power, gas, telephone and cable TV, including obtaining alignment approvals and easement requirements.

The Developer shall forward the following information to ATCO Gas, Shaw Cable Systems, Telus Communications and Fortis Alberta.

- .1 Copies of the roadway and deep utilities plan drawings,
- .2 A copy of the tentative legal plan
- .3 A copy of the Outline Plan

Following the completion of the design of each service provider's facilities, copies of their alignments and easement requirements will be forwarded to the Developer for preparation of the Shallow Utilities Plan. Alignment approval letters will also be provided.

Note: The Developer is also responsible for any costs related to the provision of power, gas, telephone and cable TV to service a subdivision, including the cost of installing ducts for road crossing.

## 12.0 Roadway Design Standards

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### 1 ROAD AND STREET CLASSIFICATION

Street systems incorporate several types of roadways, each with its own particular design standards. This Section will provide design information for the following road classifications:

- Provincial Highway,
- Divided (Major) Arterial Roadway
- Undivided (Minor) Arterial Roadway
- Divided Primary Collector Roadway
- Undivided Primary Collector Roadway
- Minor Residential Collector Roadway
- Local Residential Roadway
- Industrial Major Roadway
- Industrial Collector/Local Roadway
- Frontage/Service Roadway
- Public Lane

### 2 REFERENCE MATERIAL

The following reference materials (current editions) have been used in preparing these Design Guidelines and should be referred to for further detail:

Geometric Design Guide for Canadian Roads, TAC

Metric Curve Tables, TAC

A Policy on Geometric Design of Highways and Streets, AASHTO

Turning Vehicle Templates, TAC

Manual of Uniform Traffic Control Devices for Canada, TAC

Roadside Design Guide, AASHTO



TAC/ITE Canadian Guide to Neighbourhood Traffic Calming, TAC/ITE

The TAC Manual and TAC Urban Supplement noted above must be adhered to unless otherwise specified in these Design Guidelines or by the Engineer.

### 3 DESIGN INFORMATION

The following standards will apply to roadways listed in Section 4 – Outline Plan Guidelines. These standards are summarized at the end of this Section.

#### 3.1 Auxiliary Lanes on Divided Arterial Roadways

An auxiliary lane providing right turn in/out access to adjacent properties may be considered as an alternative to a Frontage Road, subject to the approval of the Engineer. The auxiliary lane must be designed in accordance with TAC Geometric Design Guide for Canadian Roads, and shall have a minimum lane width of 3.7m.

#### 3.2 Minimum Grades

##### .1 Roadways

The minimum longitudinal surface grade for all road classifications is 0.5%. For curved roadways, cul-de-sacs, and expanded bulb corners, centre line grades should be increased to provide a minimum gutter grade of 0.50%. It is desirable to use a slightly steeper grade where possible.

##### .2 Lanes and Public Utility Lots

The minimum longitudinal surface grade for gravel lanes, paved lanes, and public utility lots in new subdivisions is 0.8%. Grades <0.80% are acceptable in older subdivisions where a grade  $\geq$ 0.80% cannot be established due to adjacent development restrictions (e.g. existing concrete or paved driveways, garages, etc.). Grades <0.50% are not to be used unless approved by the Engineer.

#### 3.3 Vertical Curves

Vertical curves shall be provided at points where a vertical grade change takes place, which shall be in accordance with the following criteria:

Length of Vertical Curve,  $L = KA$

Where “K” is the vertical curve calculation factor, and

“A” is the algebraic difference between grades.

Crest "K" Factor based on  $L > SSD$

.1  $SSD = 0.278tV + d$  (TAC Formula 1.2.5)

Where  $d = V^2/254f$  (TAC Formula 1.2.4)

Where Perception and reaction time (t) = 2.5 sec., and Coefficient of Friction (f) is as listed in Table 13.1 below or TAC - Table 1.2.5.2

.2  $K_{Crest} = SSD^2 / 200 (h_1^{-0.5} + h_2^{-0.5})^2$  (TAC Formula 2.1.24)

Where  $h_1 = 1.05$  m and  $h_2 = 0.38$  m

Sag "K" Factor for comfort control (illuminated roadways)

.1  $K_{Sag} = V^2 / 395$  (TAC Formula 2.1.28)

Table 13.1 Vertical Curve "K" Values				
Design Speed	Coefficient of Friction	Stopping Sight Distance	K Factor	
(km/hr)	(f)	(m)	Crest Vertical Curve	Sag Vertical Curve
30	0.40	30	2	2
40	0.38	44	4	4
50	0.35	63	7	6
60	0.33	85	13	9
70	0.31	111	23	12
80	0.30	140	36	16
90	0.30	169	53	21
100	0.29	205	78	25
110	0.28	247	113	31
120	0.28	286	152	36
130	0.28	328	200	43

Note:

.1 Crest vertical curves are not required if "L" is less than the following values:

Local Street L < 20 m

Collector Street L < 30 m

Arterial Street L < 40 m

- .2 Sag vertical curves are not required for any roadway if L is less than 15 m.
- .3 The mid-ordinate difference in elevation between V.P.I. elevation and pavement design elevation on the vertical curve, "M" is to be calculated and shown on the drawings,

### 3.4 Superelevation/Transition Spirals for Arterial Roadways

Superelevation is normally rotated about the centre line of the median; however, other rotation points can be used if the Engineer feels it is necessary and the rideability of the end product would be better.

The length of tangent runout shall be as shown in Table 13.2:

### 3.5 Design and Posted Speed

#### .1 *Design Speed*

The design speeds for the various roadway classifications are summarized at the end of this section.

#### .2 *Posted Speed*

The Consultant is required to provide written recommendations and/or confirmation of the posted speed for all expressways and arterial (divided and undivided) roadways within their project limits.

The posted speed limit for collector and local roadways is 50 km/hr.

<b>Table 13.2</b> <b>Superelevation Runout Rates</b> (Based on AASHTO (1990) Table III-14 and TAC Urban Supplement)	
Design Speed (km/hr)	Runout Length Factor
60	1:167
70	1:182
80	1:200
90	1:222
100	1:250
Runout Length Factor = Maximum relative slopes for profiles between the edge of two lane pavement and the centerline (percent)	
Tangent Runout Length = $w \times 0.02 \times \text{Runoff Length Factor}$ w = width of roadway from centre line to edge of pavement (m).	
<b>Example:</b> Design Speed = 80, w = 10.5, and normal crossfall = 2.00% Tangent Runout Length = $10.5 \times 0.02 \times 200 = 42.0 \text{ m}$	

### 3.6 Design Vehicles

Based on recommendations included in the Geometric Design Guide for Canadian Roads (Chapter 1.2), the following design vehicles have been selected as being representative of vehicles operating in Canada:

- .3 Passenger Cars (P)\*\*,
- .4 Light Single-Unit Truck (LSU)
- .5 Medium Single-Unit Trucks (MSU),
- .6 Heavy Single-Unit Trucks (HSU)\*\*,
- .7 WB-19 Tractor Semitrailers (WB19)
- .8 WB-20 Tractor Semitrailers (WB20)\*\*,
- .9 A-Train Doubles (ATD),
- .10 B-Train Doubles (BTD),
- .11 Standard Single-Unit Buses (B-12)\*\*,
- .12 Articulated Buses (A-BUS),

.13 Intercity Buses (I-BUS)

\*\* Designates design vehicles selected as being representative of vehicles operating in the City of Lacombe. The Engineer may specify the use of smaller WB design vehicles in special circumstances.

Note: The minimum travel way designs for the HSU design vehicle will accommodate both the single-unit truck, city transit bus, fire truck, garbage truck and other vehicles with a similar wheelbase.

Additional information on design vehicles is included in Geometric Design Guide for Canadian Roads - Chapter 1.2 and A Policy on Geometric Design of Highways and Streets (AASHTO).

### 3.7 Roadside Safety

Roadside safety design is an important component of roadway design. roadside safety is defined as the design of the area between the outer edge of the roadway and the right of way limits. There are many reasons why a vehicle will leave the pavement and encroach on the roadside. Regardless of the reason for the vehicle leaving the roadway, a roadside environment free of fixed objects with stable, flattened slopes enhances the opportunity for reducing crash severity.

Design options for reducing roadside obstacles, in order of preference, are as follows:

- .14 Remove the obstacle.
- .15 Redesign the obstacle so it can safely be traversed.
- .16 Relocate the obstacle to a point where it is less likely to be struck.
- .17 Reduce impact severity by using appropriate breakaway device.
- .18 Shield the object with a longitudinal traffic barrier designed for redirection or use a crash cushion.
- .19 Delineate the obstacle if the above alternates are not appropriate.

Design features, such as horizontal and vertical curvature, lane and shoulder widths, signing, pavement marking, etc. play an important role in keeping the motorist on the travelled way.

Establishing a traversable and unobstructed roadside area (clear zone) extending beyond the edge of the travelled way, particularly on high-volume, high speed roadways will help prevent collisions with fixed objects. The term "clear zone" is used to designate the unobstructed, relatively flat area provided beyond the edge of the travelled way for the recovery of errant vehicles. The clear zone includes any shoulders or auxiliary lanes.

The edge of the travelled way is generally determined as follows:

- .1 Arterial Roadways - measured from the Face of Curb (FoC) or the shoulder (edge) line.

- .2 Divided Collector and Local roadways - measured from the Face of Curb (FoC)
- .3 Undivided Collector and Local roadways – measured from the edge of the parking lane (generally 2.25 m or 2.5 m from FoC).

Trees with a trunk diameter of 150 mm or greater, when mature, are considered to be fixed objects that should be planted outside of the established clear zone.

### 3.8 Pedestrian Accessibility/Safety

Pedestrian environments which are designed to be used by the general public, including those with disabilities, should be accessible to all persons, as well as being safe, functional and attractive. The design elements to be addressed are identified in the Geometric Design Guide for Canadian Roads manual – Chapter 3.3.

## 4 CURB, GUTTER, AND SIDEWALKS

### 4.1 General

Curb and gutter will be required on all roadways with the exception of industrial roadways that may be constructed to a rural cross section. A 0.25 m wide concrete gutter shall be provided on arterial roadways. A 0.25 m gutter width shall be provided on all other road classifications. In addition to gutters, a shoulder may be required on arterial roadways.

The Consultant is required to provide written recommendations and/or confirmation of the cross-section for all arterial (divided and undivided) roadways within their project limits.

Reverse gutter may be used where the road cross slopes away from the curb such as on superelevation and for median curbs.

Standard curb without gutter may be used for medians and islands where the pavement cross-section directs drainage away from the median or island curb along its full length.

Standard curb and gutter shall be used on arterial roadway medians, urban industrial roadways, frontage roads, adjacent to school and park areas, and along divided sections of residential roadways unless otherwise required by the Engineer. Mountable and semi-mountable curb and gutter shall be used along arterial roadways as outlined in TAC Geometric Design Guide for Canadian Roads.

Requirements for sidewalk along the various road classifications are generally as follows. Specific requirements are subject to review by the CAO and the Planning & Development Department.

### 4.2 Arterial Roadways

A 1.8 m wide concrete or a 2.5 m wide asphalt sidewalk shall be constructed on one side of the roadway to form part of the City Trail System. A 1.2 m walk may be required on the opposing side of the street, at the discretion of the CAO.

#### **4.3 Minor Residential Collector Roadways**

A 1.5 m low profile monolithic or a 1.2 m separate sidewalk with standard or rolled curb, and 0.25 m gutter is normally required along both sides of residential collector roadways.

Sidewalk widths should be increased to 1.8 or 2.5 m (monolithic or separate) on one side of collector roadways if designated as part of the Trail Network by the Planning Department.

#### **4.4 Local Residential Roadways**

A 1.5 m monolithic or a 1.2 m separate sidewalk with standard or rolled curb, and 0.25 m gutter is normally required along both sides of local residential roadways.

#### **4.5 Industrial, Commercial, and Institutional Roadways**

Sidewalks are generally not required for industrial areas, but should be provided in commercial or institutional areas. Specific requirements will depend on the anticipated pedestrian volumes and desirable walking routes.

#### **4.6 Frontage Roads**

A 1.5 m monolithic or separate sidewalk is generally required along the private property side of the frontage road.

### **5 CURB RAMPS**

Curb ramps should be provided at crosswalks to accommodate persons with special needs. The ramps shall be placed at the midpoint of the curb return at all intersections involving existing, new, or future sidewalk crossings.

Curb ramps shall be provided for Municipal Reserve parcels that must be accessed over standard curb and gutter.

### **6 ROADWAY DRAINAGE**

Requirements for stormwater management, major drainage design standards, minor storm sewer design criteria, catch basin locations, length of drainage run, etc. are included in Section 9.

Weeping tile drains, or French drains tied to the storm system, are to be installed at sag points in the roadway to drain the subgrade, and minimize frost damage.

### **7 ROADWAY CONSTRUCTION**

#### **7.1 Existing Soil Conditions**

As discussed in numerous geotechnical reports, construction problems related to high groundwater tables and fine-grained silty soils are very common in Lacombe. The silty soils are highly frost

susceptible and sensitive to disturbance. This condition may impact roadbed construction depending on seasonal groundwater and weather at the time of construction. In these cases, it is recommended that all design roadway grades be established as high above the groundwater table as possible.

## 7.2 Pavement Design

The minimum pavement structure permitted for each road classification shall be as outlined in **Table 13.3**:

The pavement structures shown in **Table 13.3** provide for the minimum allowable thickness for asphalt, granular base, and granular subbase. These pavement structures are founded on a prepared subgrade having a California Bearing Ratio (CBR) of at least 4.0 in a soaked condition, that the granular base has a CBR of at least 80, and that granular subbase has a CBR of at least 20. These conditions are considered representative of the typical level of subgrade support for the site during spring thaw when the subgrade soils will exist in a weakened condition. Where soils of lower stability are used, an increase in the pavement structure will be required. Any reduction of the pavement standards must be substantiated by a geotechnical report and approved by the Engineer.



Table 13.3 Pavement Structure					
Road Classification	Design Traffic (80 KN axles)	Asphaltic Concrete Depth (mm)	Granular Base Depth (mm)	Granular Subbase Depth (mm)	Total Depth (mm)
Arterial	4 x 10 <sup>6</sup>	125	200	350	675
Primary Collector	3 x 10 <sup>6</sup>	100	200	350	650
Minor Residential Collector	1 x 10 <sup>6</sup>	100	150	300	550
Local Residential	9 x 10 <sup>4</sup>	80	100	250	425
Industrial Major	3 x 10 <sup>6</sup>	100	200	300	600
Industrial Collector	2 x 10 <sup>6</sup>	100	200	300	600
Industrial Local	8 x 10 <sup>5</sup>	90	150	300	540
Frontage/ Service	9 x 10 <sup>4</sup>	80	100	250	425
Paved Lane	1 x 10 <sup>3</sup>	80	225	-	300
Gravel Lane	5 x 10 <sup>2</sup>	-	250	-	250
Asphalt Trails	-	80	150	-	-

### 7.3 Subgrade Preparation and Improvement

Based on experience, the level of subgrade support available after site grading and intermixing of surficial soils is expected to be equivalent to a soaked CBR value in the order of 2 to 5. Subgrade support at this level will be slightly below the design levels. In areas where the water levels are close to the existing surface grades, there will be the potential for groundwater to be pumped up into the subgrade soils by surface vibrations from construction traffic. This rise in groundwater and subgrade moisture content will be accompanied by a significant loss of strength in the subgrade soils.

Typical local practice for road base construction for sensitive subgrades is to thicken the granular sub-base layer of the pavement section (i.e. construct a working platform of free draining coarse gravel or sand). Placement of this thickened granular subbase will support construction traffic and

will improve the level of subgrade support for the design pavement section. The required thickness of the sub-base gravel will vary across the site depending on actual subgrade conditions. A geotechnical firm should be contacted to determine acceptable depths of granular subbase required to provide the required support.

Construction procedures should be designed to minimize disturbance to the sensitive subgrades and to protect the integrity of the granular working mats. If the subgrade has failed during construction, the weakened material should be subcut and replaced with an approved fill material on top of a filter fabric.

Required granular thickness, initial lift thickness and the need for any special construction procedures are best determined based on observations at the time of construction.

## 8 ASPHALT PLACEMENT

The maximum depth of a single lift of asphalt shall be 75 mm. The minimum initial depth of asphalt shall be 50 mm, unless approved otherwise by CAO. The minimum depth of successive lifts shall be 40 mm.

## 9 STAGED CONSTRUCTION OF LANES

### 9.1 Gravel Lanes

Gravel lanes shall be constructed to their final design cross section within one year of completion of underground utilities. After one year of initial lane construction, the lane shall be rehabilitated by removing contaminated material and soft spots, scarifying and recompacting the remaining base course gravel, and finally placing and compacting additional base course gravel to the design cross section.

### 9.2 Paved Lanes

Staged construction of paved lanes shall be undertaken where underground utilities have been constructed within one year. Initial construction shall be to a gravel lane standard section. After one year of the initial construction, the lane should be rehabilitated as outlined under Clause 9.1 above, shaped to the proper cross section, and then paved.

Lanes shall be paved at least 15 m from all intersections (including lane-lane intersections), and 10 m each way from catch basins.

No section of lane of less than 25 meters shall be unpaved if both ends of the lane are to required to be paved.

## 10 STANDARD ROAD CROSS SECTIONS

Standard roadway cross-section drawings are available in the Design Guidelines drawings appendices.

## 11 PAVEMENT MARKING AND TRAFFIC CONTROL SIGNS

### 11.1 Pavement Marking Materials

Pavement markings for the various roadway classifications are as follows:

Table 13.4 Acceptable Pavement Marking Materials	
Item	Type of Material
<b>Arterial Roadways</b> <sup>1</sup>	
1. Centre Lines	Type 1
2. Edge Lines	Type 2 or Type 3
3. Lane Lines	Type 1
4. Stop Bars	Type 1
5. Crosswalk Lines	Type 1
6. Guide Lines	Type 1
7. Arrows	Type 2 or Type 3
8. Concrete Bridge Decks	Type 2 or Type 3
9. Asphalt Bridge Decks	Type 1
<b>Collector Roadways</b>	
1. Centre Lines	Type 2 or Type 3
2. Lane Lines	Type 2 or Type 3
3. Stop Bars	Type 2 or Type 3
4. Crosswalk Lines	Type 2 or Type 3
<b>Local Roadways</b>	
1. Centre Lines	Paint
2. Stop Bars	Paint
3. Crosswalk Lines	Type 2 or Type 3
Notes:	
1.	Arterial roadways include any portion of a Collector or Local roadway within 50 m of an intersecting arterial roadway.
2.	Type 1 permanent pavement marking material - Thermoplastic "Hot In-Laid" material, or approved equivalent.
3.	Type 2 permanent pavement marking material - Spray applied hybridized polymer

	epoxy surface material, or approved equivalent.
4.	Type 3 permanent pavement marking material – Surface applied cold plastic marking material, or approved equivalent.

Pavement marking and traffic control signs shall conform to the Manual of Uniform Traffic Control Devices.

### 11.2 Pavement Marking and Signage Drawing Approval Process

The CAO shall approve pavement markings and traffic control signs. The approval process is as follows:

- .1 Developers consulting Engineer submits traffic signing and pavement marking drawings to the CAO for review. The Developers consulting Engineer then revises the drawings in accordance with the CAOs comments and resubmits for final review.
- .2 Upon approval in principle, the Developers consulting Engineer submits reproducible original traffic drawings for stamping and signing by the CAO. The CAO may then accept the pavement markings and signing plan.
- .3 The Developers consulting Engineer is to arrange for the installation of traffic signs and pavement markings through the use of a private contractor or by City Forces as noted in the Development Agreement.

## 12 FENCING

Uniform fencing is required along all lanes adjacent to public utility lots, municipal reserves, environmental reserves, and public open space areas as specified by the Engineer and/or the Planning Department. The type of fence must be approved by the CAO prior to construction.

## 13 EMERGENCY ACCESS DESIGN REQUIREMENTS

The clear unobstructed width of an emergency access right of way shall be a minimum width of 6.0 m with a 3.0 m driving surface. The driving surface may be concrete, asphalt, paving stone, or turf stone on a properly constructed base.

The emergency access shall be structurally and geometrically designed (e.g. width, turning radii, structure) to safely carry fire-fighting equipment loading to a connecting street or lane.

Avoid placing an emergency access in line with a road segment, so that it does not appear to be an extension of the road.

The overhead clearance through an emergency access shall be a minimum of 5.0 m.

Emergency access roads must be signed at each street or lane intersection as “Emergency Access”, and the signs designed such that they meet the intent of the Alberta Fire Code.

Collapsible bollards must be installed at each street or lane intersection to limit access to traffic other than emergency vehicles. Reflective strips must be installed on the bollards so that they are visible to cyclists and pedestrians at night.

## 13 LANDSCAPING

### 13.1 Arterial Roadways

Level One Landscaping of medians and boulevards within arterial roadway rights of way will normally be completed at the time of roadway construction. The adjacent Developer shall supplement the Level One Landscaping by providing Level Two Landscaping as required by the CAO.

The boulevard from back-of-walk/streetlight alignment to the curb shall be graded to drain to the curb at 2.0%. A berm may be constructed from the back-of-walk/streetlight alignment to the edge of the right of way. Berms shall have maximum side slopes of 3.5:1 and be constructed to the specified height.

No drainage should be allowed to run from the right of way onto private property. If private property abuts the right of way, a swale should be provided within the boulevard to intercept drainage from the right of way and convey it to the storm system.

### 13.2 Collector and Local Roadways

The Developer will be responsible for Level One Landscaping of boulevards and medians on collector and local roadways that are not directly adjacent to the frontage or flankage of a residential or industrial lot.

The Developer will also be required to provide collector roadway boulevard tree planting for designated roadways.

Level Two Landscaping may be provided in the medians of divided collector and local roadways. All tree and shrub planting shall be in accordance with Section 13.

The boulevard from the back-of-walk/curb to the edge of the right of way shall be graded to provide positive drainage to the street. The minimum boulevard cross slope shall be 2.0%.

### 13.3 Medians

In general, the surface treatment for medians shall be as follows:

- .1 *Arterial Roadways*
  - .1 The median shall be capped with concrete where the median width is 3.0 m or less.
  - .2 The median shall be finished to Level One Landscaping standards where the median width is greater than 3.0 m.

- .3 No trees shall be planted in an expressway or arterial roadway median area where the median width is less than 6.0 m.
  - .4 The median cross section shall conform to the cross section shown in the Construction Specifications.
- .2 *Divided Collector and Local Roadways*
- .1 The median shall be capped with concrete or paving stone if the median width is 3.0 m or less.
  - .2 The median shall be capped with concrete, paving stone, or finished to Level One Landscaping standards where the median width is greater than 3.0 m.
  - .3 No trees shall be planted in collector and/or local roadway median areas where the median width is less than 5.0 m.
  - .4 The median cross section shall conform to the cross section shown in the Construction Specifications.

## 14 DRIVEWAYS

Direct access from private property to arterial roadways is not permitted without provision of an auxiliary deceleration/acceleration lane and the approval of the Engineer.

Driveways entering onto collectors shall be set back from intersections in accordance with TAC Standards. Front driveways will not be permitted on divided sections of collector and local roadways. Rear access is to be provided for these lots.

The minimum setback from the nearest face of curb in the intersection to the nearest edge of driveway shall be 30 m.

A culvert (minimum diameter of 400 mm unless otherwise specified by the CAO) and an earth embankment must be installed where a proposed driveway crosses an existing ditch.

ROADWAY GEOMETRIC DESIGN ELEMENTS									
Roadway Designation	Design Elements								
	TAC Design Classification	Daily Service Volume (vpd)	Right Of Way Width	Horizontal Alignment Minimum Radius of Curvature	Minimum Intersection Angle (degrees)	Intersections			
						Corner Cutoff Dimensions (m)			
						Arterial Roadway	Collector Roadway	Local Roadway	Lanes
Divided Arterial	UAD 70	>20,000	60 m	250 m	75	30 x 30	10 x 10	N/A	N/A
Undivided Arterial	UAU 70	<20,000	48 m	250 m	75	30 x 30	10 x 10	N/A	N/A
Divided Primary Collector	UCD 60	<10,000	See Drawing 4-05	185 m NC 135 m RC	75	10 x 10	5 x 5	5 x 5	N/A
Undivided Primary Collector	UCU 60	<10,000	See Drawing 4-06	185 m NC 135 m RC	75	10 x 10	5 x 5	5 x 5	N/A
Minor Residential Collector	UCD 60	<3,000	See Drawing 4-07	115 m	75	N/A	5 x 5	5 x 5	N/A
Local Residential	ULU 50	<3,000	See Drawing 4-08	115 m	75	N/A	5 x 5	5 x 5	N/A
Industrial Major Collector	RCU 60 UCU 60	<10,000	30 m	185 m	75	10 x 10	10 x 10	10 x 10	N/A
Industrial Collector/Local	RLU 50 ULU 50	<3,000	22 m	115 m	75	N/A	10 x 10	10 x 10	N/A
Frontage/Service Road	RLU 50 ULU 50	<3,000	20m	115 m	75	N/A	10 x 10	10 x 10	N/A
Public Lanes	20	<500	6 m	No Permitted	75	N/A	N/A	N/A	5 x 5

ROADWAY DESIGN ELEMENTS										
Roadway Designation	Design Elements									
	TAC Design Classification	Horizontal Alignment		Minimum "K" for Vertical Curves	Vertical Alignment			Intersections		
		Rate of Superelevation (As per TAC)			Road Gradient (%)			Curb Return Radii (m)		
		Desireable Rate (m/m)	Maximum Rate (m/m)		Maximum Grade	Desired Maximum Grade	Minimum Grade	Arterial Roadway	Collector Roadway	Local Roadway
Divided Arterial	UAD 70	0.04	0.06	< < < See Section 12 - Clause 3.3 and Table 13.1 > > >	6.00	3.00	0.50	See Drawing 4-19	15	N/A
Undivided Arterial	UAU 70	0.04	0.06		6.00	5.00	0.50	15	15	N/A
Divided Primary Collector	UCD 60	Normal Crown 0.02	Reverse Crown 0.02		9.00	6.00	0.50		8	N/A
Undivided Primary Collector	UCU 60	Normal Crown 0.02	Reverse Crown 0.02		9.00	6.00	0.50	15	8	8
Minor Residential Collector	UCD 60	Normal Crown 0.02	Normal Crown 0.02		9.00	6.00	0.50	N/A	8	8
Local Residential	ULU 50	Normal Crown 0.02	Normal Crown 0.02		9.00	6.00	0.5	N/A	8	8
Industrial Major Collector	RCU 60 UCU 60	Normal Crown 0.02	Reverse Crown 0.02		6.00	6.00	0.50	See Drawing 4-19	8	8
Industrial Collector/Local	RLU 50 ULU 50	Normal Crown 0.02	Normal Crown 0.02		6.00	6.00	0.50	N/A	N/A	
Frontage/Service Road	RLU 50 UCU 50	Normal Crown 0.02	Normal Crown 0.02		6.00	6.00	0.50	N/A		
Public Lanes	20	N/A	N/A	9.00	6.00	0.60	N/A	N/A	N/A	



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## 13.0 Landscaping Standards

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### 1 GENERAL

The Developer responsible for the design and development of the Neighbourhood Park Site(s), School Site, and Detention Ponds, all remaining public open space (e.g. parkettes, linear parks, natural parks, boulevards, medians, utility lots, buffer areas, roadway berms), including all amenities falling within these open spaces (e.g. plantings, walkways, furniture, playgrounds, buildings, structures) as noted by the CAO and as specified in the Development Agreement.

The areas to be landscaped are identified in the following documents:

- .1 Outline Plan,
- .2 Servicing Study,
- .3 Development Agreement,
- .4 The City of Lacombe's Trail/Sidewalk Development Plan.

Detailed landscape drawings shall be prepared for each phase of Development in accordance with the conceptual landscape plans prepared as part of the Servicing Study. The plans shall incorporate design information for the following landscape features:

- .1 *Level One Landscaping,*
- .2 *Level Two Landscaping,*
- .3 *Level Three Landscaping,*
- .4 *Level Four Landscaping,*
- .5 *Collector Roadway Tree Planting,*
- .6 *Development of the all municipal reserves (open space), and/or*
- .7 *Detention Ponds*

## 2 LEVEL ONE LANDSCAPING

The Developer is required to provide Level One Landscaping for all public open space areas (e.g. parkettes, linear parks, natural parks, boulevards, medians, utility lots, buffer areas, roadway berms, walkways), etc., as specified by CAO.

The Developer shall provide Level One Landscaping for all boulevards located between the curb and separate sidewalk. The property owner shall landscape the boulevard area located between the back of walk and the property line.

## 3 LEVEL TWO LANDSCAPING

### 3.1 General

- .1 The Developer is required to provide Level Two Landscaping for all public open space areas, ornamental parks, playgrounds, natural parks, boulevards, utility lots, walkways, buffer areas, roadway berms, medians, and/or utility lots, as specified by the CAO.
- .2 Level Two Landscaping requirements and cost recoveries for detention pond facilities are included in Clause 8.

### 3.2 Planting Guidelines

- .1 Deep rooting trees, such as poplars and willows, shall not be planted within 8 m of any utility line, road, or lane.
- .2 Shallow rooting trees or shrubs may be planted over deep utility lines (i.e. water, sanitary, or storm).
- .3 Trees and shrubs shall be set back at least 1.0 m from the edge of any collector road (boulevard or median), local road (boulevard or median), or lane.
- .4 Trees and shrubs shall be set back at least 3.0 m from the edge of any arterial roadway (boulevard or median).
- .5 Hedge plants shall be spaced 1.0 m apart.
- .6 The offset shall be measured horizontally from the centre of the tree to the face of curb for roads, or to the edge of gravel/pavement for lanes.
- .7 For trees and shrubs planted in the medians and boulevards, an excavation to the following dimensions is required to accommodate the root zone/planting area:

- .1 Trees: 2.0 m wide x 2.0 m long x 1.5 m deep
- .2 Shrubs: 1.0 m wide x 1.0 m long x 250 mm deep

The excavated areas shall be backfilled with topsoil and prepared for tree and shrub planting as detailed in the current Contract Specifications.

### 3.3 Berms

- .1 Berms shall have a side slope not steeper than 4:1, have a horizontal crest not less than 1.0 m wide, and be graded to the approved grades and cross sections. The bottom of all berms shall transition into adjacent elevations. A retaining wall will be required if the berm side slope is steeper than 4:1. The height of the wall will be determined using a 4:1 slope on either the fore slope or the back slope while maintaining a constant alignment for the centre of the berm.
- .2 Berms along arterial roadways shall be graded to provide 400 mm depressions at regular intervals along the length of the berm for tree and shrub planting. The length of the depressions shall vary from 25 m to 50 m in length. The spacing of the depressions along the berm will follow a regular pattern, using either a single bed or a combination no more than four bed variations for planting. The spacing between depressions should be approximately 25 m. Linear hedge planting will be planted along the entire length of the upper crown of the berm between depressions.

### 3.4 Recommended Tree Species

- .1 The City of Lacombe is located in Hardiness Zone 3 with an overlap of Zones 1 and 2. Appended at the end of this Section are tables which identify trees and shrubs recommended for planting in these zones.
- .2 The final Table identifies trees that are suitable for arterial roadway, collector roadway boulevards and median tree planting.
- .3 The Developer shall identify all proposed tree and shrub species on the landscape drawing.
- .4 If the Developer proposes to plant species that are not listed in the Tables, the Developer shall submit a list of the proposed species for approval by the CAO.
- .5 The minimum size of deciduous trees suitable for arterial roadway, collector roadway, and median tree planting shall be 60 mm (2½ in.) calliper.

## 4 LEVEL THREE LANDSCAPING

### 4.1 General

The Developer is required to supply and install Level Three facilities and amenities in various locations throughout the Development, as identified in the Outline Plan and Servicing Study. Some of the standard Level Three Landscaping facilities and/or amenities to be provided are as follows:

- .1 Post and cable fences
- .2 Bollards
- .3 Paved, gravel, woodchip, and/or shale trails
- .4 Site furnishings (e.g. garbage receptacles, benches, etc.)
- .5 Tot lots and playschool play structures, and/or
- .6 Trail signage.

### 4.2 Uniform Fencing

Fencing, of a uniform style approved by the CAO, is to be provided at the following locations:

- .1 Separating a public roadway from a lane or Public Utility Lot.
- .2 Separating a lane from a park or other open space.
- .3 At other location specified by the Engineer and/or the Planning Department.

### 4.3 Bollards

Bollards are to be placed on Public Utility Lots to allow for pedestrian and/or emergency vehicle access. The front yard bollards should be located at the building setback while the rear yard bollards should be located on the easement line unless approved otherwise.

#### 4.4 Site Furnishings

The Developer shall supply and install site furnishing at locations specified by the CAO. All furnishings shall conform to Recreation, Parks, and Culture Department's Standard Detail Specifications.

#### 4.5 Trails

- .1 The minimum width for walkways shall be 2.5 m wide and constructed of 20 mm crushed gravel or other approved surface. Construction details shall conform to the City of Lacombe's Construction Specifications.
- .2 Where the ecological profile has identified a unique or sensitive natural area which is to be incorporated in the Development, wood mulch may be used as the walkway surface material when approved by the CAO.

#### 4.6 Tot Lots

- .1 In addition to the playground facilities to be provided in the Neighbourhood Park site(s), the Developer may have designated other sites within the development as Tot Lots. The Developer shall provide the following for these Tot Lots:
  - .1 A site grading plan showing any berms, etc. for the parcel.
  - .2 Level One and Level Two landscaping for the parcel.
  - .3 The following Level Three landscaping facilities and amenities:
    - .4 A CSA compliant play structure base complete with treated timber surround.
    - .5 A CSA compliant composite play structure.
    - .6 One pedestal park bench.
    - .7 One pedestal picnic table.
    - .8 Two garbage receptacles.
    - .9 Paved trails 2.5 m wide.
- .2 All equipment, facilities, and amenities are to meet current Recreation, Parks, and Culture Department specifications.

## 5 LEVEL FOUR LANDSCAPING

Level Four Landscaping (supplying and installing optional/enhanced amenities (e.g. Ornamental structures, gazebos, sculptures, feature walls, water features, fountains, spray pools, etc.)) will be at the discretion of the Planning and Engineering Departments. Level Four Landscaping will only be considered if arrangements for long-term maintenance by the Developer are agreed to at the plan approval stage and agreements are established prior to Development Agreement approval. The Developer will be responsible for any and all capital cost of any permitted optional amenities

## 6 COLLECTOR ROADWAY TREE PLANTING

### 6.1 Collector Roadway Tree Planting Policy

The Developer is required to provide one tree per single family residential lot (i.e. R1 Zoning). All other land fronting onto collector roadway (i.e., park sites, commercial, public service, and all other residential zoning) shall require tree spacing of between 11 m and 15 m, ensuring spacing remains consistent with adjacent single family residential planting. Exceptions of one tree per lot may be considered by the CAO in unique circumstances for duplex lots or lots with narrow frontage.

### 6.2 Collector Roadway Tree Planting Standards

The following standards will apply:

- .1 Trees are to be planted within the road right of way, including boulevards adjacent to all municipal reserve parcels, in a straight line parallel to the property line.
- .2 Where a separate boulevard between the curb and sidewalk is provided, the Parks Department will determine the tree spacing.
- .3 Maintenance of trees planted within the road right of way (boulevard) shall become the responsibility of The City upon issuance of the Landscaping CCC

## **7 MUNICIPAL RESERVE/PARK SITE(S)**

### **7.1 General**

As noted in Section 4, the Developer is to provide municipal reserve land that may be used for various purposes. The land area required for the parks and or school site(s) will be determined as outlined in Section 4.

The cost of developing these lands is the responsibility of the Developer.

### **7.2 Neighbourhood Park Financing and Construction**

Construction of the Neighbourhood School/Park sites and Neighbourhood Park Sites will be the responsibility of the Developer.

### **7.3 Neighbourhood School/Park And Neighbourhood Park Design**

The Developer shall be responsible for the preparation of detailed design drawings for the development of the Neighbourhood School/Park Sites and Neighbourhood Park Sites. The design shall conform to standards established by the Planning and Engineering Departments. The design shall include:

- .1 Establishing site grades, including grades for a detention pond (if required).
- .2 Establishing the area required for an elementary or middle school.
- .3 Development of public open space areas.
- .4 Construction of play areas and sports fields.
- .5 Tree planting.
- .6 Preservation of natural features.

### **7.4 General Municipal Reserve/Park Development Standards**

Table A, included at the end of this Section, provides a summary of the various park facility and amenity requirements to be provided in Neighbourhood School/Park Sites, Neighbourhood Park Sites, Parkette Sites and Linear Parks, and their minimum and maximum level of development, as it pertains to a single subdivision or quarter section.

The minimum and maximum quantities of various site amenities for the following municipal reserve designations are noted in the Tables included at the end of this Section.

- .1 Multi-neighbourhood (High School) Park Sites – Table B
- .2 Neighbourhood School/Park Sites – Table C
- .3 Neighbourhood Park Sites – Table D
- .4 Parkette Sites – Table D
- .5 Linear Parks – Table F

If the Developer wishes to develop parks exceeding the maximum standards, they must apply to the Parks Department for approval and may be required to enter into a maintenance agreement prior to commencing construction. Also see Clause 5 - Level Four Landscaping.

## 8 DETENTION PONDS

The Developer may be required to construct detention pond facilities in one or more locations in the Development. A detention pond may be located within the Neighbourhood Park Sites; however, every effort should be made to exclude detention ponds from Neighbourhood Park Sites containing school sites.

## 9 LANDSCAPE DRAWING REQUIREMENTS

### 9.1 General

General Landscape Drawing requirements are listed in Section 2.

### 9.2 Detailed Landscape Drawing

Detailed drawings at a scale of 1:500 shall be submitted showing the following:

- .1 Specific site location for all proposed plantings.
- .2 Size (height and calliper), botanical name, and specie names of all plant material and intended number of plants form each species indicated on a planting list and referenced to the specific plant location.
- .3 Mixture ratios and application rates for all grass seed and fertilizer.



- .4 Locations of all utility lines, services, and easements.
- .5 Existing and proposed grades.

### **9.3 Detailed Municipal Reserve Construction Drawings**

Detailed plans shall be prepared for construction at a scale of 1:500 indicating the following:

- .1 Detailed grading plan showing drainage patterns, the tie-in to grading on adjacent land uses, and existing site elevations.
- .2 Detailed detention pond grading plan, if applicable.
- .3 Existing vegetation to be retained.
- .4 Existing and proposed utilities and easements, including storm sewer and catch basins for site drainage.
- .5 Detailed design of baseball diamonds and sports fields.
- .6 Detailed design of park furniture and playground structures indicating manufacturer and model number, log, boundaries, and sand areas.
- .7 Detailed design and specifications for the parking lot and hard-surface play area/tennis courts.
- .8 Detailed design and specifications for all trails.
- .9 Detailed design and specifications for a Community Shelter, if applicable.
- .10 Tree and shrub planting details.

### **9.4 Detailed Detention Pond Construction Drawings**

Detailed plans shall be prepared for construction at a scale of 1:500 indicating the following:

- .1 Detailed grading plan showing sideslope grades, drainage swale grades, the tie-in to grading on adjacent land uses, and existing site elevations.
- .2 Detailed design of any baseball diamond or soccer pitch/football field, if applicable.

- .3 Existing and proposed utilities and easements, including storm sewer mains, weeping tile drains and catch basins for site drainage.
- .4 Detailed design and specifications for any trails.
- .5 Tree and shrub planting details.

#### **9.5 Drawing Review**

The Developer shall submit landscape drawings, as detailed in Section 2 of this document, for review and approval.

#### **9.6 Design Revisions**

The CAO must approve all revisions to the approved design drawings.

**TREE SPECIES**

COMMON NAME	BOTANICAL NAME	SIZE AT MATURITY HEIGHT/SPREAD (METRIC)	SIZE AT MATURITY HEIGHT/SPREAD (IMPERIAL)
<b>CONIFEROUS TREES</b>			
Colorado Blue Spruce	<i>Picea pungens</i> 'Glauca'	12 m/5 m	40'/16'
Colorado Spruce	<i>Picea pungens</i>	12 m/5 m	40'/16'
Lodgepole Pine	<i>Pinus contorta latifolia</i>	12 m/3 m	40'/10'
Norway Spruce	<i>Picea abies</i>	15 m/8 m	49'/26'
Ponderosa Pine	<i>Pinus ponderosa</i>	12 m/6 m	40'/20'
Scots Pine	<i>Pinus sylvestris</i>	12 m/6 m	40'/20'
Siberian Larch	<i>Larix sibirica</i>	12 m/5 m	40'/16'
White Spruce	<i>Picea glauca</i>	15 m/5 m	49'/16'
<b>DECIDUOUS TREES</b>			
American Elm	<i>Ulmus americana</i>	20 m/15 m	65'/49'
Amur Cherry	<i>Prunus maackii</i>	12 m/10 m	40'/33'
Brandon Elm	<i>Ulmus americana</i> 'Brandon'	15 m/10 m	49'/33'
Bur Oak	<i>Quercus macrocarpa</i>	10 m/10 m	33'/33'
Cutleaf Weeping Birch	<i>Betula pendula</i> 'Gracilis'	15 m/8 m	49'/26'
Fallgold Black Ash	<i>Fraxinus nigra</i> 'Fallgold'	10 m/5 m	33'/16'
Flowering Crabapple	<i>Malus species</i>	5 m/4 m	16'/13'
Hawthorn	<i>Crataegus species</i>	3 m/2.5 m	10'/8'
Laurel-Leaf Willow	<i>Salix pentandra</i>	15 m/15 m	49'/49'
Manchurian Ash	<i>Fraxinus mandshurica</i>	8 m/5 m	26'/16'
Manchurian Elm	<i>Ulmus pumila</i>	10 m/8 m	33'/26'
Mayday	<i>Prunus padus commutata</i>	10 m/10 m	33'/33'
Mountain Ash	<i>Sorbus americana</i>	10 m/6 m	33'/20'
Northwest Poplar	<i>Populus x</i> 'Northwest'	20 m/15 m	65'/49'
Ohio Buckeye	<i>Aesculus glabra</i>	12 m/10 m	40'/33'
Paper Birch	<i>Betula papyrifera</i>	12 m/6 m	40'/20'
Patmore Green Ash	<i>Fraxinus pennsylvanica</i> 'Patmore'	12 m/8 m	40'/26'
Schubert Chokecherry	<i>Prunus virginiana</i> 'Schubert'	5 m/5 m	16'/16'
Swedish Columnar Aspen	<i>Populus tremula</i> 'Erecta'	12 m/1.5 m	40'/5'
Tower Poplar	<i>Populus x canescens</i> 'Tower'	10 m/1.5 m	33'/5'

TABLE A - SUBDIVISION PARK DEVELOPMENT STANDARDS

ITEM	QUANTITY		DETAILS
	Minimum	Maximum	
Site Preparation	Entire Site	Entire Site	Approved by Department
Final Grading/Seeding	Entire site	Entire site	As per Contract Specifications
Tree Planting	10 trees/acre	15 trees/acre	Approved species
Shrub Planting	50 m <sup>2</sup> /ha(5shrubs/10m <sup>2</sup> )	100 m <sup>2</sup> /ha	Approved species
Pre-School Play Structure	1 per neighbourhood	1 per neighbourhood	Department approved
Elementary Play Structure	1 per neighbourhood	1 per neighbourhood	Department approved
Tot Lot	1 per neighbourhood	2 per neighbourhood	Department approved
Class A Soccer Field	1 per neighbourhood	1 per neighbourhood	As per RP&C Specifications
Class B Ball Diamond	1 per neighbourhood	1 per neighbourhood	As per RP&C Specifications
Multi Use Pad	1 per 2 neighbourhoods	1 per neighbourhood	As per RP&C Specifications
Activity Center	1 per 2 neighbourhoods	1 per neighbourhood	Subject to School/City approval
Boarded Rink/Power/Lights	1 per neighbourhood	1 per neighbourhood	As per RP&C Specifications
Snow Bank Rink	1 per neighbourhood	1 per neighbourhood	As per RP&C Specifications
Sliding Hill	1 per neighbourhood	1 per neighbourhood	As per RP&C Specifications
Power to Site	1 per neighbourhood park site	1 per neighbourhood park site	As per RP&C Specifications
On-Site Asphalt Parking Pad	1 per neighbourhood park site	1 per neighbourhood park site	18 parking stalls/sports field
Trails	500 lin. meters		As per 2.5m asphalt Contract Specifications
Picnic Tables	5 per neighbourhood	8 per neighbourhood	As per RP&C Specifications
Pedestal Park Benches	10 per neighbourhood	14 per neighbourhood	As per RP&C Specifications
Pedestal Garbage Receptacles	15 per neighbourhood	22 per neighbourhood	As per RP&C Specifications
Park Signage	1 per neighbourhood park site	1 per neighbourhood park site	As per RP&C Specifications

TABLE B – MULTI-NEIGHBOURHOOD PARK

ITEM	QUANTITY		DETAILS
	Minimum	Maximum	
Site Preparation	Entire site	Entire site	As per Contract Specifications
Final Grading/Seeding	Entire site	Entire site	As per Contract Specifications
Tree Planting	10 trees/acre	15 trees/acre	Approved species
Shrub Planting	50 m <sup>2</sup> /ha	100 m <sup>2</sup> /ha	Approved species
Pre-School Play Structure	R,P&C discretion	RP&C discretion	Department approved
Elementary Play Structure	1 per site	1 per site	Department approved
Class A Soccer Field	1 per site	1 per site	As per RP&C Specifications.
Class B Ball Diamonds	2 per site	2 per site	As per RP&C Specifications
Multi Use Pad	1 per site	1 per site	As per RP&C Specifications
Activity Center	As required	1 per site	Subject to School/City approval
Boarded Rink/Power/Lights	1 per site	1 per site	As per RP&C Specifications
Snow Bank Rink	1 per site	1 per site	As per RP&C Specifications
On-Site Asphalt Parking Pad	1 per site	1 per site	18 parking stalls/sports field
Trails	1.5m aggregate	2.5m asphalt	As per RP&C Specifications
Picnic Tables	4 per site	6 per site	As per RP&C Specifications
Pedestal Park Benches	6 per site	10 per site	As per RP&C Specifications
Pedestal Garbage Receptacles	10 per site	16 per site	As per RP&C Specifications
Park Signage	2 per site	2 per site	As per RP&C Specifications

TABLE C - NEIGHBOURHOOD/SCHOOL PARK

ITEM	QUANTITY		DETAILS
	Minimum	Maximum	
Site Preparation	Entire site	Entire site	As per Contract Specifications
Final Grading/Seeding	Entire site	Entire site	As per Contract Specifications
Tree Planting	10 trees/acre	15 trees/acre	Approved species
Shrub Planting	50 m <sup>2</sup> /ha	100 m <sup>2</sup> /ha	Approved species
Pre-School Play Structure	As required/school type	1 per site	Department approved
Elementary Play Structure	1 per site	1 per site	Department approved
Class A Sports Field	1 per site	1 per site	As per RP&C Specifications
Multi-Use Pad	1 per site	1 per site	As per RP&C Specifications
Activity Center	As required	1 per site	Subject to school/City approval
Boarded Rink/Power/Lights	1 per site	1 per site	As per RP&C Specifications
Snow Bank Rink	1 per site	1 per site	As per RP&C Specifications
On-Site Asphalt Parking Pad	1 per site	1 per site	Lot shared with school
Trails	1.5m aggregate	2.5m asphalt	As per RP&C Specifications
Picnic Tables	2 per site	3 per site	As per RP&C Specifications
Pedestal Park Benches	3 per site	5 per site	As per RP&C Specifications
Pedestal Garbage Receptacles	5 per site	8 per site	As per RP&C Specifications
Park Signage	1 per site	1 per site	As per RP&C Specifications

TABLE D - NEIGHBOURHOOD PARK

ITEM	QUANTITY		DETAILS
	Minimum	Maximum	
Site Preparation	Entire site	Entire site	As per Contract Specifications
Final Grading/Seeding	Entire site	Entire site	As per Contract Specifications
Tree Planting	10 trees/acre	15 trees/acre	Approved species
Shrub Planting	50 m <sup>2</sup> /ha	100 m <sup>2</sup> /ha	Approved species
Pre-School Play Structure	1 per site	1 per site	Department approved
Class A Soccer Field	1 per site	1 per site	As per RP&C Specifications
Boarded Rink/Power/Lights	1 per site	1 per site	As per RP&C Specifications
Snow Bank Rink	1 per site	1 per site	As per RP&C Specifications
On-Site Asphalt Parking Pad	1 per site	1 per site	18 parking stalls/sports field
Trails	1.5m aggregate	1.5m aggregate	As per RP&C Specifications
Picnic Tables	1 per site	2 per site	As per RP&C Specifications
Pedestal Park Benches	2 per site	4 per site	As per RP&C Specifications
Pedestal Garbage Receptacles	3 per site	6 per site	As per RP&C Specifications
Park Signage	1 per site	1 per site	As per RP&C Specifications

**TABLE E – PARKETTE**

ITEM	QUANTITY		DETAILS
	Minimum	Maximum	
Site Preparation	Entire site	Entire site	As per Contract Specifications
Final Grading/Seeding	Entire site	Entire site	As per Contract Specifications
Tree Planting	10 trees/acre	15 trees/acre	Approved species
Shrub Planting	50 m <sup>2</sup> /ha	100 m <sup>2</sup> /ha	Approved species
Pre-School Play Structure	1 per site	1 per site	Department approved
Elementary Play Structure	R,P&C discretion	R,P&C discretion	Department approved
Trails	1.5m aggregate	1.5m aggregate	As per RP&C Specifications
Picnic Tables	1 per site	1 per site	As per RP&C Specifications
Pedestal Park Benches	1 per site	2 per site	As per RP&C Specifications
Pedestal Garbage Receptacles	2 per site	3 per site	As per RP&C Specifications
Park Signage	1 per site	1 per site	As per RP&C Specifications

**TABLE F – LINEAR PARK**

ITEM	QUANTITY		DETAILS
	Minimum	Maximum	
Site Preparation	Entire site	Entire site	As per Contract Specifications
Final Grading/Seeding	Entire site	Entire site	As per Contract Specifications
Tree Planting	10 trees/acre	15 trees/acre	Approved species
Shrub Planting	30 m <sup>2</sup> /ha	70 m <sup>2</sup> /ha	Approved species
Trails	1.5m aggregate	2.5m Asphalt	As per RP&C Specifications
Pedestal Park Benches	1/acre	1/acre	As per RP&C Specifications
Pedestal Garbage Receptacles	1/acre	1/acre	As per RP&C Specifications
Bollards	1 set/trail opening	1 set/trail opening	As per RP&C Specifications
Park Signage	1 per site	1 per site	As per RP&C Specifications



SHRUB SPECIES

COMMON NAME	BOTANICAL NAME	SIZE AT MATURITY HEIGHT/SPREAD (METRIC)	SIZE AT MATURITY HEIGHT/SPREAD (IMPERIAL)
Adelaide-Hoodless Rose	Rosa species	1 m/1.5 m	3'/5'
Alpine Currant	Ribes alpinum	1 m/1.5 m	3'/5'
Amur Maple	Acer ginnala	4 m/4 m	13'/13'
Canada Buffaloberry	Shepherdia canadensis	1 m/1 m	3'/3'
Cherry Prinsepia	Prinsepia sinensis	2 m/1.5 m	6 ½'/5'
Common Caragana	Caragana arborescens	3 m/3 m	10'/10'
Common Lilac	Syringa vulgaris	3 m/2.5 m	10'/8'
Dart's Gold Ninebark	Physocarpus opulifolius 'Dart's Gold'	1 m/1 m	3'/3'
Diabolo Ninebark	Physocarpus Opulifolius "Monio"	2 m/2 m	6 ½" /6 ½"
Double-Flowering Plum	Prunus triloba 'Multiplex'	2 m/2 m	6 ½'/6 ½'
Elder	Sambucus species	3 m/2 m	10'/6 ½'
Fern-leaved Caragana	Caragana-arborescens 'Lorbergii'	3 m/2 m	10'/6 ½'
Globe Caragama	Caragana Frutex « Globosa »	1 m/1 m	3'/3'
Golden Ninebark	Physocarpus opulifolius 'Luteus'	2 m/2 m	6 ½'/6 ½'
Golden Twig Dogwood	Cornus sericea 'Flaviramea'	1.5 m/2 m	5'/6 ½'
Golden-Flowering Currant	Ribes aureum	2 m/2 m	6 ½'/6 ½'
Hansa Rose	Rosa species	1.5 m/1.5 m	5'/5'
Highbush Cranberry	Viburnum trilobum	3 m/2 m	10'/6 ½'
Horizontal Juniper	Juniperus horizontalis species	.25 m/2.5 m	¾'/8'
Juniper Species	Juniperus sabina species	.6 m/2 m	2'/6 ½'
Juniper Species	Juniperus chinensis species	.6 m/2 m	2'/6 ½'
Late Lilac	Syringa villosa	3 m/2.5 m	10'/8'
Miss Kim Lilac	Syringa patula 'Miss Kim'	3 m/2 m	10'/6 ½'
Mugo Pine	Pinus mugo	2 m/2 m	6 ½'/6 ½'
Nanking Cherry	Prunus tomentosa	2 m/2 m	6 ½'/6 ½'
Nannyberry	Viburnum lentago	4 m/3 m	13'/10'
Peking Cotoneaster	Cotoneaster acutifolius	2 m/2 m	6 ½'/6 ½'
Persian Yellow Rose	Rosa species	1.5 m/1.5 m	5'/5'

COMMON NAME	BOTANICAL NAME	SIZE AT MATURITY HEIGHT/SPREAD (METRIC)	SIZE AT MATURITY HEIGHT/SPREAD (IMPERIAL)
Potentilla (Shrubby Cinquefoil)	Potentilla fruticosa	1 m/1 m	3'/3'
Purple-Leaved Sandcherry	Prunus x cistena	1.5 m/1.5 m	5'/5'
Pussy Willow	Salix discolor	4 m/4 m	13'/13'
Pygmy Caragana	Caragana pygmaea	1 m/2 m	3'/6 ½'
Red Osier Dogwood	Cornus sericea	2m/3m	6 ½'/10'
Russian Almond	Prunus tenella	1m/1m	3'/3'
Sakhalin Honeysuckle	Lonicera-maximowiczii sachalinensis	1.5m/1.5m	5'/5'
Sandbar Willow	Salix exigua	3m/1m	10'/3'
Saskatoon	Amelanchier alnifolia	3m/2m	10'/6 ½'
Sea Buckthorn	Hippophae rhamnoides	5m/3m	16'/10'
Siberian-Coral Dogwood	Cornus alba 'Sibirica'	1m/1m	3'/3'
Silver Buffaloberry	Shepherdia argentea	4m/3m	13'/10'
Silver-Leaved Dogwood	Cornus alba 'Argenteo-marginata'	1m/1m	3'/3'
Smooth Sumac	Rhus glabra	3m/4m	10'/13'
Snowberry	Symphoricarpos albus	1m/1m	3'/3'
Spirea	Spirea species	1m/1m	3'/3'
Theresa Bugnet Rose	Rosa species	2m/2m	6 ½'/6 ½'
Turkestan-Burning Bush	Euonymus nana'Turkestanica'	1m/1m	3'/3'
Upright Juniper	Juniperus scopulorum species	3m/1.5m	10'/5'
Wayfaring Tree	Viburnum lantana	3m/2m	10'/6 ½'
Wild Rose (Nursery)	Rosa species	1m/1m	3'/3'
Wolf Willow	Elaeagnus commutata	2m/2m	6 ½'/6 ½'

TREES SUITABLE FOR ROADWAY PLANTING

COMMON NAME		
American Elm	Linden	Schubert Chokecherry
Amur Cherry	Manchurian Ash	Spruce
Brandon Elm	Mayday	Swedish Columnar Aspen
Bur Oak	Mountain Ash	Tower Poplar
Falgold Black Ash	Ornamental Crabs	Pine
Larch	Patmore Green Ash	

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## APPENDIX G – EROSION AND SEDIMENT CONTROL

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### 1. EROSION AND SEDIMENT OBJECTIVES

Soil erosion is the removal and loss of soil by the actions of wind, rainfall and runoff. In construction activities, soil erosion is caused by the force of falling and flowing water, or gusting wind, resulting in the detachment and transport of soil particles. Erosion is a phenomenon that has the potential to carry significant amounts of sediment into storm sewers and watercourse during and immediately after rainstorm events. Erosion control is required after land has been stripped of native vegetation, particularly if the land will be exposed for significant periods of time.

Sedimentation is the settling out process of soil particles transported by water. Sedimentation can occur in slower moving, quiescent water bodies or in treatment facilities such as storm water ponds.

The main objective of erosion and sediment control is to prevent sediment pollution in the various watercourses. Secondly, it is to prevent nuisance airborne dust or tracked-on dirt to City roadways and surrounding neighbourhoods. The majority of these concerns related to urban development are as a result of construction activities. An Erosion and Sediment Control (ESC) Plan is to be approved by the City prior to the start of any site clearing and grading.

Erosion and sediment control techniques are part of Best Management Practices (BMP's). BMP's operate by trapping storm water runoff and detaining it until unwanted pollutants such as sediment, phosphorous and other harmful contaminants are allowed to settle out or be filtered through underlying soils. The trapped pollutants are then removed through regularly scheduled maintenance.

Therefore, any preventative measures that will reduce erosion and sedimentation are beneficial.

### 2. REFERENCE MATERIAL

The following reference materials (current editions) have been used in preparing this Section of the Design Requirements and should be referred to for further detail:

Alberta Transportation - Design Guidelines for Erosion and Sediment Control for Highways.

Alberta Transportation - Field Guide for Erosion and Sediment Control for Highways.

Alberta Transportation - Fish Habitat Manual

Alberta Transportation - Navigable Waters Protection Act Manual

The City of Calgary - Guidelines for Erosion and Sediment Control

The City of Calgary - field Manual for Erosion and Sediment Control

The City of Edmonton - Erosion and Sediment Control Guidelines

The City of Edmonton - Erosion and Sediment Control Guidelines Field Manual

### 3 INTRODUCTION OF AN EROSION AND SEDIMENT CONTROL (ESC) PLAN

#### 3.1 Goals and Objectives

The main objective of erosion and sediment control is to protect our watercourses from pollution, primarily sediment pollution.

#### 3.2 Responsibilities

Erosion and sediment control is the responsibility of the Developer.

#### 3.3 Elements of an Effective ESC Plan

The following elements are to be considered in the preparation of an effective ESC plan:

##### .1 *Minimize Needless Clearing And Grading.*

Some areas of a development site should never be cleared or graded, or these activities should be restricted. This includes stream buffers, forest conservation areas, wetlands, springs, highly erodible soils, steep slopes and environmental areas.

##### .2 *Protect Waterways And Stabilize Drainage Ways*

Streams and waterways are particularly susceptible to sedimentation. Clearing adjacent to a waterway should not be permitted, and a silt fence should be installed along the perimeter of the buffer. Existing drainage ways should be identified; as these will likely be the major routes that eroded sediments will take to reach streams, rivers, and storm sewers. Drainage ways are also prone to erosion due to the high velocity of runoff. Erosion should be minimized.

*.3 Phase Construction To Limit Soil Exposure*

Large areas of grading should be avoided since this maximizes erosion potential. Construction phasing, where only a portion of the site is disturbed at one time, minimizes sediment load potential.

*.4 Stabilize Exposed Soils Immediately*

To provide soil stabilization, it is important to establish ground cover over the denuded area within a short period of time with the soils being exposed. Covers such as grass, mulch, erosion control blankets, hydro seeding and/or plastic sheeting can be used to achieve this.

*.5 Protect Steep Slopes And Cuts*

Steep slopes are the most highly erodible surfaces within construction sites. Steep slopes are generally defined as 6H:1V or greater. Where possible, clearing and grading of steep slopes should be avoided. Otherwise, special techniques, such as uphill flow diversion and silt fencing, should be used to prevent uphill runoff from flowing down the slopes.

*.6 Install Perimeter Controls To Filter Sediment*

Perimeter controls should be implemented at the edge of the construction site to retain or filter runoff before it leaves the site. Silt fences and earth dikes or diversion are two of the more common control methods.

*.7 Employ Advanced Sediment Settling Controls*

Even when the best ESC measures are employed, high concentrations of sediments may be discharged during larger storms. Therefore, the ESC plan should include some sediment traps or basins to allow captured sediments to settle out. To improve the trapping efficiency, these basins should be designed to incorporate such features as larger storage volumes, use of baffles, skimmer's and other outlet devices, and multi-cell construction. Regular inspection and maintenance are also critical to the operation of these practices.

*.8 Ensure Contractors Are Trained On ESC Plan Implementation, Inspection, Maintenance and Repairs.*

The most important element in the implementation of an ESC Plan is the training and experience of the contractors, as they are usually responsible for the installation and maintenance of the practices. In the end, everyone is responsible for the erosion and sediment control. Therefore, training and education is important for everyone, from the **Developer** to the **Homebuilder**. Everyone is working towards the same goal of protecting our waterways.

*.9 Adjust ESC Plan At Construction Site*

For an effective ESC Plan to be effective, it may have to be modified due to discrepancies between planned and as-constructed grades, weather conditions, altered drainage and unforeseen requirements. Regular inspections by the Consulting Engineer are needed to ensure that the ESC controls are working properly. Inspections should be conducted every seven days and following heavy rainstorms or snowfall events.

*.10 Assess ESC Practices After Rainstorms Or Snow Melt Events*

After a rainstorm or snow melt, it is usually clear whether an ESC Plan worked or not. If the event was unusually large or intense, it is likely that many of the controls will require repair, clean out or reinforcement. Therefore, a quick response to assess and correct damages of the control is required.

**3.4 Design of an Erosion and Sediment Control Plan**

An Erosion and Sediment Control Plan must be prepared for all construction projects. Best Management Practices should be indicated on the construction drawings.

General principles should consider the following:

- .1 Prevent pollutant release. Source control BMP's should be selected as the first line of defense.
- .2 Erosion and sediment control measures, or other BMP's, should be selected based on the site characteristics and the construction plan.
- .3 Site drainage and soil conditions should be reviewed to determine the most significant factors for the site and planned construction.
- .4 Runoff should be diverted away from exposed areas where possible.

- .5 Existing vegetation should be preserved.
- .6 The extent of clearing and phased construction should be limited.
- .7 Natural drainage features should be incorporated when possible. Adequate buffers should be used to protect areas where flows enter the drainage system. Keep clean water clean.
- .8 Minimize slope length and steepness.
- .9 Runoff velocities should be reduced to prevent channel erosion.
- .10 Prevent tracking of sediment off-site.
- .11 Select appropriate control measures for the control of pollutants other than sediment.

### 3.5 Erosion and Sediment Concerns and Practices

- .1 There are many erosion and sedimentation concerns that arise due to construction activities. These include, but are not limited to the following:
  - .1 Mud tracking from construction sites onto adjacent properties and roadways,
  - .2 Silt and debris washed into existing storm sewer (drainage) system,
  - .3 Silt and debris transported to receiving watercourse by surface runoff and the sewer system,
  - .4 Wind blown dust.
- .2 Good maintenance practices will help to minimize erosion and sediment concerns, and should be considered when preparing the construction schedule. While some may be impractical under certain conditions, others should be considered based on suitability, practicality and cost effectiveness.
  - .1 Stockpiles should be located away from watercourses, environmentally sensitive areas, drainage courses, and existing adjacent developments. The stockpiles should be stabilized against erosion immediately following stripping operations. Stabilization can include, but is not limited to establishment of a cover crop or hydro seed matrix consisting of seed, fiber bond and tackifier.



.2 All construction traffic should leave the site at a designated point or points. Graveling or paving (where practical) of frequently used access roads will help ensure that minimal material such as mud is tracked off-site. The access road should consist of a bed of non-erodible material (i.e. gravel) of sufficient length to ensure that a minimum of material (mud) is tracked off-site onto adjacent municipal roadways. Internal haul roads and/or track packs can also be designated and maintained to help reduce off-site tracking.

.3 When storm sewers have been installed or are existing, measures should be undertaken to ensure sediment and debris does not get into the municipal storm sewer system. Both catch basins and manholes should be protected. This may be accomplished by sealing the openings, setting up sumps or weirs inside the structure, or by providing appropriate inlet protection (filter fences, sediment traps, etc.). A temporary drainage system should be used with appropriate velocity controls and temporary storage areas for sediment control. This will ensure that sediment and debris do not get into the municipal storm sewer system and into the downstream waterways. Diligent efforts must be taken to ensure that the temporary drainage system does not flood adjacent properties.

.4 Where on-site or downstream detention facilities are provided, use can be made of a quality control facility (through placing temporary weirs or check dams) for sediment control during construction.

.5 Dust control measures should be implemented to prevent wind transport of dust from disturbed soil surfaces. This may be accomplished several ways:

- i Vegetate, hydro seed, or mulch areas that won't receive vehicular traffic,
- ii Construct windbreaks or screens,
- iii Site may be sprinkled with water or a chemical dust suppressant to control dust (care must be taken to prevent tracking of mud that may result), or
- iv A combination of the above noted methods.

.6 All accumulated sediment and debris should be removed as required. Once construction activities are complete, all related materials and temporary structures must be removed and properly disposed of.

## **4 BEST MANAGEMENT PRACTICES (BMP'S) FOR EROSION AND SEDIMENTATION CONTROL**

### **4.1 General**

BMP's for erosion and sedimentation control are various methods that have been proven to work on past construction sites when they are properly planned and constructed.

These measures reduce erosion potential by stabilizing exposed soil or reducing surface runoff flow velocity. There are generally two types of erosion control BMP's that can be used in conjunction with the minimum requirements. They are as follows:

- .3 source control BMP's for the protection of exposed surfaces; and
- .4 Conveyance BMP's for control of runoff.

These measures reduce off-site sedimentation potential by promoting sedimentation before surface water flows leave the construction site. There are generally two types of BMP's that can be used in conjunction with the minimum requirements of an erosion control plan. They are as follows:

- .1 *Filtering and Entrapment BMP's; and*
- .2 Impondment BMP's

It is the Consultant's responsibility to ensure that BMP's are appropriate for the site conditions.

### **4.2 Erosion and Sediment Control BMP's**

This clause provides general information on BMP's that may be used in the City of Lacombe . Additional information can be found in the references noted in Clause 2. The following list includes BMP's that would be most likely used in an urban setting. Non-inclusion of BMP's in this list does not mean that a BMP is not acceptable in Lacombe. The Consultant is to use flexibility and good judgment to select BMP's appropriate for the site and situation.

- .3 *Permanent Best Management Practices*

Permanent BMP's to be incorporated in the final site storm water plan may include:

- .1 Storm water ponds,
- .2 Armouring,
- .3 Vegetation,
- .4 Constructed wetlands,
- .5 Sediment (Grit) Separation Storm water Treatment Units.

For permanent ESC installations:

- .1 Make sure the proper vegetation is being used in each situation.
- .2 Pond and pipe situations are designed to overflow, therefore plan for the pond overflow situation. Know where the overflow will go and provide the required surface armour.

.2 *Erosion Control BMP's*

Erosion control BMP's protect the soil surface and prevent soil particles from being detached by rain and wind. These tend to be the least expensive and most effective BMP's. Erosion control treats soil as a resource with value and works to keep it in place. Erosion control BMP's are the first line of defense against erosion and sedimentation. Temporary BMP's are intended to address temporary conditions, be easily removed or be biodegradable. The following list includes some of the current erosion control BMP's. Other erosion control BMP's may also be considered.

- .1 Preservation of existing vegetation,
- .2 Construction sequence scheduling,
- .3 Just-in-time grading,
- .4 Slope treatments,
- .5 Seeding,
- .6 Mulches,
- .7 Hydroseeding and hydromulching,
- .8 Erosion control netting,
- .9 Erosion control blankets, and
- .10 Rip-rap

.3 *Temporary Sediment Control BMP's*

Sedimentation control BMP's help collect sediment on the site in selected locations and minimize the sediment transfer off the site. Sedimentation controls are generally passive systems that rely on filtering or settling of soil particles out of the water or air. Sedimentation controls treat soil as a waste product and works to remove it from the transport system. Sedimentation control BMP's are the last line of defense against erosion and Sedimentation. The following list includes some of the current sediment control BMP's. Other erosion control BMP's may also be considered.

- .1 Sediment basins,

- .2 Sediment traps,
- .3 Sediment barriers,
- .4 Inlet protection measures,
- .5 Stabilized construction entrance,
- .6 Dust control,
- .7 Brush/rock filter berms,
- .8 Dewatering.

#### 4.3 BMP Installation

The sequence of BMP installation must minimize erosion and sedimentation. The following should be considered:

- .1 Established methods may not meet the objective of preventing erosion and sedimentation.
- .2 If the contractor can demonstrate that substitute materials can provide the same level of protection, then alternative methods may be considered.
- .3 Consider the proposed approach and methods in light of achieving the desired goal as well as the economics.

The Consultant and the Contractor should consider the following when designing, installing and maintaining the BMP's:

- .4 *Time the grading work to avoid rainy periods where possible (typically mid June to early August),*
- .5 Leave as much undisturbed vegetation as possible,
- .6 Minimize the duration of soil disturbance,
- .7 Disturb and then restore small areas rather than fewer large areas,
- .8 Protect soil stockpiles from eroding and trap sediment,
- .9 Break up slope lengths, reduce slope steepness, and control flow concentrations,

- .10 Emphasize erosion control by vegetating, mulching or stabilizing disturbed areas quickly,
- .11 Direct runoff away from disturbed areas,
- .12 Design and construct drainage channels and outlets to handle concentrated flows until permanent structures and vegetation are functional,
- .13 Use sufficiently sized temporary sediment basins, traps, etc.,
- .14 Inspect and maintain control measures, especially before and after storms,
- .15 Install backup BMP's upstream of critical areas and have materials available for emergencies,
- .16 Keep good records.

BMP's will not work properly unless they are installed properly and in accordance with specifications and the manufacturer's recommendations. Regular inspection and maintenance of BMP's is required to keep them fully functional. Deficiencies in quality control can make the ESC situation worse and lead to disastrous failures.

## **5 EROSION AND SEDIMENT CONTROL (ESC) REPORT AND PLAN**

### **5.1 Introduction**

The ESC Plan must be submitted to the Engineering Services Department for review of the Plan. **It is not the responsibility of the Engineer or the City of Lacombe to ensure that the ESC plan is appropriate for the level of work suggested by the proposed project.** Ultimately the Developer, who is entitled as the registered and equitable owner of development lands, is responsible for all aspects of the ESC Plan, including compliance with all applicable legislation.

The Outline Plan Erosion and Sediment Control Report provides a *brief* description of the overall strategy for ESC. The Erosion and Sediment Control Report is a description of the overall strategy for ESC. It should summarize the aspects of the project that are important for erosion and sediment control and should include:

- .1 Location and Site Characteristics
- .2 Proposed Development Characteristics

- .3 Erosion and Sediment Controls

## 5.2 Location and Site Characteristics

- .1 Describe the location of the proposed development, including a legal description of the site and a reference to adjacent properties and landmarks.
- .2 Describe the existing land use:
  - .1 General topography.
  - .2 Vegetation
  - .3 Soil types (approximate particle sizes, erodibility).
  - .4 Extent and nature of development.
  - .5 Drainage patterns.
  - .6 Critical areas within the proposed development site that have the potential for serious erosion or sediment problems.
- .3 Identify neighbouring areas such as streams, lakes, residential, commercial and/or industrial areas, environmental and/or municipal reserves, escarpments, and/or roads that may be effected by the land disturbance.

## 5.3 Proposed Development Characteristics

- .1 Provide a general description of the proposed development with a brief description of the land disturbing activity.
- .2 Indicate the area and the amount of grading for each phase of development.
- .3 Describe the permanent storm water management system and the use of these facilities during the construction period.

## 5.4 Erosion and Sediment Controls

- .1 Provide a description of the methods that will be used to control erosion and sediment transport on the site. Stabilization of soils should be the first line of defense.

- .2 Identify permanent and temporary control methods for each phase of development.
- .3 Determine the impact on the receiving water bodies Wolf Creek or Whelp Creek if the erosion and sediment controls are breached or fail.
- .4 Indicate good “housekeeping” practices.
- .5 Show the location, height and volume of stockpiles. Indicate erosion control measures to control sediment runoff from the stockpiles.
- .6 Indicate the types and scheduling of individual erosion control measures, including interim or short-term measures (Less than 45 days duration).
- .7 Clearly indicate the measures to control sediment export off the development site.
- .8 Describe how the site will be stabilized after construction (site grading and servicing) is completed.

#### **5.5 Modifications to ESC Plan**

The ESC Plan must be a stand-alone document that can be located on the construction site for use by site personnel, inspectors and regulators. As site work progresses, the ESC Plan should be modified by the consultant and/or contractor, in consultation with City staff, to reflect changing conditions.

#### **5.6 Inspection and Maintenance**

- .1 Establish a schedule of regular inspections and expected repairs of erosion and sediment control devices.
- ~~.2~~ Record changes to the ESC Plan due to changing conditions, revised phase boundaries, etc.