SECTION	CLAUSE/DRAWING NUMBER	DATE OF REVISION
Section 13 Typical Design Drawings	Drawing 4.03 – 4.04 Drawing 5.10 – 5.20	September 2020
Section 11 Roadway Design	Clause 1 –Road and Street Classification Clause 4 – Curb, Gutter and Sidewalks Clause 7 – Roadway Construction Clause 13- Fencing Appendix A & B	September 2020
Section 10 Shallow Utilities Standards	Clause 1 – General Clause 2 – Electrical System	September 2020
Section 11 Road Design Standards	Clause 11- Pavement Marking and Traffic Control Signs	April 2020
Section 3 Engineering Services Guidelines	Clause 7 – Post Construction Services	August 2019
Section 13 Typical Design Drawings	Drawings 5.14 – 5.20, Compaction Standards	July 2017
Section 8 Storm Water Management	Clause 1.9 - Lot Drainage	July 2017
Section 13 Typical Design Drawings	Drawing 3.06 – Lot Drainage Swale	July 2017
Section 9 Service Connections Standards	Clause 10 – Inspection Manholes	December 2016
Section 13 Typical Design Drawings	Drawing 1.05 – Offline Hydrant Detail	December 2016
Section 13 Typical Design Drawings	Drawing 4.02 – Service Layout	December 2016
Section 13 Typical Design Drawings	Drawing 6.02 – Sample Information Sign	December 2016

City of Cold Lake

CITY OF COLD LAKE

Municipal Engineering Servicing Standards
September 2020

SECTION 4 – EROSION AND SEDIMENT CONTROL MEASURES

SECITON 5 – SITE CLEARING AND GRADING GUIDELINES

SECTION 6 – WATER DESIGN STANDARDS

SECTION 7 – SANITARY DESIGN STANDARDS

SECTION 8 – STORMWATER MANAGEMENT DRAINAGE SYSTEMS

SECTION 9 – SERVICE CONNCECTIONS STANDARDS

SECTION 10 –SHALLOW UTILIIES STANDARDS

SECTION 11 – ROADWAY DESIGN STANDARDS

SECTION 12 – LANDSCAPING STANDARDS

SECTION 13 – TYPICAL DESIGN DRAWINGS TABLE OF CONTENTS

END OF SECTION

The Municipal Engineering Standards and Guidelines Manual provides information regarding The City of Cold Lake's Standards governing subdivision design, servicing, standards, the design and construction approval process, and the as constructed drawing submission requirements. The Infrastructure Services Department requirements alone do not constitute the only conditions of Development in the City of Cold Lake. Planning and Development, Inspections and Licensing Department, and other City Departments should be contacted to determine pertinent Development requirements.

The primary focus of this document is to aid the Developer or Consulting Engineer in the preparation of Construction Drawings. It is incumbent upon the Consulting Engineer / Developer to ensure that the design conforms to these Guidelines as well as any Servicing Studies and Functional Plans the City of Cold Lake has in their possession. These studies are available at City Hall and available on a sign out basis. Any deviations from the City of Cold Lake Engineering Standards have to be approved by the City of Cold Lake. It is the responsibility of the Consulting Engineer and/or the Developer to notify the City if any deviations from City Standards are being proposed.

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 minimum requirements. Where unusual or complicated design situations arise, sound best practice engineering should prevail. The City reserves the right to require a deviation from these Guidelines where conditions warrant same.

This manual will be updated from time to time.

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

Section 1: General Information

Definitions, general Development Agreement information, community mailbox request 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 Substantial Construction Completion Certificate, Construction Completion Certificate (CCC) and Final Acceptance Certificate (FAC) inspection reports.

Section 4: Erosion and Sediment Control Guidelines

Specific requirements for the implementation of Erosion and Sediment Control Measures to be implemented in conjunction with Site Clearing and Grading.

Section 5: Site Clearing and Grading Guidelines

Specific requirements for the design and implementation of Site Clearing and Grading.

Section 6: Water Design Standards

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

Section 7: Sanitary Design Standards

Specific requirements for the design of the sanitary sewer system.

Section 8: Storm Water Management Standards

Specific requirements for the design of the Storm Water System, including major drainage, minor drainage and detention/retention ponds.

Section 9: Service Connection Standards

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

Section 10: Shallow Utilities Standards

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

Section 11: 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 12: Landscaping Standards

The City of Cold Lake's requirements with respect to development and landscaping of Municipal Reserves, Neighborhood Park Sites, and Detention Ponds should be directed to the Community Services Department.

Section 13: Design Drawings

The Design Drawings are supplemental to the various Sections and illustrate the design criteria/concepts noted in text form.

END OF SECTION

1. DEFINITIONS

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

.1 "City" shall mean the Corporation of The City of Cold Lake in the Province of Alberta.

.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 Guidelines.

.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 Guidelines and The City's Detailed Contract Specifications

.4 "Consulting 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 "Developer" shall mean the registered and equitable owner of the Development lands including, but not restricted to, the Consulting Engineers, Contractors, and/or Subcontractors acting for or on behalf of the owner.

.6 "Development" shall mean the area to be serviced, as determined by the Developer

.7 "Development Agreement" shall be the document prepared by The City specifying legal, administrative, and technical requirements of the Developer.

.8 "Ecological Profile" means a report p which identifies all natural features (treed and wetland areas) located on undeveloped land in the City and rates them for preservation purposes.

.9 "Electrical Specifications" shall mean Atco Electric's Construction Specifications to which the power and lighting portions of the Municipal Improvements must conform.

.10 "Engineer" shall mean the Director of Public Works and Infrastructure Services or an approved designate.

.11 "Level One Landscaping" means the work included in preparing the site to specified grades, placing and leveling topsoil, seeding to grass, and establishing turf; all in accordance with the City's current Design Guidelines 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 Guidelines and Standard Specifications.

.13 "Level Three Landscaping" means the work included in supplying and installing various park facilities and/or amenities (e.g. Trails, trail directional signs, playground equipment, bollards, post and cable fencing, site furnishing ect.) all in accordance with the City's current Design Guidelines and Standards 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 Guidelines.

.15 "Municipal Improvement" 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 paved, concrete and/or shale walkways
.9 park and recreation amenities (e.g. playground equipment, benches etc.); and
10 traffic control, street name, subdivision information (including updates) signs

.16 "Professional Engineer" shall mean a licensed member of the Association of Professional Engineers, Geologists, and Geophysicists of Alberta.

.17 "TAC" refers to the Transportation Association of Canada.

2. COMMUNITY MAILBOXES

2.1 General

The Consulting Engineer shall submit a copy of the Neighborhood Area Structure Plan and a copy of the current Subdivision Plan along with a request for mailbox locations to:

Delivery Planning
Canada Post Prairie Region
Suite 400, 9828 – 104 Avenue NW
Edmonton, AB T5J 4Y4

Telephone Number 780-944-3002

E:mail: tim.palmar@canadapost.ca

2.2 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 & Postal Code Management
Address Management
Suite N0813 – 2701 Riverside Drive
Ottawa, Ontario K1A 0B1

Canada Post 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 criteria, wherever possible.

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

Note: Current design standards for local roadways allow for a boulevard (back of walk to property lines) to accommodate shallow utilities and street furniture; however, the width of the concrete pad for the community mailbox is 1.2m (back of walk to back of pad). The length of the pad parallel to the sidewalk will vary depending on the number of modules to be located at any location. The developer will be required to provide a 0.5m easement along the side yard of a lot at these locations to allow for the encroachment of the community mailbox onto private property.

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 10m from a fire hydrant or bus stop.

.7 Not on a utility easement or over a utility trench (deep or shallow).

.8 Not too close to streetlight standards, street name poles or any raised utility boxes such as a transformer.

.9 The location of the boxes shall not impede the pedestrian and vehicular sight distances.

.10 Community mailboxes are normally installed within public road rights of way. Multiple unit developments, such a 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.

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 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 drawing and sales brochures.

3. ALBERTA ENVIRONMENTAL PROTECTION STANDARDS & 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 2006 edition of the above noted standards is to be used in conjunction with the City's Design Guidelines and the minimum requirements of each must be met.

4. ALBERTA ENVIRONMENT APPROVALS

4.1 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

Effective October 1993, Alberta Environment has introduced 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.

Until notification is received from the Director responsible for Alberta Environment, the following documents are to be submitted to Alberta Environment:

.1 Letter of Authorization for extension to a waterworks, wastewater or storm drainage system

.2 An amendment to the City's wastewater and storm drainage permit. Please Note that the permit amendment must be posted for a 30 day appeal period. The permit amendment will be issued following the appeal period.

4.2 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 & Storm) Collection System..

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

4.3 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) System 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 system 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 system, 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 will not allow construction to proceed until copies of the required Code notices have been received.

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 Pipeline 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:

http://www3.gov.ab.ca/env/water/legislation/CoP/

5. CROSSING, PROXIMITY, GROUND DISTURBANCE AND/OR ENCROACHMENT AGREEMENTS

5.1 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.

5.2 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 the initial drawing submission to the City.

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

.1 A covering 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 by the Developer.

.3 Three copies of drawings (11 x 17 or 8 ½ x 11) clearly marking in RED the location of the proposed crossing proximity, ground disturbance, and/or encroachment. Plan/profile drawing are required for all crossings.

.4 If an Encroachment Agreement is needed, then the applicant shall provide a current up to date Certificate of Title.

5.3 High Pressure Gas Main Crossing

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. These Crossing Agreements typically take 6 to 8 weeks. Appendix C, appended to this Section, illustrates the application format.

6. ROAD CLOSURES AND DETOURS

6.1 General

The Developer must submit an application for a road closure or detour to the Engineer at least four (4) 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 one (1) week prior to the start of any work.

All signing must be in accordance with the City Construction Specifications, Sections 01570 and 02890.

6.2 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 Engineer 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.

The application shall be prepared in accordance with the City of Cold Lake's Temporary Road Closure Policy 101-OP-08:

7 DEVELOPER'S SUBDIVISION SIGNS

7.1 Subdivision Map Signs

Subdivision Map Signs shall be installed on collector roadways ,expressway/collector or arterial/collector roadway intersections. The signs should show the total area that uses the same prefix letter (i.e. Deer Park – 4 ¼ Sections). Subdivision maps (or revisions to same) shall be included in the submission of the Engineering Design Drawings and approved by the Public Works and Infrastructure Services Department.

7.2 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 neighborhood park site

.4 any other amenities that would be of interest to perspective homeowners

The signs shall be similar in design to the sample "Subdivision Information Signs" included in Section 13 – Drawings of the City of Cold Lake Municipal Engineering and Servicing Standards.

7.3 Neighborhood School/Park Site Signs

Neighborhood Park Site Information Signs shall be installed near the boundary of the Neighborhood Park Site indicating where the public may obtain information related to the Neighborhood Park Site development. The sign shall be similar in design to the sample "Subdivision Information Signs" included in Section 13 – Drawings.

Future school site indicating where the public may obtain information related to the future construction of a school. The sign shall be similar in design to the sample "Subdivision Information Signs" included in Section 13 – Drawings.

7.4 Detention Pond Warning Sign

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. The sign shall be similar in design to the sample "Detention Pond Warning Signs" included in Section 13 – Drawings.

Sign locations shall be shown on the Engineering Drawings.

7.5 Street Name Signs

Street Name Signs shall conform to Pubic Works Department's standards.

7.6 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.

.2 The sign should be located as shown in Section 13 – Drawings.

.3 A Development Permit is not required of the construction of any entrance signs. The location of any entrance sign must be reviewed and approved by the Engineer.

.4 Drawings showing the proposed sign location shall be forwarded to the Infrastructure Services Department and the Planning and Development Department for review and approval.

END OF SECTION

ALBERTA ENVIRONMENTAPPLICATION LETTER SAMPLE

Date

Mr. Alberta Liu, Municipal Approvals Engineer
Alberta Environment
Regional Services
Northern Region
111 Twin Atria Building
4999 – 98 Avenue
Edmonton,, AB T6B 2X3

Dear Sir:

Re: Application for Letter of Authorization for the Storm water Drainage Treatment Facilities or Strom Outfall

OR

Notification for Extension to a Waterworks, Wastewater, or Storm Drainage System
For (Name of Developer)
(Name of Subdivision and Phase Number)
In ¼ Section - 38 – 27 – W4 in the City

Please accept this letter for the above noted project. The following outlines the project information.

1.	Owner's Name	"Name of Developer"
2.	Project Name:	"Subdivision Name & Phase Number
3.	Project Type	Construction of water mains, sanitary sewer mains, storm sewer mains and service connections.
4.	Project Description	"Provide brief description of work"
5.	Project Location:	"Quarter Section Description"
6.	Material Specification	See Attached City Fact Sheet
7.	Disinfection Procedures:	See Attached City Fact Sheet
8.	Standards Confirmation:	See Attached City Fact Sheet
9.	Minimum Pipe Separation:	The minimum horizontal separation between water and sewer is ___m and the vertical separation is ___m
10.	City Water System	See Attached City Fact Sheet
11.	City Sanitary System	See Attached City Fact Sheet
12.	City Storm System	See Attached City Fact Sheet

13.	Municipal Confirmation & Awareness	The attached detailed design drawings have been prepared based on Neighborhood Area Structure Plan approved by City Council on _____ and a Servicing Plan approved by the Infrastructure Services Department on _____. The city Infrastructure Services Department reviewed the proposed construction drawings on _____,
14.	Construction Schedule:	Construction on this project is proposed to start on _____ and to be completed by _____.

Enclosed please find plans for the proposed construction.

Yours truly,

Xx/yy
Encl.
Att:
c. Infrastructure Services, City of Cold Lake

THE CITY OF COLD LAKE
INFRASTRUCTURE SERVICES DEPARTMENT

FACT SHEET

1. Standards and Specifications

.1 The Developer is required to confirm that this project has been designed in accordance with and conforms to:

.1 Alberta Environment's Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems

.2 The City's Design s Standards

.3 The City's Contract Specifications

.2 The City's Specifications state, in part, as follows:

.1 Section 02511: Water Mains – Materials

Polyvinyl chloride pressure pipe to CAN3-B.137.3 (AWWA C900 for 100 mm to 300 mm diameter pipe and AWWA C905 for 350 mm to 900 mm diameter pipe), pressure class 150, DR 18.

.2 Section 02511: Water Mains – Execution

All flushing and disinfection procedures to be in accordance with the most recent edition of City of cold Lake Municipal Engineering Servicing Standards.
Prior to the flushing and disinfection procedure the developer or their agent shall submit the dosage calculations to the City of Cold Lake. All super chlorinated water shall be de-chlorinated and tested in accordance with the City of Cold Lake Standard for the Disinfecting and Testing of Water Mains

.3 Section 02530: Sanitary Sewer Mains – Materials

.1 Polyvinyl chloride pressure pipe to CSA B.182.1 and B182.2 (ASTM D3034), SDR 35.

.2 Ultra-Rib and Royal Kor-Flo PVC pipe to CSA B.182.4 (ASTM F794)

4. Section 02560: Storm Sewer Mains – Materials

.1 Reinforced circular concrete pipe to ASTM C76, Sulfate resistant (Type 50 cement), and designed for flexible rubber gaskets.

.2 Catch Basin Leads:
Polyvinyl chloride pressure pipe to CSA B.182.1 and B182.2 (ASTM D3034), SDR 35.

Ultra-Rib and Royal Kor-Flo PVC pipe to CSA B.182.4 (ASTM F794)

2. Municipal Water System

Refer to Section 6 of the City of Cold Lake Municipal Engineering Servicing Standards.

3. Municipal Sanitary System

Refer to Section 7 of the City of Cold Lake Municipal Engineering Servicing Standards.

4. Municipal Storm System

.1 Surface storm water run off from existing and proposed developments is split into two drainage basins and transported through buried pipe systems, overland surface systems or a combination thereof to Palm Creek and the Beaver River, or to Cold Lake (the lake). The City of Cold Lake has developed a Master Drainage Plan which Developers and consultants must use as a guide for the management of stormwater. There must be a concentrated effort by the developer or their consultant to utilize best management practices to improve the quality of stormwater prior to its discharge to the receiving water body.

.2 Refer to Section 10 of the City of Cold Lake Municipal Engineering Servicing Standards.

ALBERTA ENVIRONMENTAL FACT SHEETS AND APPLICATION FORMS

The following Alberta Environment Information Sheets, Fact Sheets and Application Forms have been provided to assist the Consultant in applying for and receiving timely approval for the construction of Municipal Improvements in a development.

1. Extending Water Distribution and Wastewater Collection Systems Information Requirements

2. Water Act Fact Sheet – Approval and Licenses

3. Water Act Fact Sheet – Additional Information on Approvals and Licenses

4. Application under the Water Act for Approvals and/or Licenses

5. Written Notification for Extension to a Waterworks, Wastewater or Storm Drainage System.

6. Application for a letter of Authorization for Strom Drainage Treatment Facilities

7. Notice under Code of Practice Water Act

   (Notification for the placement, construction, installation, maintenance, replacement or removal of a watercourse crossing)

8. Notice under Code of Practice – Water Act

   (Notification for the placement, construction, installation, maintenance, replacement or removal of Pipelines or Telecommunications Line Crossing)

9. Application For Shoreline/Water body Modification Under the Public Lands Act and the Water Act.

   (Included Application for Aquatic Vegetation Control, Bank Stabilization, Beach Construction, Domestic Waterline, Erosion Protection, Outfall Construction, Permanent Boat Launch, Permanent Pier Site, Reservoir Construction, and/or Other Noted Work)

EXTENDING WATER DISTRIBUTION AND WASTEWATER COLLECTION SYSTEM

INFORMATION REQUIREMENT

ALBERTA ENVIRONMENT OCTOBER 2003

Approval or Registration holders, or their authorized agents (such as developers or consultants) must provide certain information to Alberta Environment, prior to construction, as part of the written notice required when extending or replacing water mains, sanitary sewer and/or storm sewers.

INFORMATION THAT MUST BE PROVIDED

- The approval or Registration number for the facilities
- The location of the project (name of municipality/development)
- The type of project (water, sanitary sewer, storm sewer)
- Confirmation by a professional engineer that the increased flows associated with the extension are within the design capacity of the existing distribution or collection system
- Confirmation by a professional engineer that the additional loading as a result of the extension is within the design capacity of the system supplying treatment
- Confirmation that all aspects of the design meet Alberta Environment's Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage System.
- Any other pertinent information

The approval or registration holder must also meet the specific requirements of their approval.

The director (at Alberta Environment) must authorize any waterworks system being extended to a new development that is not serviced by a wastewater system authorized under the Environmental Protection and Enhancement Act (EPEA)

The director must be satisfied that the wastewater produced as a result of supplying water can be satisfactorily handled by other means.

Construction may proceed on projects where the director or inspector has requested to review the plans and specifications.

IF THE DESIGN DOES NOT MEET STANDARDS

If all aspects of the design do not meet Alberta Environment's Standards and Guidelines for Municipal Waterworks, Wastewater, and Storm Drainage Systems, the project cannot proceed until the director has issued written authorization.

The approval or registration holder must indicate why the standards cannot be met and justify the alternative proposed design.

For projects that include new storm water ponds and/or outfalls to a water body or drainage course, the approval or registration holder must also obtain an additional authorization or registration as required by EPEA and its associated regulations.

A separate application under the Water Act may also be required for projects involving storm water ponds and/or outfalls. Check with you regional district office of Alberta Environment.

RANDOM COMPLIANE INSPECTIONS

As part of an ongoing compliance inspection program, Alberta Environment may conduct random, unannounced inspections of construction activity.

Extensions to water distribution and wastewater collection and storm drainage systems that do not meet Alberta Environment's Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems may be subject to enforcement action.

For more information, contact your regional district Alberta Environment office.

WATER ACT

FACT SHEET

APPROVAL AND LICENCES

ALBERTA ENVIRONMENT

Alberta's Water Act requires that an approval and/or license be obtained before undertaking a construction activity in a water body or before diverting and using water (surface water and groundwater)

An approval provides authority for constructing works or for undertaking an "activity" within a water body. The approval will include conditions under which the construction or "activity" must take place.

A license provides authority for diverting and using surface water or groundwater. The license identifies the source of water supply, the location of diversion site, an allocation of water to be diverted and used from that source, the priority of the "water right" established by the license, and the conditions under which the diversion and use must take place.

When do I need to apply for approvals for licenses?

The following lists the activities in water bodies and diversions of water that do not require approvals or licenses:

Approvals are NOT required for

Placing, constructing, installing, maintaining, replacing or removing

- floating platforms, portable or seasonal piers, boat launches or docks
- fences in water bodies
- portable pumps if there are no significant alterations or disturbances of bed sand shores of water bodies
- beaver dams on land owned by the individuals requiring removal
- water wells if the water is to be used for household purposes
- dugouts where the dugouts are not located in watercourses, lakes or wetlands

Commencing, continue or conducting exploration for groundwater for the purpose of obtaining information in support of an application for a license to divert water.

Any surface water control system defined and approved in the Agricultural Operation Practices Act.

Licenses to Divert Water and NOT required for

- statutory household use
- traditional agriculture use
- fire fighting
- wells equipped with hand pumps
- operating an alternate watering system, using surface water for livestock that are generally grazed

For further information on other approval and license exemptions, please contact the nearest Regional office.

How do I apply for an approval or a license?

Application forms are available at the regional offices and can be filed at these offices. The completed application form should have the following supporting information

Plans

Accurate drawings of the project showing:

- suitable scale and legal land location tied to section or quarter section lines
- features such as water bodies with flow directions, roads, buildings such as pump houses, ect.
- If applicable, water and wastewater conveyance structures, such as ditches, canals, water supply lines, wastewater discharge channels, ect.
- Location if intake structures, control structures, spillway, dam and reservoir locations, including cross sections of structures, dams and reservoirs
- Layout of the water system and indicate the location and extend of the lands to be serviced
- If applicable, number of acres to be irrigated, irrigable areas to be shown cross hatched
- If applicable reservoir capacity elevation rating curve

Depending on the type and complexity of the structures, it may be necessary to submit additional detailed plans

Conceptual plans may be accepted for initial processing on the understanding that construction plans will be forwarded for review. One set of plans will be require for the initial processing

Reports

Depending on the complexity of the project, the following information may be required:
Project description including;

- Construction specification
- Proposed construction schedule
- Operational plans
- Water requirements
- Method of operation
- Anticipated operating capacity of pumps

Hydrologic analysis indicating potential adverse effects on;

- The source of water supply
- Neighboring lands, works and water supply
- The aquatic environment

For irrigation projects involving agricultural crop production, and Agricultural Feasibility Report indicating;

- Soil and water suitability for irrigation
- Water requirements for irrigation
- Losses
- Method of operation

Geotechnical information for dykes and dams falling within the Dam Safety Branch Guidelines.

Other Requirements

You may be required to submit written permission for right of access from appropriate authorities where works affect highways, roads, utilities or lands.

Authorizations under other legislation may be required. You will be informed of these during the review of your application.

What happens to my application after Alberta Environment receives it?

Regional staff will review your application for

- Hydraulic, hydrological and hydro geological effects
- Effect on the aquatic environment
- Effects of public safety
- Effects on licensees, household and other water users
- Suitability of the land for irrigation, if irrigation is involved

Also, the applications may

- Be referred to other agencies that have interests in the project
- Require notification in the form of a public notice to appear in appropriate newspapers or postings at specified locations
- Require resolution of concerns received from the referrals and/or notification

Water Act Application
Review Process

Application submitted to Alberta Environment

Application reviewed by Alberta Environment for completeness and;

- Additional information, if required
- Referrals to other agencies for concerns
- Public notice requirements
- Applicable license fee

Identify and review issues resulting from public notice

Process appropriate authorization

Appeals to Environmental Appeal Board

Follow ups such as

- Extensions, amendments, cancellations
- License renewals
- Submission certificate of completion
- Natural flow declaration
- Compliance

Approvals/Licenses

Approvals:
If the director decides to issue an approval, the applicant will receive an approval with conditions attached. The approval holder will have a certain period of time to construct the project.

Once the project is constructed, the approval holder will be required to submit a certificate of completion that certifies the project is completed according to the approval.

Licenses:

Following the submission of the required information, consideration will be given to issuance of a license granting the allocation and use of surface water or groundwater. The license may be issued providing there is evidence the water source can supply the needs of the applicant and nearby users, and that the diversion of water has no adverse effect on the source, surrounding users, and the environment. Licenses may include conditions requiring the licensee to submit water monitoring date, quantities of water diverted, investigation of users impacted by the licensee's diversion and monitoring of nearby sources.

A license will have an expiry date based on the type of project or on the applicants estimations of how long the project will be in existence.

Appeals

Decisions made, regarding applications or approvals and/or licenses, are subject to appeal. An applicant, a person who submitted a statement or concern, or an individual who is directly affected may submit an appeal to the Environmental Appeal Board.

License Fee

Where the applicant requests an annual diversion of water exceeding 62 500 cubic meters, a license fee is assessed and obtained prior to the issuance of the license.

Fee Schedule

Annual Diversion Cubic Meters (m^3)	$ Fee
0 – 62 500 m^3	0
62 501 to 75 000 m^3	$ 90.00
75 001 to 87 500 m^3	$ 105.00
87 501 to 100 000 m^3	$ 120.00
100 001 to 112 500 m^3	$ 135.00
112 501 to 125 000 m^3	$ 150.00

For diversion in excess of 125,000 m^3, please contact the nearest regional office for license fee information

Supplemental Information

The following information is available in a separate package or when available, on website

http://www3/gov.ab.ca/env/water/legislation/index.html

Submit applications to your nearest regional office:

http://www3.gov.ab.ca/env/water/legislation/RegionalContacts.html

WATER ACT

FACT SHEET
ADDITIONAL INFORMATION ON APPROVALS AND LICENSES

1. INDUSTRIAL RUNOFF, STORM WATER AND SEWAGE LAGOON DRAINAGE OND OUTFALL WORKS
2. MODIFICATIONS OF LAKESHORES OR OTHER WATER BODIES.

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1. Industrial Runoff, Storm Water and Sewage Lagoon Drainage and Outfall Works

The following are some legislative requirements for persons to obtain approvals authorizing the development and maintenance of these works;

- The Water Act (WA) for constructing drainage channels and outfall structures affecting natural water bodies
- The Environmental Protection and Enhancement Act (EPEA) for ensuring works are constructed according to provincial standards. EPEA also sets the standard for the quality of effluent, time of release, and ensures reclamation is done according to standards
- The Public Lands Act (PLA) for accessing crown owned bed and shore and on other public lands where construction is to be located

A "one window" process is in place (and currently being revised) to ensure coordinated issuance of approvals and joint public notification.

All new developments must provide storm water management to

- Minimize potential downstream flooding and erosion
- Not adversely affect the hydraulic capacity of existing watercourses through the development
- Have the develop area above the 1:100 year flood level
- Include runoff control through storage with:
  - a maximum release rate equal to rep development rate unless it can be shown the outlet is adequate
  - detention or retention facilities for flood events up to and including the 1:25 year event, except where it can be shown an adequate outlet exists that an increased runoff release rate will not do any harm – events greater than the 1:25 hear event must be maintained at the pre development rate for any given event and no development is allowed within the 1:100 year flood plain

- reduce, to acceptable levels, the potential risk of health hazards, loss of life, and property damage from flooding
- reduce, to acceptable levels, the incidence of inconvenience caused by surface ponding and flooding
- integrate and conform the proposed design with the approved master drainage plans
- minimize the impact, especially during construction on
  - the groundwater regime
  - increased erosion or
  - increased sediment transport
- maintain the natural stream geometry

2. Modifications to Shoreline of Lakes or other Water Bodies

A "one window Protocol for Proposed Activities involving Modification for Lakeshores or other Water Bodies", including

a single application form pursuant to the Water Act and the Public Lands Act, was implemented (and currently being revised) to simplify the process or issuing the required authorizations under these two Acts.

The proponent may submit a completed application form along with all the supporting information to the:

- district or regional offices of the Public Lands Division, Alberta Agriculture, food and Rural Development of
- regional office of Regional Support Service, Alberta Environment.

Application under the Water Act
For Approvals and/or Licenses

Documents or information provided to Alberta Environment pursuant to section 15(1)(a) of the Water (Ministerial) Regulation are public records and are accessible by the public.

Check one or more of the following to indicate type of application:

Diversion of water ☐ Renewal of License ☐ Constructing Works ☐

Applicant

Print Name and Company Name (if applicable)		Home Telephone:	Bus. Telephone:
Address (Street, PO. Box etc)	City, Province	Postal Code:	Fax

Are you the registered landowner? ☐ Yes ☐ No If no, please attach a copy of consent form from landowner.

Consultant, Signing Authority, or Applicant's Representative (if applicable)

Print Name and Company Name (if applicable)		Home Telephone:	Bus. Telephone:
Address (street, box etc)	City, Province	Postal Code:	Fax:

Contact Person if not shown above:

Print Name:	Telephone:	Fax:

Project Description:

Tentative Starting Date: _____ Duration of Construction/Development_____
(if applicable)

Duration of Water Diversion/Use: _____

Provide a detailed description including location of works and activities relating to the project and attach plans:

_____

_____

_____

_____

_____

_____

Affected Water Sources (Location of Works and Activities):

Surface Water (if only constructing works, complete the first two columns):

Source (lake, stream or name of source if known)	Diversion/Activity location ¼ Sec. Twp Rge Mer.	Annual Quality (cubic meters)	Rate of Diversion (show units)	Is Construction or Development Required? (yes/no)	Purpose
1.					
2.					
3.					

Groundwater:

Date Well Drilled or proposed drilling date	Well (proposed) Location ¼ sec. twp. Rge. m	Total Depth (meters)	Production interval (meters)	Pumping Rate (show units)	Annual Quantity (cubic meters)	Purpose
1.						
2.						
3.						

Please attach a separate sheet if you wish to provide more information.

Statement of Confirmation:

The information given on this form is true to the best of my knowledge.

_____	_____	_____	_____
Date of Signing	Signature	Print Name	Company Name

Return the completed form to an Alberta Environment Regional office nearest you:

Northern Region, Peace River	Northern Region, Edmonton	Central Region, Stony Plain	Central Region, Red Deer	Southern Region, Calgary	Southern Region, Lethbridge
Bag 900 – 5 Provincial Bldg.	Twin Atria	523322 Golf Course Rd.	304 Provincial Bldg.	200, 3116-12 St. NE	2nd Fl. Provincial Bldg.
9621 – 96 Ave.	111, 4999 – 98 Ave.	Stony Plain, AB	4920 – 51 St.	Calgary, AB	200 – 5 Ave.South
Peace River, AB	T6B 2X3	T7Z 2K9	Red Deer, AB	T2E 7J2	Lethbridge, AB
T8S 1T4	Tele: 780-427-5296	Tele: 780-963-6131	T4N 6K8	Tele: 403-297-6582	T1J 4L1
Tele: 780-624-6167	Fax: 780-427-7824	Fax: 780-963-4651	Tele: 403-340-4654	Fax: 403-297-2749	Tele: 403-382-4254
Fax: 780-624-4335			Fax: 403-340-5022		Fax: 403-381-5337

OFFICE USE:

File Number:	Fee Receipt Number:	Application ID: Operation ID:
Notice Information:	Application Completion Date:	Priority Number:

WRITTEN 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 Strom Drainage Systems, January 2006 as well as the City of Cold Lake Municipal Engineering Servicing Standards and certify that the design of the above noted project complies with all of the requirements specified therein for the construction of the water distribution, wastewater collection and storm drainage systems.

SIGNED AND STAMPLED 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.

APPLICATION FOR A
LETTER OF AUTHORIZAITON
FOR
STORM DRAINAGE TREATMENT FACILITIES

Project Name: _____

Location: _____

Municipality: _____

I acknowledge that I have reviewed the Standards and Guidelines for Municipal Waterworks, Wastewater and Strom Drainage Systems, January 2006 as well as the City of Cold Lake Municipal Engineering Servicing Standards 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.

NOTICE UNDER CODE OF PRACTICE – WATER ACT

This notification is for the placement, construction, installation, maintenance, replacement or removal of watercourse crossings.
Documents or information provided to Alberta Environment pursuant to section 15(1)(a) of the Water (Ministerial) Regulation are public records accessible by the public.

Check one or more of the following to indicate: Department Use:

__ Temporary Crossing __ Permanent Crossing File No._____

__ Type 1	__ Type 1	__ New	__ Replacement	__ Removal/Maintenance
__ Type 2	__ Type 2	__ New	__ Replacement	__ Removal/Maintenance
__ Type 3	__ Type 3	__ New	__ Replacement	__ Removal/Maintenance
__ Type 4	__ Type 4	__ New	__ Replacement	__ Removal/Maintenance
__ Type 5	__ Type 5	__ New	__ Replacement	__ Removal/Maintenance

Brief Description:

Owner of Watercourse Crossing

Print Name or Company Name:	Home/Cell #:	Bus. Telephone:	E-Mail Address:
Address (street, Box)	City, Province	Postal Code	Fax:

Person Responsible or Contract Person (if not the same as Owner):

Print Name or Company Name:	Home/Cell #:	Bus. Telephone:	E-Mail Address:
Address (street, box)	City, Province:	Postal Code	Fax:

Under Schedule 1 of the code, a location plan, diagram or an aerial photograph showing the following criteria must accompany this notice:
a) minimum size of 21 cm by 27 cm 5,00 and in a suitable format and scale,
b) where the watercourse crossing is located in the water body in relation to the boundaries of the quarter section that the crossing is located in, including the legal description of the land and
c) name of each water body to be crossed (if applicable)

Location of Crossing (if more crossings are proposed, attach a separate list) ¼ sec twn reg m	Name of Water Body if known	Diameter and length of culvert in cm or m	Number of spans in bridge, and length /width of span (m)	Where applicable, description of Type 4 Crossing	Expected commencement and completion dates of work	Maximum time the work will occur in the water body		Are specifications and recommendations prepared by qualified environment specialist, incorporated in the plans __yes/__no If yes, enter name of specialist and company name Was a less preferred crossing method chosen? __yes/__no If yes, describe reasons

Note: The director may ask for other information required by the code of Practice including detailed design plans for the construction, assessments, and reports.

Will physical or other measures be required to meet clause (a) in Part 1 of Schedule 2? __ yes __ no

Signature of owner of/person responsible for the crossing:

_____	_____	_____	_____
Date	Signature	Print Name	Title

Request to change 14 – day notification requirement to ____ days(insert number of days or n/a if request is not requested.

Approved by Director: _____ _____

Director's Signature Date

Return completed form to the appropriate Alberta Environment regional office:

Northern Region, Peace River	Northern Region, Edmonton	Central Region, Stony Plain	Central Region, Red Deer	Southern Region, Calgary	Southern Region, Lethbridge
Bag 900 – 5 Provincial Bldg.	Twin Atria	523322 Golf Course Rd.	304 Provincial Bldg.	200, 3116-12 St. NE	2nd Fl. Provincial Bldg.
9621 – 96 Ave.	111, 4999 – 98 Ave.	Stony Plain, AB	4920 – 51 St.	Calgary, AB	200 – 5 Ave.South
Peace River, AB	T6B 2X3	T7Z 2K9	Red Deer, AB	T2E 7J2	Lethbridge, AB
T8S 1T4	Tele: 780-427-5296	Tele: 780-963-6131	T4N 6K8	Tele: 403-297-6582	T1J 4L1
Tele: 780-624-6167	Fax: 780-427-7824	Fax: 780-963-4651	Tele: 403-340-4654	Fax: 403-297-2749	Tele: 403-382-4254
Fax: 780-624-4335			Fax: 403-340-5022		Fax: 403-381-5337

NOTICE UNDER CODE OF PRACTICE – WATER ACT

This notification is for the placement, construction, installation, maintenance, replacement or removal of pipeline or Telecommunication line crossing

Documents or information provided to Alberta Environment pursuant to section 15(1)(a) of the Water (ministerial) regulation are public records and are accessible by the public.

CHECK ONE OR MORE OF THE FOLLOWING TO INDICATE TYPE OF ACTIVITY

___ Pipeline Crossing: Installation ___ Removal ___ Maintenance ___ File NO._____
___ Telecommunication Line Crossing Installation ___ Removal ___ Maintenance ___

Brief Description:

OWNER OF PIPELINE OR TELECOMMUNICATION LINE CROSSING

Print Name or Company Name:	**Home/Cell:**	**Bus. Telephone:**	**E-Mail Address:**
Address:	**City/Province:**	**Postal Code:**	**Fax #:**

PERSON RESPONSIBLE OR CONTACT PERSON (if not the same as owner)

Print Name or Company Name:	**Home/Cell**:	**Bus. Telephone**:	**E-Mail Address**:
Address:	**City/Province**	**Postal Code:**	**Fax #:**

Under Schedule 1 of the Code, a location plan, diagram, or an aerial photograph showing the following criteria must accompany this notice:

a) minimum size of 21 cm by 27 cm and is a scale of 1:15,000 or larger
b) where the pipeline crossing or telecommunication line crosses the water body in relation to the boundaries of the quarter section that the crossing is located in, including the legal description of the land
c) name of each water body to be crossed (if applicable)

Please attach a separate page for additional crossings or information

Location of Crossing (if more crossings are proposed, attach separate list) ¼ sec twn reg m	Name of Water Body, if known	Diameter of pipeline and/or telecommunication line (cable, pipe, conduit)	Substance to be conveyed by the pipeline	Method of installation, repair or removal	Expected commencement and completion dates of work	Maximum time the works will occur in the water body	Are specifications prepared by a qualified aquatic environment specialist, incorporated in the plane? Yes__ No__ If yes, enter name of specialist and the company name below Was a less preferred crossing type chosen Yes ___ No ___ describe reason:

Note: The Director may ask for other information required by the Code of Practice including detailed design plans for the construction, assessments and reports.

Will Physical or other measures be required to meet clause (a) in Part 1 of Schedule 2? Yes ___ No ___

Signature of owner or person responsible for the crossing:

_____ _____ _____ _____

Date Signature Print Name Title

Request to change 14 day notification requirement to _____ days (insert number of days or n/a if request is not requested)

Approved by the Director: _____ _____

Signature Dated

Return the completed form to the appropriate Alberta Environment regional office:

Northern Region, Peace River
Bag 900 – 5 Provincial Bldg
9621 – 96 Ave.
Peace River, AB
T8S 1T4
Tele: 780-624-6167
Fax: 780-624-4335

Northern Region, Edmonton
Twin Atria
111, 4999 – 98 Ave.
T6B 2X3
Tele: 780-427-5296
Fax: 780-427-7824

Central Region, Stony Plain
523322 Golf Course Rd
Stony Plain, AB
T7Z 2K9
Tele: 780-963-6131
Fax: 780-963-4651

Central Region, Red Deer
304 Provincial Bldg.
4920 – 51 St.
Red Deer, AB
T4N 6K8
Tele: 403-340-4654
Fax: 403-340-5022

Southern Region, Calgary
200, 3116-12 St. NE
Calgary, AB
T2E 7J2
Tele: 403-297-6582
Fax: 403-297-2749

Southern Region, Lethbridge
2nd Fl. Provincial Bldg.
200 – 5 Ave.South
Lethbridge, AB
T1J 4L1
Tele: 403-382-4254
Fax: 403-381-5337

APPLICATION FOR SHORE LINE/WATER BODY MODIFICATION
UNDER THE PUBLIC LANDS ACT AND THE WATER ACT

Documents or information provided to Alberta Sustainable Resource Development pursuant to Section 15(1)(a) of the Water Regulation are public record which are accessible by the public.

PURPOSE

__ Aquatic Vegetation Control __ Bank Stabilization __ Beach Construction __ Domestic Waterline
__ Erosion Protection __ Outfall Construction __ Permanent Boat Launch __ Permanent Pier Site

APPLICANT'S NAME AND ADDRESS:

Print Name or Company Name	Home Telephone:	Bus. Telephone:	E-Mail Address:
Address:	City/Province:	Postal Code:	Fax #:

Is the applicant the adjacent land owner? __ yes __ no If no, provide written consent form the adjacent land owner
Is the applicant a Canadian Citizen? __ yes __ no Has the applicant attained the age of 18 years? __ yes __ no
Is the applicant an employee of the Government of Alberta or a member of Legislative Assembly? __yes __ no
Department? _____

AUTHORIZED REPRESENTATIVE(if not the same as Applicant)

Print Name or Company Name	Home Telephone:	Bus. Telephone:	E-Mail Address:
Address:	City/Province:	Postal Code:	Fax #:

Location of Modification ¼ sec. twp. Rge m	Name of Water Body if known	Name of Subdivision	Plan No. Block Lot Parcel	Proposed date of commencement and completion

Information Requirements to Accompany Application Form:

a) a plan of proposed activity as per attached sample plans and Content Requirements for Disposition Plans
b) a location plan must show:
   i) proposed works in relation to property lines
   ii) if applicable, any municipal reserve lands between the applicants property and the water body
   iii) location of proposed works and the present, highest, and lowest known water levels
   iv) if applicable, dimensions of the site(outer boundary of area required to enclose installation)
   v) minimum plan size 21.5 cm x 28 cm
c) cross section must show:
   i) existing conditions and proposed modifications
   ii) relevant measurements
   iii) minimum plan size 21.5 cm 2 28 cm
d) a letter stating:
   i) what the proposal is
   ii) why it needs to be done
e) if available, a photograph or copy of a photo showing the existing shore line

_____ _____ _____ _____
Date Signature Print Name Title

HIGH PRESSURE GAS MAIN CROSSING APPLICATION

Date

Land & Permits Crossings
ATCO Gas Ltd.
10035-105 Street
Edmonton, AB T5J 2V6

Dear Sir:

RE: Permit to Cross High Pressure Gas Main Location Description
Quarter Section Legal Description in City of Cold Lake, Alberta

In accordance with the conditions of the Master Facility Crossing Agreement MA109, we are hereby forwarding on behalf of the City of Cold Lake 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 780 _____.

Yours truly,

Project Engineer

Enc.

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 and requirements are provided in the following sections:

Section 4 Erosion and Sediment Control Measures

Section 5 Site Clearing and Grading Guidelines

Section 6 Water Design Standards

Section 7 Sanitary Design Standards

Section 8 Storm water Management Drainage Systems

Section 9 Service Connections Standards

Section 10 Shallow Utilities Standards

Section 11 Roadway Design Standards

Section 12 Landscaping Standards

Section 13 Design Drawings

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 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 560mm x 865 mm (A1) preferred

2.3 Sheet Material

Construction drawings are to be submitted using bond media.

2.4 Title Block

Title Blocks shall be placed along the right side or bottom of the drawings and must include the following:

.1 developers/owners name
.2 consultant's name
.3 subdivision name including staging and/or phasing
.4 drawing name
.5 drawing number and job number if applicable
.6 revision number
.7 horizontal and vertical scales
.8 space for the signature of the designer, draftsman, checker and approving principal
.9 space for the number, date, description, designer and approving principal of all revisions
.10 space for issue dated including preliminary, approval, tender, construction, as built, and in addition the date and initials of person approving each issue must be shown.
.11 space for professional stamps and permits

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 upper right quadrant of the sheet.

2.6 Dimensions

All dimensions on plans and profiles are to be in SI metric units.

2.7 Lettering

The lettering is to be a minimum 2mm height and 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 should differentiate between existing (light) and proposed construction (heavy).

2.8 Legend

The symbols illustrated in the Appendix A – Digital As-constructed Drawing Standards are to be used on the construction drawings to provide consistency for the preparation of City record drawings (as builts).

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 should be used for all plan drawings.

.2 A drawing scale of 1:500H and 1:50 V should be used for all plan/profile drawings.

3. Cross sections and details as required.

3. PLAN CONSTRUCTION DRAWING REQUIRMENTS

3.1 Cover Sheets

.1 Name of subdivision or project.

.2 Names of developer and consulting engineer.

.3 City map showing project location; scale 1:25,000.

.4 Index plan showing street names and limits to each plan/profile drawing.

.5 List of drawings.

3.2 Clearing and Grading Drawings

.1 General Drawing Requirements

.1 Identify the owners of all lands adjacent to and within the clearing and grading area.

.2 Identify 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 proposed for areas to be developed in following years.

.4 Any unusual site conditions.

.5 Existing utility rights of way (easement).

.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 Identify natural features that are to be preserved and/or removed.

.11 Details of topsoil stockpiles, include height, width, length and volumes.

.12 Location of all existing (eg: water, sanitary sewers, storm and volumes).

.13 The means by which all storm water in and from the subject lands will be controlled and disposed of including:
- .1 how drainage from its natural route will be controlled
- .2 what erosion and sediment control measures are to be installed

.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 fill ≥ 2.1 meter are to be highlighted on the drawing.

3.3 Roads, Lanes and Walkway Drawings

.1 Street and /or lane name

.2 Cross section designation

.3 Carriageway widths

.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 Centre line and face of curb curve data (radius, length of curve, tangent length and deflection angle)

.11 Face of curb radii for all curb returns

.12 Lane and Public Utility Lot 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 Catch basin manholes and catch basins, including type and identification number

.16 Erosion and sedimentation control measures

.17 Reinforced lane and/or driveway crossings

.18 Wheel Chair / Bike Ramps

.19 Berms complete with top of berm grades

.20 Temporary access roads and/or turnarounds

.21 Walkways, including bollard locations

.22 Typical cross sections for all roadway designations

.23 Community Mailboxes

.24 Subdivision Entrance Signs

.25 Transit stops

3.4 Traffic Control and Signage Drawings

.1 Traffic signs

.2 Pavement markings

.3 Street name identification signs

.4 Subdivision information signs

.5 Subdivision map sign

.6 Detention pond warning signs

3.5 Water Distribution Drawing

.1 Invert elevation at all P.I.'s

.2 Distance, pipe size, pipe material and grade between P.I.'s
.3 main alignments

.4 Hydrants and hydrant identification numbers

.5 Valves and valve identification numbers

.6 Fittings

3.6 Water Distribution Disinfection and Flushing Drawing

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

.2 Show chlorination calculations and de-chlorination location, solution calculations and receiving storm sewer manholes.

3.7 Sanitary Sewer Drawings

.1 Invert elevations at all manholes.

.2 Distance, pipe size, pipe material and grade between manholes.

.3 Main alignments.

.4 Direction of pipe flow.

.5 Manholes and manhole identification numbers.

.6 Identify drop manholes (interior only).

3.8 Storm Sewer Drawing A – Major/Minor System

This drawing should be prepared at a scale of 1:2000 and show the entire drainage area, not just the immediate development phase.

.1 Phase/project boundaries.

.2 Major drainage routes.

.3 Location of trapped lows.

.4 Minor drainage catchments area.

.5 Minor drainage main alignments.

.6 Direction of minor drainage pipe flow.

3.9 Storm Sewer Drawing B – Minor System

.1 Invert elevations at all manholes.

.2 Distance, pipe size, pipe material and grade between manholes.

.3 Manhole alignments.

.4 Direction of pipe flow.

.5 Manholes, catch basin manholes, and manhole identification numbers.

.6 Catch basin type and identification numbers.

.7 Catch basin leads.

.8 Detention ponds, including contours, perimeter drainage facilities outline of playing field.

.9 Erosion and sedimentation control measures.

.10 Details on Flow Control Devices and Outlet Structures.

3.10 Shallow Utilities Drawing

.1 Alignments for all shallow utilities

.2 Location of transformers, switch gear, URD boxes, and streetlights, telephone facilities and cable television facilities.

.3 Location of community mailboxes.

.4 All utility right of ways.

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.

.2 Legal description for each parcel of land.

.3 Civic address.

.4 Back of walk elevations at lot lines.

.5 Lane/public utility lot elevations at lot lines.

.6 Service location and invert elevation.

.7 Recommended lowest top of footing elevation.

.8 Recommended ground elevation at house.

.9 Location of Shallow Utility services.

.10 Location of hydrants, streetlights, transformers, switch gear cubicles, URD's, telephone pedestals, and cable television pedestals.

.11 Location of community mailboxes.

.12 Indication of areas where depth of fill exceeds 1.2 m (bearing certificates).

3.12 Landscape Drawings

.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.

.3 Show existing vegetation, 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.

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.

.2 Cross section designation.

.3 Carriageway widths.

.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 Centerline cure data..

.11 Face of curb radii including all curb returns.

.12 Lip of gutter/edge of pavement at the following locations:

- .1 Vertical points in intersection
- .2 Beginning of vertical curves and end of vertical curves
- .3 Beginning of horizontal curves, point of curve to curve and end of horizontal curves
- .4 Beginning, midpoint and end for all curb returns
- .5 Location and rim elevation of any catch basins

.13 L.O.G. grades for all curves.

.14 Curb return grades.

.15 Lane and public utility lot P.I. elevation.

.16 Lane and public utility lot distance and property line grade between P.I.'s.

.17 Direction of flow along lanes and utility lots.

.18 Catch basin manholes and catch basins including type and identification number.

.19 Reinforced lane and/or driveway crossings.

.20 Wheel Chair / Bike Ramps.

.21 Berms complete with top of berm grades.

.22 Temporary access road and/or turnaround.

.23 Walkways, including bollard locations.

.24 Reference drawing numbers 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, 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 line.

.2 Vertical and horizontal point of intersection elevations for utility mains and surface improvements.

.3 Length and grade between P.I.'s for utility mains and surface improvements.

.4 Vertical curve information, if applicable.

.5 Vertical alignments of manholes, valves and hydrants.

.6 Hydrant flange elevation.

.7 Manhole rim and invert elevations.

.8 Utility main length, sizes, materials and gradients.

5. SUBMISSION OF PROPOSED CONSTRUCTION DRAWINGS

5.1 General

One complete set of Construction Drawings, including the Shallow Utility and Building Grade Drawing, shall be submitted to each of the following departments for review and approval:

.1 Infrastructure Services Department

.2 Planning and Development Department

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".

.2 Digital copy of the following Plan View and Plan /Profile construction drawings submitted in the most recent AutoCAD formats:

.1 Roads, lanes and walkways drawing.

.2 Traffic control and signage drawings.

.3 Water distribution drawing.

.4 Sanitary sewer drawing.

.5 Storm sewer drawings major systems, minor systems and stormwater management facilities.

.6 Electrical system if installed by a private contractor.

.7 Landscape drawings.

5.2 Shallow Utility 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 10 for additional information.

6. CHANGES (REVISIONS) TO APPROVED CONSTRUCTION DRAWINGS

The approved Construction Drawing form an integral part of the Development Agreement between the Developer and the City.

The Consulting Engineer shall submit revised Construction Drawings (bond or vellum media) if significant design changes are made following approval and submission of the Construction Drawings and execution of the Development Agreement. Changes include 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 may be submitted if significant changes are being made.

The Consulting Engineer shall submit a Change Order in a format similar to the Contract Change Order form included in the Contract Documents with the revised Construction Drawings detailing the changes.

The Engineer must approve any significant changes to the approved Construction Drawing.

7. AS – CONSTRUCTED DRAWINGS (RECORD)

7.1 General Requirements for As-constructed (record) drawings.

Digital files and hard copies of the revised Construction Drawings are required, as follows:

.1 Digital drawings shall be submitted with each major Construction Completion Certificate application as follows:

.1 Water, sanitary and storm digital files.

.2 Concrete work and gravel/paved roadways.

As constructed files for paved roadways are to be submitted with the Construction Completion Certificate for curb, gutter and sidewalk as the grades

and cross section dimensions will have been established at this stage of construction.

.3 Traffic control and signage.

.4 Gravel and/or paved lanes.

Digital files of As-Constructed" Plan View Drawings must be submitted in AutoCAD DWG formats no later than thirty (30) days from the date of the Construction Completion Certificate. The digital data must conform to the digital As constructed Drawings Standards as outlined in Clause 8 of this Section.

A hard copy "As-Constructed" Drawing for all improvements must be submitted no later than thirty (30) days from the date of the Construction Completion Certificate. If the "As Constructed" drawings are not received within one year from the date of the Construction Completion Certificate, the City will not process or release any further CCC's, FAC's and/or security reductions for the subject or subsequent phases of that development.

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

7.2 Site Clearing and Grading

.1 Extend of encroachment into adjacent lands for back sloping 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 $\geq$ 1.2 meter are to be highlighted on the drawings.

7.3 Roadways

.1 Roadway As Constructed Drawings are to be submitted upon completion of all concrete work. As constructed elevations are to be provided at the lip of gutter / edge of pavement at the following locations and shown on the plan/profile as constructed to confirm the as constructed centerline grade as shown of the plan drawings.

.1 Vertical points of intersection (VPI) (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 (BVC's) and End of Vertical Curves (EVC.)

.3 Beginning of Horizontal Curves (BHC) Point of Curve to Curve (PCC) and End of Horizontal Curves (EHC).

.4 Beginning (BVC) Midpoint (MP) and End (EVC) 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.

CCC's for gravel roads will not be issued until all concrete work is complete.

.2 Spot elevation checks should be completed following paving to verify grades, VPI elevations and slope.

.3 Confirm all centerline and face of curb (FOC) radii.

.4 Revisions to type of sidewalk and or curb and gutter installed.

.5 Revisions to pavement cross section, including location of filter fabric or geotextiles.

.6 Revisions to pavement markings if applicable.

.7 If the developer installs the traffic, street name and information signs utilizing the services of a private contractor, the developer shall complete a sign survey sheet and submit it to the City of Cold Lake.

7.4 Lanes and Public Utility Lots

.1 Spot elevation checks should be completed following lane construction to verify grades, VPI elevations and slope.

7.5 Utilities

.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 Diameter and type of water, sanitary, storm mains, services and curb stops; locations dimensioned in two directions.

7.6 Building Grade Plan

.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 Revise Back of Walk (BOW) and lane/PUL elevations if variance from design is greater than 10 mm.

.3 Complete a Service Location Report for each serviced lot. Included at the end of this section as Appendix B is a sample report.

7.7 Subdivision Entrance Signs

.1 Detailed Construction Drawings of the signs are to be provided. These drawings 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 angles.

7.8 Building Grade Certificates/Building Permits

.1 General

Prior to the issuance of a Construction Completion Certificate for service connections (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 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 Shallow Utility services location.

.3 Sidewalk and boulevard width.

.4 Utility rights of way.

.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, community mailboxes and any other surface improvements.

This information shall be provided in the form as shown on the sample drawing included in Section 15, Drawing 4.07 – New Residential Building Grade Certificate.

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.

8. DIGITAL AS CONSTRUCTED DRAWING STANDARDS

8.1 Overview

The Infrastructure Services Department is developing an Infrastructure Management System to manage the recording and distribution of road, sanitary, storm, traffic and water as constructed information. The IMS is comprised of digital record drawings, associated database records, and custom routines to automate the input and extraction of data. The system is based on Microsoft's Access Database.

Digital files of As Constructed Plan View and Plan/ Profile Drawings must be submitted in AutoCAD DWG format. These standards are based on AutoCAD layer format, with AutoCAD attribute data attached to various AutoCAD Blocks.

These standards will be updated and modified as engineering practices change. Any changes will be noted in this document.

8.2 Submitting Files

The following illustrates the basic steps for preparing an "As Constructed" file for submission:

.1 Place the as built data into separate files for each improvement (road, sanitary, storm, traffic and water). Each file can only contain "as constructed" information. Note any changes to the existing infrastructure (hydrant removed, main replaced, internal drop installed in manhole) on the miscellaneous level or layer. Rename the files according to the contract and improvement).

.2 As constructed data must conform to NAD'83 3TM coordinates. Ensure the data is represented in ground units or at a 1:1 relationship in model space. Paper space drawings will not be accepted.

.3 Organize the data within each file to conform to the standards listed in Appendix A appended at the end of this Section.

.4 The underground utilities require the attachment of attribute data to various features. The attribute fields must be defined and contain the required values, with no units, for the various features as specified in Appendix A.

.5 Submit a transmittal form that shows the following:

- project name
- consultant
- contract number
- graphic file format
- version
- projection
- date

8.3 Drawing Standards

In order to ensure a smooth integration of the as constructed data into the IMS, the following standards must be followed. Failure to do so will result in the rejection of the file and will require the consultant to resubmit the digital as constructed data.

Appendix A contains the Digital As constructed Drawing Standards that specify the AutoCAD layer, element type, block name and the attribute field. Information placement notes and illustrations for each improvement (road, sanitary, storm, traffic and water).

Appendix B included at the end of this section, contains information for creating symbols for AutoCAD systems.
The following specifications must be used for the preparation of digital as constructed drawings:

.1 Pipes are to be drawn as a single continuous element form feature to feature (i.e. manhole to manhole, reducer to tee, bend to hydrant). Simple lines or line strings are preferred. Multiple pipes at a manhole should all connect to the centre point of the manhole.

.2 Flow arrows are to be placed on all pipe segments for the water, sanitary and storm sewers. The insertion point of the arrow must be placed at the downstream end of the pipe, at approximately 2.5 m back from the end of pipe (i.e. to ensure that the flow arrows on sanitary and storm sewers are located on the outer edge of the manhole symbol).

.3 Valves are placed on top of the water pipe. The water pipe is not broken at the insertion point of the valve.

.4 Attribute data must contain only the required values with no units (i.e. 35.0 not 35.0 m, 200 not 200 mm, 0.45 not 0.45%)

.5 The dimension style should resemble the dimensions shown in Appendix A. Dimensioning should be dropped to primitive elements.

.6 Blocks are to be created as shown in the "RDIMS Project Cell Library" in Appendix B.AutoCAD specifications are listed for each cell.

.7 All dimensions are to be SI metric units and to 2 decimal units.

8.4 Attribute Data

The underground utilities require the attachment of attribute to various features. Because AutoCAD cannot attach attribute data to linear elements, the attribute is attached to the flow arrow. Therefore, flow arrows are required on the water system. The features that require these attachments include flow arrows manholes, hydrants, valves and catch basins.

The required field names for each attribute set are shown on the Digital as constructed drawing standards in Appendix A for each feature. Only the required values with no units are to be entered into the appropriate fields, as specified in the standards. Approved pipe material and class abbreviations for each improvement are listed on the bottom of the standards sheets.

Example: A flow arrow for a storm main having a description of "45.23 – 200 mm PVC-DR 35 @ 0.15%, would have the following tag or attribute set:

Field Name	Value
Size	200
Material	PVC
Length	45.23
Slope	0.15
Class	DR 35
Upperz	880.15
Lowerz	880.08

8.5 Additional Information

If you have any questions about the Digital As-constructed Drawing Standards please contact the GIS Coordinator at 780 594-4494.

SERVICE LOCATION REPORT

Subdivision:	Country Meadows Estates
Civic Address:	15 Country Boulevard
Legal Description:	Lot 1 Block 2 Plan 003-0000
Consulting Engineer:	XYZ Consulting
Contractor:	ABC Construction
Service Completion Date:	30/9/3

1. SERVICE CONNECTION DETAILS

ITEM	WATER SERVICE	SANITARY SERVICE	STORM SERVICE
Location of Service from Side Property Line	4.75 m N of S	5.05m N of S	4.45m N of S
Location of service box/curb stop	1.72m		
Service size (mm)	25mm	150 mm	100 mm
Type of material (copper, PE or DR28)	PE	DR28	DR28
Water, sanitary and/or storm invert at service box location (m)		887.93	887.88

Service Information				
a. Saddle	(Y/N)	N	Y	Y
b. Killed	(Y/N)	N	N	N
c. Main stop	(Y/N)	Y	N/A	N/A
d. Insulated	(Y/N)	N	N	N
e. Riser	(Y/N)	N/A	Y	Y
f. Service into manhole	(Y/N)	N/A	N	N
g. Inspection Chamber	(Y/N)	N/A	N/A	N/A

2. STATUS OF EXISITING MAINS

ITEM	EXISTING WATER MAIN	EXISTING SANITARY MAIN	EXISITNG STORM MAIN
Main location (lane, pul)	Lane	Lane	Lane
Main size	200 mm	200 mm	375 mm
Main material	DR18	DR35	Ultra-Rib

Report prepared by: _____ _____

Consulting Engineer Date

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 service 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 advise the Developer and the Owner.

2. CONSULTING ENGINEER/CITY RELATIONSHIP

.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 City has the right to request that the developer, through the Consulting Engineer, correct deficiencies as the City 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 City may, as specified in the Development Agreement – Part Two, General Conditions, 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 Engineer 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 City Developments/Projects

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

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

3. DOCUMENTS AND SCHEDULES

.1 The Consulting Engineer, prior to commencement of construction, shall be completely familiar with:
- .1 City Design Guidelines
- .2 City Contract Specifications
- .3 Development Agreement for the project

.2 The Consulting Engineer shall notify the City engineering representative 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 Engineer of all changes to the work schedule.

.3 Notification by the Consulting Engineer shall be by letter, fax or e-mail at least 48 hours prior to commencing construction, excluding Saturday, Sunday and Holidays. The notification shall include the following information:

- .1 Name of Developer
- .2 Subdivision name and phase number
- .3 Type of inspection (utility, subgrade, concrete structures, gravel placement, park development, landscaping etc.)
- .4 Start up date and time
- .5 Contractors 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 contractors and the City engineering representative which 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 City Engineering 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 City Engineer in a timely manner

- .1 Minutes of the pre construction site meeting
- .2 Minutes of the site meeting
- .3 A copy of the contractors proposed schedule
- .4 Copies of change orders as applicable

5. DOCUMENTATION

5.1 General

The Consulting Engineer shall prepare and apply for in writing Substantial Construction Completion Certificates, Construction Completion Certificates and Final Acceptance Certificates as required and have any maintenance deficiency items dealt with in 60 days.

.1 Private Developments

Substantial Completion Certificates, Construction Completion and Final Acceptance Certificates for private developments are to be submitted as detailed in the Development Agreement in the form appended at the end of part six of the Development Agreement. Copies of the certificates are available in Appendix A of this Section or from the Infrastructure Services Department.

.2 City Development/Projects

Substantial Completion Certificates, Construction Completion Certificates and Final Acceptance Certificates for City developments and projects are to be submitted as detailed in the Contract Documents under General Conditions "Completion and Warranty" for that particular project or as specified above, whichever applies.

5.2 Reporting of Deficiencies by the Engineer

Any deficiencies observed by the City Engineering representative during construction that are 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 Engineer with a minimum of 48 hours notice, excepting weekends and holidays when the deficiency is to be corrected.

5.3 Materials Compliance

All materials supplied and installed shall comply in all respects to the City 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 Engineer.

The Contractor will not be permitted to install any material not approved by the City Engineering Representative.

6. CONSTRUCTION INSPECTION

6.1 General

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

Inspections are required at key times before and during the project. The Consulting Engineer is responsible for determining the site supervision and inspection requirements and how these inspections are to be provided. The Consulting Engineer's site representation shall be experienced and competent in performing their duties.

The City engineering representative shall be given a minimum of 24 hours notice when requesting a joint inspection with the Consulting Engineer and/or Contractor.

Failure to notify the City engineering representative may require all work to be exposed for an inspection at the contractors 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 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 / Developer 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 Construction Completion Certificate

.1 The Consulting Engineer shall inspect the work with the Contractor / Developer, record any deficiencies and advise the Contractor / Developer, who shall repair any deficiencies. After the Contractor / Developer has repaired the deficiencies, the Consulting Engineer shall arrange for a joint inspection with the Contractor and the City Engineering representative. Prior to applying for any Substantial Construction Completion Certificate or Construction Completion Certificates to the City Engineer, all related outstanding change orders and deficiencies are to be resolved and addressed. Any omissions to be approved by Infrastructure Services. Substantial and Construction Completion Certificates for landscaping (levels one to four and collector roadway tree planting) must also be approved by the City's respective representative.

.2 The Substantial and Construction Completion Certificate application shall be accompanied by the following documentation:

.1 Underground Utilities
- .1 Appropriate form documenting completion of successful water pressure testing, flushing and disinfections duly executed by the consulting engineer and the City's representative.
- .2 Chronological package of all compaction and materials testing reports that state the location of tests corresponding to the "Issued for Construction Drawings" station and offset.
- .3 As constructed drawings, hard and digital copies within 30 days of the date of the certificate.
- .4 Copy of CCTV (DVD format)video inspection and hard copy report reflecting an installation in accordance to the City Standards. The CCTV shall be submitted 7 days prior to the CCC submission to allow time for the City's review.
- .5 Service location Certificate for each lot as depicted in Section 2, Appendix B.

.2 Surface Improvements
- .1 As constructed drawing, hard and digital copies within30 days of the date of the certificate. Included is to be an "as built" survey confirming site grades are as per design.
- .2 Chronological package of all compaction and materials testing reports that state the location of tests corresponding to the "Issued for Construction Drawings" station and offset.
- .3 Documentation of any deficiencies, which may or may not have payment reductions as per the contract specifications.
- .4 Lot grading certificates for each lot of the subdivision.

.3 All documentation supporting Substantial Construction Completion and / or Certification of Construction Completion shall be bound in an indexed document or three ring binder and accompanied by a signed, stamped letter from the professional engineer stating that the intent of the Development Agreement and the City of Cold Lake Municipal Engineering Servicing Standards and Standard Construction Specifications have been satisfied.

7.2 Warranty Periods

There shall be a two year warranty period on all underground and surface works commencing on the date that the works are put into service or the date of acceptance as indicated on the respective certificate, whichever occurs later.

In the event that there are materials testing results that are sub-standard the City of Cold Lake reserves the right to extend warranty periods.

7.3 Activity Subsequent to Issuance of 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 works as well as respond to any complaint calls forwarded to the City.

7.4 Activity Prior to Issuance of Final Acceptance Certificate

At the end of the warranty period and 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 City Engineer, of the works referred to in the Final Acceptance Certificate

The Consulting Engineer shall prepare a list of the deficiencies, if further deficiencies are noted, submit the list to the City's Engineer.

When the additional deficiencies have been corrected, the Consulting Engineer shall, within 14 days, request from the City Engineer a re-inspection only for the inspection of deficient items.

END OF SECTION

Clearing and Grubbing Checklist	
ITEM	COMPLETED/NOT APPLICABLE
General	
Review plans for all site conditions. Check for encroachments to be removed and notices to adjacent property owners, if required.	
Check limits of work and make sure they are clearly staked in accordance with plans	
Check location and protection of all survey markers and monuments	
Determine what structures, trees and other improvements are to remain	
Locate all utilities and other substructures. Pipelines and conduits should be uncovered as specified by the specific utility company.	
Check for proper haul roads and permits	
Check for contractor's authority to stockpile or dispose of material on private or City property. Check for spillage and dust on public roadways and take corrective measures.	
Check for drainage, erosion control and protection of adjoining property from damage or loss of lateral support.	
Local depressions or holes caused by grubbing or removals must be filled and compacted before any subsequent grading or fill operations begin.	
Has a herbicide or soil sterilent been applied to the finished surface in the proper proportions and rate of application, where required by the specifications?	

Comments:

Site Grading Checklist	
ITEM	COMPLETED/NOT APPLICABLE
Review Clearing and grubbing checklist	
Check for seepage and other latent conditions that might affect the foundations of fill	
Report unsuitable foundation conditions to the contractor for investigation	
Order survey to establish ground lines for payment purposes	
Are organic materials removed and surfaces scarified? Are benches cut into existing fill to tie in new fill?	
Check for adequate drainage. Do not permit ponding of water in new fill	
Check for haulage conditions on public roadways; spillage and dust control	
Test for optimum moisture content range for adequate compaction	
See that compaction tests are performed at an early stage to verify contractor's method	
Observe the operations and verify the uniformity of spreading, mixing, lift thickness and moisture control	
Check for uniformity of compactive effort, equipment used, coverage and number of passes	
Evaluate adequacy of equipment; quantity, type and condition	
Be sure the mixing equipment (plows, discs) are adequate to break up and mix soil and distribute moisture uniformly	
Observe grade under roller for movement and signs of excess moisture. Have contractor rip and aerate if necessary	
Watch for changes in fill material	
Order sufficient compaction tests to evaluate quality. Remember that good fill construction results and fewer tests will be required when the material is uniform, moisture is uniform and the compacting method and procedure are uniform.	
Have all areas and lifts that failed been reworked and retested satisfactorily?	
Observe the finished surfaces, contours and slope rounding for appearance, drainage and other requirements.	
Order survey to check for conformity and payment quantities	

Comments:

Erosion and Sediment Control Checklist	
ITEM	COMPLETED/NOT APPLICABLE
General	
Have erosion and sediment control plans been approved by engineer?	
Are temporary and permanent erosion and sediment control devices being installed as required?	
Has the contractor provided for standby crews for emergency work?	
Have retention and desilting basins been promptly dewatered and cleaned following a rainfall event?	
Do you have the contractor's emergency telephone number?	

Comments:

Water, Sanitary and Strom Main Checklist	
ITEM	COMPLETED/NOT APPLICABLE
Preliminary	
Check plan requirements, utilities and other substructure (ducts) pipe materials, joints and bedding. Are shop drawings required?	
Has water flushing plan been approved by public works department staff?	
Are road closures required for connections to existing mains?	
Are connections to existing mains being made by contractor or City forces?	
If required, are temporary traffic signs, delineators and barricades in place?	
Are utilities (gas, electrical, telecommunications) marked by the respective companies? Have their depths been confirmed by hydrovacing or other approved means?	
Have crossing, proximity, ground disturbance and/or encroachment agreements been received? Field copies available?	
Is construction surveying complete? Off set distance sufficient for protection of hubs? Grade sheets on job site?	
Trenching	
Does trench comply with Alberta occupational health and safety requirements for slope and protection?	
Check for maximum trench depth	
Line and grade control satisfactory?	
Does actual soil condition agree with geotechnical report? Is approved shoring method adequate for the actual trench condition?	
Is spoil pile clear of trench?	
Check sub grade. Is it granular or will imported bedding material be required?	
Check trench for evidence of unconsolidated fill. If in trench bottom, may require additional excavation and backfill with select material. If located above pipe invert, may require additional compaction.	
Is temporary support of existing utilities and improvements being provided? In the event of damage, are the owners promptly notified?	
Are sufficient ladders provided? Check AOH&S requirements	
Pipe Laying	
All loose soil removed from the trench?	
Required granular bedding material and thickness provided? Shaped to cradle pipe?	
Excavation provided for projecting bells?	
Method of transferring line and grade into trench accurate?	
Provisions for increased bedding at locations where maximum trench width is exceeded?	
Pipe handling satisfactory? Not being damaged? Spigot insertion unaided by hoe?	
Is ground water being controlled adequately (not allowed to enter pipe)?	
Jointing of pipe satisfactory? Gaskets and contact surface lubricated as required?	
In place pipeline checked for line and grade?	

Has additional bedding been placed alongside and under haunches of pipe after laying? Is the bedding rodded or spaded so that is completely fills all voids?	
Service Installations	
Water services installed as per City of Cold Lake standards?	
Backfill and Compaction	
Is backfill material placed in lifts and compacted as specified?	
Manholes, Structures and Catch Basins	
Is excavation size sufficient for working room? Sloped back or shored?	
Is grading for bottom of excavation completed properly? All loose earth removed firm and unyielding?	
Is bedding material properly placed and compacted?	
Are stubs set to correct alignment and inverts?	
Are rungs aligned properly? Spaced and located as per specifications?	
Check frames and covers for compliance. Does cover seat in frame without rocking?	
Are all joints and openings sealed properly?	
Miscellaneous and Testing	
Water disinfection and testing procedures completed in accordance with specifications?	
Sewer cleaning and testing completed in accordance with specifications?	

Comments:

Tunneling and Jacking Checklist	
ITEM	COMPLETED/NOT APPLICABLE
General	
Have all required crossing permits been obtained?	
Does the contractor have a safety program for the tunneling operation?	
Has a pre construction meeting been held prior to beginning of any tunnel work?	
When tunneling or jacking is proposed, has the consulting engineer provided additional soil information and reports?	
Have the contractors shop drawings for jacking pit bracing, shaft bracing and tunnel supports been approved?	
Is the contractors plan for monitoring ground movement submitted to the consulting engineer for approval prior to beginning any tunneling or jacking operation?	
Pipe Installation	
Is the supplied pipe designed for jacking and does it meet dimensional tolerances?	
Has the contractor implemented the approved plan to monitor groundwater?	
Is the jacking force monitored to ensure that the maximum is not exceeded?	
Is the unlined portion of lined RCP being oriented at the bottom (invert) when less than 360º of liner coverage is specified?	
Have spacers been properly installed?	
Back Packing and Grouting	
Are tunnel supports back packed as soon as possible after loss of ground occurs?	
When grouting of voids around the outside face of the pipe is required, is the method of placement and mix design approved by the consulting engineer?	
Has the contractors method to prevent pipe shifting or flotation been approved by the consulting engineer?	

Service Connection Checklist	
ITEM	COMPLETED/NOT APPLICABLE
Preliminary	
Check plan requirements, utilities and other substructure (ducts) pipe materials, joint and bedding.	
Are connections to existing mains being made by contractor or City forces?	
If required are temporary traffic signs, delineators and barricades in place?	
Are utilities (gas, electrical, telecommunications) marked by the respective companies? Have their depths been confirmed by hydrovacing or other approved means?	
Is construction surveying complete? Off set distance sufficient for protection of hubs? Grade sheets on job site?	
Trenching	
Does trench comply with OH&S requirements for slope and protection?	
Check for maximum trench depth	

Line and grade control satisfactory?	
Check sub grade. Is it granular or will imported bedding material be required?	
Is temporary support of existing utilities and improvements being provided? In the event of damage, are the owners promptly notified?	
Pipe Laying	
All loose soil removed from the trench?	
Required granular bedding material and thickness provided? Shaped to cradle pipe?	
Excavation provided for projecting bells?	
Method of transferring line and grade into trench accurate?	
Provision for increased bedding at locations where maximum trench width is exceeded?	
Pipe handling satisfactory? Not being damaged? Spigot insertion unaided by hoe?	
Is ground water being controlled adequately?	
Are connections to mains properly made?	
Jointing of pipe satisfactory? Gaskets and contact surface lubricated as required?	
In place pipeline checked for line and grade?	
Has additional bedding (if required) been placed alongside and under haunches of pipe after laying? Is the bedding rodded or spaded so that it completely fills all the space in the trench?	
Backfilling and Compaction	
Sanitary and storm sewer services checked for cross connection? Stubs painted proper colors?	
Have as constructed invert elevations and locations been obtained prior to start of backfilling?	
Has locations of standpipe and end of service stubs been properly marked? Has corporation cock been turned on?	
Is backfill material placed in lifts and compacted as specified?	
Have test results and other reports been forwarded to the engineer?	

Comments:

Concrete Work Checklist	
ITEM	COMPLETED/NOT APPLICABLE
General, Before Placing Concrete	
Check drawings and specifications and review with contractor and confirm approved mix design. Are materials testing personnel present for QC?	
Check for completion of site work and grading; completion of underground construction; and utility clearance before beginning concrete work	
Check sub grade. Firm and on grade? Any base material required? Elevation proper for thickness required?	
If required, check forms. Rigid? To correct alignments? Elevation?	
Joints laid out and expansion joints installed, if required	
Curing compound and spray equipment on job	
Check finishing tools	
Extruded Concrete Work	
Check alignment and off set before start of work	
Check extruding machine and mold; does the mold form conform to specifications?	
How will grade be controlled? Check wire line for sensor or tack setting	
If a crawler type is used, check smoothness of sub grade (machine sensor cannot correct for rough grade); check transverse grade (should be level for the operating width of the machine)	
Check extruded shape for accuracy (use level and rule); check for sag before concrete sets; check alignment	
Check cross slope	

Comments:

Concrete Placement and Finishing	
Sub grade dampened prior to concrete placement?	
What finishes are required?	
Finishers and equipment on job are sufficient for work to be done?	
Check delivery tickets and observe concrete mixture as it is being placed. Is the type of concrete correct? From approved source? General appearance and consistency satisfactory?	
Check slump and prepare compression test cylinders as required	
Is concrete being deposited properly? Without segregation? Spaded, tamped or vibrated?	
Spreaders being removed as concrete is placed in curb?	
Curb alignment checked after front face is stripped and curb straightened while still plastic? Check back edge for alignment	
Check sidewalk finishing sequence; spaded at face of form or header; screed and tamped; bull floated and edged; steel floated? Check for surface humps and hollows? Edge sloped down?	
Additional toweling of sidewalk after water sheen has disappeared? Broom finish timed for proper texture?	
Expansion joints located and edged?	
Construction joints installed and edged?	
Sidewalks 2.5m or wider have been saw cut at centerline of walk?	
Check cross slope	
Curing compound applied at specified rate?	
"CC" stamped into curb / sidewalk at proper locations, or in the case of Country Residential a blue marker post identifying the "cc" location.	
Work properly barricaded to protect finished concrete?	
Notices to adjacent property owners to avoid vehicular/pedestrian traffic over fresh concrete?	
Site cleaned up?	
Have test results been forwarded to the engineer?	

Comments:

Geotextile and Sub grade Check List	
ITEM	COMPLETED/NOT APPLICABLE
Is the fabric of the specified type and thickness?	
Is each lot clearly identified and accompanied with a test certificate from an approved testing laboratory?	
Is the fabric in good condition, free of shipping and handling damage, and is it wrapped in a protective envelope?	
Has the fabric been properly stored in a clean, dry place or if outdoors, stored at least 0.3 m above the ground? Is it protected from exposure to ultraviolet (sunlight)?	
Has the fabric been re covered while in storage?	
Are fabric rolls being handled properly in transporting to site or while being installed in the field?	
Sub grade Preparation	
Has the sub grade been shaped to the proper section? Is it free of rocks or other sharp object that could puncture the fabric?	
Has all vegetation been removed from the area and the sub grade sterilized?	
Is there standing water or mud in any area where fabric is to be placed?	
Are anchor trenches properly located and of the proper depth?	
Fabric Installation	
Has the fabric been stretched taut to eliminate major wrinkles, but not to the extent that there is no provision for shrinkage?	
Are the panels properly aligned with the specified lap at adjacent joints?	
Have the seams been heat welded and do they meet the specified tensile strength?	
Are all tears, punctures or scuffed areas properly repaired?	
Has aggregate fill over the fabric been properly placed, spread and compacted?	

Comments:

Roadway and Lane Sub grade, Sub base and Base Checklist	
ITEM	COMPLETED/NOT APPLICABLE
Is all underground construction complete? Deficiencies corrected? Concrete work?	
Locate manholes and valves to be brought to grade or to be plated over during sub grade and base construction	
Check plan requirements for existing soil foundation preparation and stabilization, sub base and base. Thickness? Density?	
Grade stakes set? Check for protection and setting of hubs by contractor.	
Review requirements and procedure with contractor. Sources of sub base and base materials; soil stabilization method, if required; material tests and approvals; compaction tests	
Check for soil movement under rollers and hauling equipment to detect soft spots. Backfilled trenches may not be sufficiently dried out and ready for sub base and base construction	
Are all pockets of soft or yielding material ripped up and dried out or replaced with suitable material?	
Is existing soil prepped to required depth and at sub grade for sub base? Watered; ripped; diced and mixed; large rocks removed; rolled to required density; required grade, cross section and smoothness tolerance; and tested?	
Imported sub base or base material sampled from material delivered to site? Test results okay?	
Maintain adequate dust and noise control during all grading operations	
Watch for changes in grading of material and appearance of all type of sub base and base material (imported or jobsite processed); and if warranted, order additional sampling and testing.	
Watch for degradation during spreading operations	
Check for adequacy and uniformity of operations; moisture control and mixing; lift thickness; compaction effort (coverage and number of passes of equipment)	
Collect delivery tickets for weight payment if required	
Test for compacted density of sub base material and base	
Have test results been forwarded to the engineer?	
Check finished base surface for grade cross section and surface smoothness as specified in specifications	
Check contractors provisions for protection of finished base course surface. Do not permit base to dry out prior to being covered with a finish surface	
Have approach erosion control devices been installed at/in catch basins to prevent silt infiltration?	

Asphalt Checklist	
ITEM	COMPLETED/NOT APPLICABLE
Preliminary	
Check drawings and specifications for pavement type, thickness, number of courses, method of payment and other project paving requirements.	
Inspect base course surface. Has surface been checked for grade, cross section and compaction? Is it firm, hard and unyielding?	
Is all underground construction complete? Deficiencies corrected?	
Are manholes and valve boxes marked?	
Are contact surfaces and joints prepared? Existing pavement trimmed? Surfaces cleaned? Tack coat applied to gutter edges, pavement joints?	
Review procedures and requirements with contractor	
Overlay of existing pavement required? Check fills for variations and determine necessity for leveling course. Check for broken pavement that should be removed	
Gutter and other concrete strength okay to lay pavement against	
Delivery of Paving Mixture	
Does delivered material meet the requirements of the job? Truck beds free of holes and depressions? Loads tarped? Compatible with paver?	
Check for truck spillage of mix on base or previous lift	
Collect delivery (sale) tickets for weight payment	
Check temperature periodically. If bottom dump trucks are delivering and windrowing the mix, check temperature in windrow ahead of pickup by paver. Stop asphalt placement if temperature drops below minimum for laying. (125º-150º C)	
Spreading Operation	
Is direction of spreading satisfactory (generally in same direction as traffic)?	
Check operation of spreader. Thickness of mat being laid? Lane width okay? Joint overlap?	
Check surface appearance of mat behind spreader. Uniformity of texture; evidence of degradation or poor mixing?	
Check handwork at joints. Is overlapped material being laid pushed back into mat with lute or gathered and deposited in front of paver?	
Check for irregularities in surface and require correction. Try to minimize hand raking. When depressions are corrected, surface must be loosened and material added and graded, a lute. High spots loosened excess material removed and area graded.	
Stop delivery from plant if weather conditions warrant. Permit pave out of remaining material if possible.	
Have test results been forwarded to the engineer.	
Traffic Control Marking and Signage	
Has the traffic control marking and signage plan been approved?	
Has the public works department been advised that seasonal or all roadwork is complete and ready for signage and/or marking?	
Have street identification signs been installed?	
Have all information sings been installed?	
Have the subdivision map signs been installed/amended?	

Landscaping – General Check List	
ITEM	COMPLTED/NOT APPLICABLE
Site Preparation and Topsoil Placement	
Has the area been graded to the approved grades?	
Have all ponding areas been repaired?	
Has any erosion damage been repaired?	
Does the new landscape areas blend into existing landscaping?	
Is the area to be landscaped excavated to the proper depth and scarified for topsoil placement?	
Is the area to be landscaped graded to required dimension below curbs and/or walks?	
Is the source of topsoil approved?	
Is the mixture and preparation of the topsoil in accordance with the requirements?	
Is the topsoil backfill consolidated with the areas to receive planting not excessively compacted?	
Verify that the required drainage conditions are provided	
Verify layout of major plant materials and adjustment to field conditions.	

Level One Landscaping Check List	
ITEM	COMPLETED/NOT APPLICABLE
Seeding	
Has the seed mixture been approved? Does it comply with the specifications?	
Has the proper fertilization been applied at approved application rate?	
Has the proper seed coverage been achieved?	
Is seed germinating properly?	
Is the area being watered as specified?	
Sodding	
Is the finished surface even?	
Have the edges been knitted in?	
Does the new sod blend into existing landscaping?	

Comments:

Level Two Landscaping and Collector Roadway Tree Planting Check List	
ITEM	COMPLETED/NOT APPLICABLE
Do the tree locations conflict with other improvements?	
Have the plant (shrub) materials been approved, checked and recorded?	
Do the plants have any diseases, insect damage?	
Are the trees approved, tagged and of the proper size?	
Complete a fertilizer and spoil amendment check for type and class required	
Does the preparation of topsoil meet specified requirements?	
Are the tree holes of the size, depth and shape required?	
Has strapping, wire and/or burlap been removed?	
Are the trees staked and properly tied as specified?	
Are rood barriers required for tree wells?	
If required, is tree well 100 mm pipe drain installed to proper elevation, with proper amount of rock?	
Are tree well covers flush and tight to adjacent walk?	

Level Three Landscaping Check List	
ITEM	COMPLETED/NOT APPLICABLE
Fencing	
Has fencing been installed?	
Pathways/Hard surfaces	
Alignment/location correct?	
Acceptable slopes?	
Defects/ponding?	
Asphalt tests?	
Play Equipment	
Equipment layout as per approved plans?	
Adequate safety zones?	
Protruding concrete bases/anchor bolts?	
Equipment height to specifications?	
Correct base depth?	
CSA certified of compliance	
Manufacturers warranty?	
Parks Amenities	
Have benches been properly installed?	
Are garbage receptacles in place?	
Have all other amenities been installed as per the drawings?	

City of Cold Lake

SUBSTANTIAL CONSTRUCTION COMPLETION CERTIFICATE

I. PROJECT INFORMATION

Project/Development Name	
Consulting Engineer	
Developer	
Contractor	

II. INSPECTION INFORMATION

This is to certify that an inspection of the above noted project or development has been completed as of _____day of _____ 20___. All work has been completed in accordance with the provisions of the contract/ agreement dated _____day of_____, 20___, provided, however, that acceptance of the project by the City shall not be deemed to relieve the Contractor, Consultant or Developer of its obligations in the contract/ agreement with respect to defective workmanship or materials discovered within the warranty period and completion of condition(s) of acceptance.

The effective date for the start of the __ year(s) warranty period shall commence as of _____day of _____ 20___.

Condition(s) of acceptance:

III. CHECKLIST OF SUBMISSION

Submission of As-Built Record Plans to the City of Cold Lake ☐

IV. ACCEPTANCE

Consulting Engineer			MM/DD/YYYY
	Print Name	Signature	Date
Developer			MM/DD/YYYY
	Print Name	Signature	Date
Contractor			MM/DD/YYYY
	Print Name	Signature	Date
City of Cold Lake			MM/DD/YYYY
	Print Name	Signature	Date

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CHECK LIST FOR SUBSTANTIAL CONSTRUCTION COMPLETION CERTIFICATE

1: **As-built record drawings**

2: **Concrete test results for walks, curbs and gutters**

3: **Compaction test results for trenches, subgrade, construction, and granular base course.**

4: **Letter of commitment and schedule from developer for asphalt placement**

5: **Digital and hard copy of the CCTV inspection report for all sanitary and storm sewers.**

6: **Hydrostatic pressure test results for all water mains, witnessed by City of Cold Lake.**

7: **Bacteriological test results.**

8. **Chlorination and De Chlorination witnessed by City of Cold Lake.**

9. **Letter of commitment and schedule from shallow utility companies whose facilitates are outstanding.**

City of Cold Lake

CONSTRUCTION COMPLETION CERTIFICATE

I. PROJECT INFORMATION

Project/Development Name	
Consulting Engineer	
Developer	
Contractor	

II. INSPECTION INFORMATION

This is to certify that an inspection of the above noted project or development has been completed as of _____day of _____ 20___. All work has been completed in accordance with the provisions of the contract/ agreement dated _____day of_____, 20___, provided, however, that acceptance of the project by the City shall not be deemed to relieve the Contractor, Consultant or Developer of its obligations in the contract/ agreement with respect to defective workmanship or materials discovered within the warranty period and completion of condition(s) of acceptance. The effective date for the start of the __ year(s) warranty period shall commence as of _____day of _____ 20___.

Condition(s) of acceptance:

III. CHECKLIST OF SUBMISSION

Submission of As-Built Record Plans to the City of Cold Lake ☐

IV. ACCEPTANCE

Consulting Engineer			MM/DD/YYYY
	Print Name	Signature	Date
Developer			MM/DD/YYYY
	Print Name	Signature	Date
Contractor			MM/DD/YYYY
	Print Name	Signature	Date
City of Cold Lake			MM/DD/YYYY
	Print Name	Signature	Date

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CHECK LIST FOR CONSTRUCTION COMPLETION CERTIFICATE

1: **As-built record drawings**

2: **Concrete test results for walks, curbs and gutters**

3: **Compaction test results for trenches, subgrade, construction, granular subbase and granular base course.**

4: **Asphalt core test results for depth and density.**

5: **Digital and hard copy of the CCTV inspection report for all sanitary and storm sewers.**

6: **Hydrostatic pressure test results for all water mains, witnessed by City of Cold Lake.**

7: **Bacteriological test results.**

8. **Chlorination and De Chlorination witnessed by City of Cold Lake.**

City of Cold Lake

FINAL ACCEPTANCE CERTIFICATE

I. PROJECT INFORMATION

Project/Development Name	
Consulting Engineer	
Developer	
Contractor	

II. INSPECTION INFORMATION

This is to certify that the maintenance of the above noted project or development has been completed and the project or development has been accepted by the City of Cold Lake this ____day of _____, 20___

Condition(s) of acceptance:

III. CHECKLIST OF SUBMISSION

Submission of As-Built Record Plans to the City of Cold Lake ☐

IV. ACCEPTANCE

Consulting Engineer			MM/DD/YYYY
	Print Name	Signature	Date
Developer			MM/DD/YYYY
	Print Name	Signature	Date
Contractor			MM/DD/YYYY
	Print Name	Signature	Date
City of Cold Lake			MM/DD/YYYY
	Print Name	Signature	Date

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1. EROSION AND SEDIMENT CONTROL 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, resulting in the detachment and transport of soil particles. Erosion is a temporary phenomenon that has the potential to carry significant amounts of sediment into storm sewers and watercourse during and immediately after rainstorm events.

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 watercourses. Secondarily, it is to prevent nuisance airborne dust or tracked on dirt to city roadways and surrounding neighborhoods. The majority of these concerns related to urban development are a result of construction activities. An Erosion and Sediment Control 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) 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 have been used in preparing this section of the Municipal Engineering Standards and should be referred to for further detail:

Alberta Transportation – Design Guidelines for Erosion and Sediment Control for Highways

Alberta Transportation – Fish Habitat Manual

Alberta Transportation - Navigable Waters Protection Act Manual

3. REGULATORY REQUIREMENTS

Erosion from land surfaces can contribute large quantities of sediment to watercourses. There are a number of federal and provincial acts and regulations governing activities that cause, or can cause harm to the environment, including construction projects that result in erosion and /or sedimentation. Regulatory agencies also publish codes of practice, guidelines and standards that set out requirements for undertaking certain types of activities. Most legislation and other types of regulatory tools make reference to preventing the release of harmful or deleterious substances, including silt, to the environment.

The Federal Department of Fisheries and Oceans (DFO) operates in Alberta to enforce relevant federal legislation. Alberta Environment enforces relevant provincial legislation in collaboration with the DFO enforcement of federal legislation.

3.1 Federal Legislation

.1 Navigable Water Protection Act

The Navigable Water Protection Act, R.S.C. 1985, c. N-22 applies to in stream work involving construction or placement in, on, over under, through or across any navigable water. Navigable waters includes a canal and nay other water created or altered as a result of construction of any work. Section 22 of the Act states:

"*No person shall throw or deposit or cause, suffer or permit to be thrown or deposited any stone, gravel, earth, cinders, ashes or other material or rubbish that is liable to sink to the bottom in any water, any part of which is navigable or that flows into any navigable water, where there are not at least twenty fathoms of water at all times, but nothing in this section shall be construed so as to permit the throwing or depositing of any substance in any part of a navigable water where that throwing or depositing is prohibited by or under any other Act."*

.2 Fisheries Act

The Fisheries Act, R.S.C. 1985, c. F-14, Section 34 to 42 exists to protect fish and fish habitat. 36(3) of the Act states, in part:

"*No person shall deposit or permit the deposit of a deleterious substance of any type in water frequented by fish or in any place under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance may enter any such water."*

Silt is amongst the most common types of deleterious substances.

Section 38(4) of the Act states:

"*where, out of the normal course of events, there occurs a deposit of a deleterious substance in water frequented by fish or a serious and imminent danger thereof by reason of any condition, and where any damage or danger to fish habitat or fish or the use by man of fish results or may reasonably be expected to result, there from, any person who at any material time*

a. owns the deleterious substance or has the charge, management or control thereof, or

b. causes or contributes to the causation of the deposit or danger thereof, shall, in accordance with any regulations applicable thereto, report such occurrence to an inspector or such other person or authority as is prescribed by the regulations."

Furthermore, Sections 35(1) and 53(2) state as follows:

1) *No person shall carry on any work or undertaking that results in the harmful alteration, disruption or destruction of fish habitat*

2) *No person contravenes subsection (1) by causing the alteration, disruption or destruction of fish habitat by any means or under an conditions authorized by the Minister or under regulations made by the Governor in Council under this Act.*

Fish habitat is defined in Section 34(1) as follows:

"Fish habitat" mean spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life process.

The Fisheries Act is enforced by DFO. Under administrative agreement with DFO, Alberta Environment acquired certain responsibility for enforcement of Section 36 and related provisions. DFO operates in the Province of Alberta to enforce relevant federal regulations in collaboration with Alberta Environment on enforcement of provincial regulations.

3.2 Provincial Legislation

.1 Environmental Protection and Enhancement Act (EPEA)

The Environmental Protection and Enhancement Act, R.S.A., C.E-12 exists to support and promote the protection, enhancement and wise use of the environment. Sections 108 and 109 state as follows:

108(1) no person shall knowingly release or permit the release of a substance into the environment in an amount concentration or level or at a rate of release that is in excess of that expressly prescribed by an approval or regulations

(2) no person shall release or permit the release of a substance into the environment in an amount concentration or level or at a rate of release that is in excess of that expressly prescribed by an approval or the regulations

(3) for the purpose of this section, if there is a conflict between an approval and the regulations as to an amount, concentration, level or rate of release of a substance, the most stringent requirements prevails.

109(1) no person shall knowingly release or permit the release into the environment of a substance in an amount, concentration or level or at a rate of release that causes or may cause a significant adverse effect.

(2) no person shall release or permit the release into the environment of a substance in an amount, concentration or level or at a rate of release that causes or may cause a significant adverse effect.

(3) subsections (1) and (2) apply only where the amount, concentration, level or rate of release of the substance is not authorized by an approval or the regulations

(4) no person may be convicted of an offence under this section if that person established that the release was authorized by another enactment of Alberta or Canada.

Sections 110 and 111, as follows, address the reporting requirements under the EPEA

110 (1) A person who releases or causes or permits the release of a substance into the environment that may cause ,is causing or has caused an adverse effect shall, as soon as that person knows or ought to know of the release, report it to:

a) the director
b) the owner of the substance, where the person reporting knows or is readily able to ascertain the identity of the owner
c) any person to whom the person reporting reports in an employment relationship
d) the person having control of the substance, where the person reporting is not the person having control of the substance and knows or is readily able to ascertain the identity of the person having control, and
e) any other person who the person reporting knows or ought to know may be directly affected by the release.

(2) The person having control of a substance that is released into the environment that may cause, is causing or has caused an adverse effect shall, immediately on becoming aware of the release, report it to the persons referred to in subsection (1)(a), (b), (c) and (e) unless the person having control has reasonable grounds to believe that those persons already know of the release.

(3) A police officer or employee of a local authority or other public authority who is informed of or who investigates a release of a substance into the environment that may cause, is causing or has caused an adverse effect shall immediately notify the Director of the release unless the police officer or employee has reasonable grounds to believe that it has been reported by another person.

111(1) A person who is required to report to the director pursuant to section 110 shall report in person or by telephone and shall include the following in the report, where the information is known or can be readily obtained by that person:

a) the location and time of the release
b) a description of the circumstances leading up to the release

c) the type and quantity of the substance released
d) the details of any action taken and proposed to be taken at the release site
f) a description of the location of the release and the immediately surrounding area

(2) in addition to a report under subsection (1), the person shall report in writing where required by the regulations

(3) a person who reports under subsection (1) and (2) shall give the Director any additional information in respect of the release that the Director requires.

Sections 112 of the EPEA deals with the remedial actions to be taken as follows:

112 Where a substance that may cause, is causing or has caused an adverse effect is released into the environment, the person responsible for the substance shall, as soon as that person becomes aware or ought to have become aware of the release,

a) take all reasonable measures to
i) repair, remedy and confine the effects of the substance
ii) remove or otherwise dispose of the substance in such a manner as to effect maximum protection to human life, health and the environment and
b) restore the environment to a condition satisfactory to the Director.

Sections 118 deals with the failure to report the release of a substance as follows:

118 Where a remediation certificate is issued, no environmental protection order requiring the doing of further work in respect of the same release of the same substance may be issued under this Act after the date prescribed or determined for the purposes of this section in accordance with the regulations.

4. PENALTIES FOR CONTRAVENTION OF ENVIRONMENTAL LEGISLATION

4.1 Navigable Water Protection Act

The following is a summary of the offences and penalties included in Section 28 of the Act

Offence	Penalties	
	Summary Conviction	Indictable Offence
Section 22 – deposit any stone, gravel, earth, etc.	Fine not exceeding $5,000	N/A

4.2 Fisheries Act

The following is a summary of the offences and penalties included in section 40 of the act.

Offence	Penalties	
	Summary Conviction	Indictable Offence
Subsection 35(1) – harmful alteration, disruption or destruction of fish habitat	1st offence - $300,000 subsequent Offence $300,000 and/or 6 month in prison	1st offence - $1,000,000 Subsequent Offences $1,000,000 and/or 3 years in prison
Subsection 36(1) and (3) – deposit of a deleterious substance	1st offence - $300,000 Subsequent Offences - $300,000 and/or 6 months in prison	1st Offence - $1,000,000 Subsequent Offences - $1,000,000 and/or 3 years in prison
Subsection 37(1) and (2) – failure to provide plans, specs, studies etc.	1st offence - $200,000 Subsequent offences - $300,000 and/or 6 months in prison	N/A
Subsection 38(4) – failure to report	1st offence - $200,000 Subsequent offences - $300,000 and/or 6 months in prison	N/A
Subsection 38(5) – failure to take any reasonable measures	1st offence - $200,000 Subsequent offences - $300,000 and/or 6 months in prison	N/A
Subsection 38(6) – failure to comply with direction of an inspector	1st offence - $200,000 Subsequent offences - $300,000 and/or 6 months in prison	N/A

4.3 Environmental Protection and Enhancement Act (EPEA)

The following is a summary of the offences and penalties included in Section 228 of the Act:

Offence	Penalties	Penalties
	Individual	Corporate
Section 108(1) – knowingly release or permit the release of a substance into the environment in excess of an approval or the regulations	$100,000 and/or 2 years in prison	$1,000,000
Section 108(2) – release or permit the release of a substance	$50,000	$500,000
Section 109(1) – knowingly release substance into the environment that causes or may cause a significant adverse effect	$100,000 and/or 2 years in prison	$1,000,000

Section 109(2) – knowingly release substance into the environment of a substance that causes or may cause a significant adverse effect	$50,000	$500,000
Section 110(1) and (2) – failure to report the release of a substance into the environment that causes or may cause a significant adverse effect	$50,000	$500,000
Section 112 – failure to take remedial measures after the release of a substance	$50,000	$500,000

4.4 Continuation of a Contravention

Where a contravention is committed or continued on more than one day, each day is considered a separate offence.

4.5 Release Information

The Environmental Protection and Enhancement Act and the Release Reporting Regulation deal with the release of substances into the environment and set out what must be reported, when, how and to whom reports must be made. Additionally, individual approvals and codes of practice may have requirements for the reporting of contraventions of the terms and conditions of the approval or the sections of the code of practice.

Where the incident, release or contravention triggers a requirement to immediately report, then this report should be made to the Environmental Services Response Center as follows:

1. Verbal reports can be phoned to 780-422-4505 or 1-800-222-6514 (on a 24 hour basis)

2. A reference number will be provided at the time of the verbal report to confirm that the report of the release was made.

3. Written reports can be faxed to 780-427-3178; or mailed to Environmental Service Response Centre, Alberta Environment, 6th Floor, Oxbridge Place, 9820 – 106 St. Edmonton, Alberta, T5K 2J6.

4.6 Due Diligence

Most environmental legislation provides for due diligence (defined simply as the exercise of reasonable care) as a defense to the majority of environment offences. By ensuring due diligence is exercised, the responsible party may prevent the occurrence of a violation altogether.

5. EROSION AND SEDIMENT CONTROL (ESC) PLANS

5.1 Goals and Objectives

The main objective of erosion and sediment control is to protect our watercourses from pollution, primarily sediment pollution.

5.2 Responsibilities

Erosion and sediment control is the responsibility of the developer.

5.3 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 without a buffer zone is not permitted, and a silt fence must be installed along the perimeter of the buffer. Existing drainage ways should be identified; as these will likely be the major routes that eroded sediment 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 diversions are two of the more common control methods.

.7 Employ Advanced Sediment Settling Controls

Even when the best ESC measures are employed, high concentration 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, skimmers 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 and waterbodies.

.9 Adjust ESC Plan at Construction Site

For an 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 the ESC controls are working properly. Inspections should be conducted every seven days and following heavy rainstorms or snowfall events.

.10 Access ESC Practices after Rainstorm or Snow Melt Events

After a rainstorm or snow melt, it is usually clear whether and 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.

5.4 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 must 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.

5.5 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 must 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. Gravelling 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 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 are to 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). 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. All temporary and permanent detention facilities must be constructed prior to the installation of any services to the site or the commencement of earth moving operations.

.5 Dust control measures are to be implemented to prevent wind transport of dust from disturbed soil surfaces. This may be accomplished several ways:

.1 vegetate, hydro seed, mulch areas that won't receive vehicular traffic

.2 construct windbreaks or screens

.3 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

.4 a combination of the above noted methods

.5 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.

6. BEST MANAGEMENT PRACTICES (BMP's) FOR EROSION AND SEDIMENT CONTROL

6.1 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 on conjunction with the minimum requirements. They are as follows:

.1 Source control BMP's for the protection of exposed surfaces

.2 Conveyance BMP's for control or 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

.2 Impondment BMP's

It is the consultant's responsibility to ensure that BMP's are appropriate for the site conditions.

6.2 Suggested BMP's for Erosion and Sediment Control

The following BMP's are described in detail in Appendix C of the Alberta transportation – Design Guidelines for Erosion and Sediment Control for Highways manual.

Each BMP lists all or some of the following information:

.1 Description and purpose

.2 Application

.3 Advantages

.4 Limitations

.5 Construction (see waiver note)

.6 Construction considerations

.7 Inspection and maintenance

.8 Similar measures

All work is to be completed in accordance with the City construction specifications.

Acceptable erosion control methods include:

.1 Seeding

.2 Mulching

.3 Hydro seeding

.4 Hydro mulching

.5 Topsoil placement

.6 Sodding

.7 Planting trees and shrubs

.8 Placing erosion control blankets

Acceptable sedimentation control methods include:

.1 Silt fences

.2 Gabions

.3 Rock filter berms

.4 Continuous (earth filled geotextile) berm

.5 Earth dyke barrier

.6 Storm drain inlet sediment barrier

.7 Storm drain inlet sediment trap

.8 Rock check dam

.9 Sandbag check dam

.10 Synthetic permeable barrier

.11 Straw bale check dam

.12 Straw bale barrier

.13 Stabilized worksite entrances

.14 Other methods illustrated in the manual may be utilized in unique situations

.15 Sediment (grit) separation storm water treatment units

.1 Purpose:
Sediment separators are a variation of traditional settling tanks. They are designed to capture sediment suspended in storm water runoff as the runoff is conveyed through a storm sewer system. The separator is a below ground 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 storm water 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 71 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 material within the treatment unit. The treatment unit shall remove at least 85% of all sediments of a 75 micrometer particle size of larger.

.3 Supplies

The following oil/grit separator units are acceptable for use in the City of Cold Lake.

Storm Water Treatment System	Supplier
CDS Technologies	Inland Pipe Ltd. (Calgary) 1-403-279-5531
Stormceptor	Lafarge Canada Inc. (Calgary) 1-800-LAFARGE
Vortechnics	Proform Concrete Services (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.

END OF SECITON

1. GENERAL

The Developer shall not do any fieldwork, including site clearing, stripping and/or grading prior to execution of a clearing and grading permit or a development agreement that includes clearing and grading construction activities.

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

The Planning and Development Manager and the Public Works and Infrastructure Department 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.

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

.1 Approved clearing and grading plans
.2 Approved erosion and sediment control plan
.3 Alberta transportation – field guide for erosion and sediment control for highways

2. REGULATORY REQUIREMENTS

Federal, Provincial and Municipal regulatory requirements for clearing and grading are included in Section 6 – 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 back sloping, 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 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 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 Erect Private Property and No Trespassing signs on the perimeter of the lands, stating the developers 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.

.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

4.2 Environment Protection

.1 All work associated with clearing and grading the work shall be completed in accordance with Section 01561 Clause 1.2 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 Section 02231.

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.

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 shall construct or complete the construction of the sound attenuation berm to the design cross sections as indicated on a drawing signed and stamped by a professional engineer licensed to practice in the Province of Alberta and approved by the Infrastructure Services Department of the City of Cold Lake, utilizing waste excavation material and/or surplus topsoil.

The Developer shall dispose of all topsoil that is surplus to the requirements of the developers land.

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, 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 City of Cold Lake.

.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 piles shall be removed as development progresses. All loam piles with the exception of the loam pile on the neighborhood school/park and/or neighborhood park site, must be removed prior to the last phase of development of the developers lands.

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 (rain water of snow melt) in and from the lands which may be cut of 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 Section 4.

.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 ≥ 1.2 meters. The report shall make general recommendations for different types of building foundations.

10. CONSTRUCTION COMPLETION AND FINAL ACCEPTANCE

10.1 General

Issuance of Construction Completion Certificates and Final Acceptance Certificates 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 their 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 City.

END OF SECTION

EROSION CONTROL MEASURES INSPECTION CHECK LIST

Project Name:_____ Agreement No._____

STAGE OF CONSTRUCTION

	Pre-construction Meeting		Rough Grading		Final Stabilization
	Clearing & Grubbing		Finish Grading		Maintenance Period

INSPECTION CHECKLIST

Item	Yes	No	N/A	Comments
Have all cleared and stripped areas requiring temporary or permanent stabilization been stabilized?				
Seeded?				
Mulched?				
Graveled?				
Are stockpiles adequately stabilized with seeding and/or sediment trapping measures?				
Does permanent vegetation provide adequate stabilization?				
Have sediment trapping facilities been constructed as the first step in stripping and grading?				
For perimeter trapping measures, are earthen structures stabilized?				
Are sediment basins installed where needed?				
Are finished cut and fill slopes adequately stabilized?				
Are on site channels and outlets adequately stabilized?				
Do all operational storm sewer inlets have adequate inlet protection?				
Are storm water conveyance channels adequately stabilized with channel lining and/or outlet protection?				
Are properties and waterways downstream from the development adequately protected from erosion and sediment deposition due to increase in peak storm water runoff?				
Is runoff upstream of the development adequately directed to the temporary and/or permanent storm water management facilities?				
Are soil and mud kept off public roadways at all access points to the site?				
Is in stream construction conducted using measures to minimize channel damage?				
Are temporary stream crossings on non-erodible material installed where applicable?				
Is necessary re-stabilization on in stream construction complete?				
Have all temporary control measures that are no longer required been removed?				
Have all permanent control structure repairs and sediment removal been performed?				

Report Completed by: _____ Date: _____

DEVELOPMENT PERMIT REQUIREMENTS LIST
FOR CLEARING AND GRADING

ITEM	REQUIRED	NOT REQUIRED	PROVIDED	DEFICIENCY CORRECTED
1. Copy of certificate of title				
2. copies of any restrictive covenants, easements and city caveats registered on title				
3. letter of authorization from the registered owner of the land				
4. identify the owners of all lands adjacent to the clearing and grading area. Provide written documentation from the affected property owners giving permission to access such lands including city land used for back sloping or other purposes. Where the clearing and grading boundary abuts other property owners, cross sections must be submitted.				
5. five (5) copies of an 8 ½ x 11 area map showing				
.1 area to be cleared stripped and graded outlined in red				
.2 the location of any stockpiles of stripped topsoil crosshatched in red				
.3 the location of any preservation area outlined in green				
6. two sets of the proposed construction drawing with a minimum scale of 1:1000				
7. general drawing requirements .1 north arrow				
.2 municipal address				
.3 legal description				
8. clearing and grading drawing				
.1 existing utility rights of way				
.2 existing survey control stations and markers				
.3 existing ground contours				
.4 proposed ground contours				
.5 test hole locations and original ground elevations				
.6 details of topsoil stockpiles include height width length and volumes				
.7 location of all existing and proposed utilities				
.8 the means by which all storm water in and from the subject lands will be controlled and disposed of including:				
. 1 how drainage from its natural route will be controlled				
. 2 what erosion and sediment control measures are to be installed				
9. any intended clearing, stripping and grading on adjacent lands, including details of edge conditions, back sloping requirement and areas where topsoil is to be placed and/or seeded until natural conditions are restored.				
10. any unusual site conditions				
.11 identify natural features that are to be preserved and/or removed				
9. development Phasing Plan				
.1 the phasing plan should indicate the area expected to be developed during the current year and the type of soil stabilization proposed for areas to be developed in following years.				
10. Cut/Fill Plans				
.1 cut/fill plans are required for every clearing, stripping and grading project				
.2 areas with fills ≥ 1.2 meters are to be highlighted on the drawing				
11. Deep Fills Geotechnical Report				
.1 a deep fill report completed by a geotechnical engineer is required when the proposed depth of fill is ≥ 1.2 meters				
.2 the report shall make general recommendations for different types of building foundations				
12. Additional Support Information				
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 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.				
A revised site plan showing fencing, including the snow fence required at the boundary of any environment reserve land.				
An erosion control report is necessary when erosion control measures are required.				

1. GENERAL

The water system consists of the Treatment Plants, Reservoirs, Booster Stations, Trunk Water Mains, Distribution Mains and Appurtenances.

In general, water mains 350 mm and larger will be designated "Trunk Water Mains" and the cost of these mains are included in the current Water Off Site Levy rate. The current Trunk Water Mains are identified in the most recent council approved Off Site Levy Report. Services will not be connected to trunk water mains.

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 System in Alberta, as published by Alberta Environmental Protection Services as amended by these guidelines.

2. PRESSURE ZONES

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

3. DESIGN FACTORS

3.1 Hydraulic Analysis Requirements

Unless approved otherwise, the Developer shall perform a Hydraulic Network Analysis using a method acceptable to the City (eg." Water CAD") for all developments to ensure both domestic and fire flow requirements are met. A report outlining the results of the analysis shall be submitted to the City with the subdivision design drawings. The Developer must utilize software compatible with the City's current water CAD modeling program for the 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) max 120 regardless of pipe material for diameters of 250mm or less.

.2 Distribution Main Sizes

The minimum size of distribution mains shall be as follows:

.1 Residential = 150 mm diameter unless one or more hydrants are located on the line in which case the minimum diameter shall be 200mm.

.2 Commercial / industrial = 250 mm diameter

3.3 Consumption Rates

.1 Residential per capita consumption rates:

.1 Average day demand: 350 liters (92.4imp Gal) per capita per day
.2 Maximum day demand: 750 liters (165 imp. Gal) per capita per day
.3 Peak hour demand: 1500 liters (330 imp. Gal) per capita per day

.2 Non residential consumption rates:

For non residential development, the minimum water consumption rate shall be equal to 0.2 liters 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 liters per second. In addition, water demand for large developments should be evaluated based on site specific service requirements as well as fire flow requirements.

3.4 Design Population

The design population shall be the ultimate population in the area under consideration based on the approved zoning by law requirements.

3.5 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 liters/minute (1000 igpm). A separate analysis shall also be made for maximum day demand plus a fire flow of 18,000 liters per minute at a node adjacent to a high value property, (e.g. school or shopping center). The minimum residual pressure at any node in the system shall be 140 KPa at ground level under this situation.

Fire flow conditions within a residential area shall be analyzed using the criteria contained in the latest edition of the Fire Underwriters Survey. The Developer must take into consideration any architectural control features (i.e. house size and spacing, shake roofs etc.) which may impact the fire flow requirements and design accordingly.

3.6 Pressure

.1 Minimum residual line pressures under maximum day plus fire flow conditions shall be 280 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.

.3 An insitu pressure and flow test shall be conducted prior to the issue of CCC to confirm the system meets Fire Flow requirements.

3.7 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. Care shall be taken by the consultant to provide line sizing to accommodate daily plus fire pressure and volume requirements.

4. DISTRIBUTION MAINS

4.1 General

The grid mains must be sized so as to provide enough flow and pressure to the development as well as future development as indicated in the Area Structure Plan. Should the existing sizing be determined inadequate through the network analysis the consultant shall provide alternative solutions to address the shortfalls. Distribution and transmission mains shall be continuous (looped) except those serving cul-de sacs less than 120m in length with residential housing. The maximum length of main permissible between ties is 300 m. Water demand in industrial, commercial and high density areas must be analyzed to determine the grid and main sizes required but in no case shall they be less than 200mm for high density residential and 250 mm for commercial / industrial.

Pipe materials for use in the water main system shall conform to applicable CSA, AWWA and ASTM recommendations. Pressure ratings for the water main pipe shall be determined by the applications and conditions the pipe shall be subjected to.

Pipe materials shall be polyvinyl chloride C-900 Class 150 DR-18.

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 longer than 6m or one pipe length to facilitate flushing and disinfection of the main.

4.2 Alignments

Water mains shall be located on the standard alignment shown on drawings 021, 022 & 024. A minimum separation of 3.0m from sanitary and storm sewers 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.

4.3 Depth of Cover

Water mains shall be installed with a minimum depth of cover of 3.0 m from the road/lane/utility lot surface grade to the top of the main. Where existing conditions dictate that the depth of bury be less than 3.0 m, the main/service is to be insulated as per current Engineering Best Management Practices and must be approved by the City of Cold Lake prior to installation.

Class "B" granular sand bedding compacted to a minimum of 98% Standard Proctor Density with a moisture content of -1% to +2% of optimum and shall be used for all water mains except where otherwise approved by the City of Cold Lake

5. HYDRANTS

5.1 Spacing

Unless otherwise specified pursuant to the IOWA worksheet or the NFPA Fire Protection Handbook, the maximum spacing between hydrants as measured along the centre line of the right of way, shall be 140 m in residential areas and 90 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's Emergency Services Department, Fire Prevention Bureau, 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 the beginning or end of curve of the curb returns at street intersections or at the extension of property lines. Fire hydrants shall be located at an alignment of 2.0m back of lip of gutter. Hydrant valves shall be located 1.0m into the carriageway from the lip of gutter. Hydrants shall be set so that the bottom of the flange is 100mm above the design finished grade at the hydrant. Hydrants must have break away flanges installed at the base of the body and must not extend below the ground grade line.

5.4 Hydrant Type

Hydrants shall be of a style and make acceptable to the City of Cold Lake and shall:

.1 Be compression type conforming to AWWA Specification C502 latest revision, for dry barrel fire hydrants complete with unplugged drains and stainless steel bolts.
.2 Include two 65 mm hose nozzles with AMA thread connection.
.3 Include one pumper connection with 100 mm "Storz" connection.
.4 Have hydrant body painted chrome yellow in color and red shall be reserved for private hydrants.
.5 Hydrants shall be Canada Valve Century Model, AVK-2700 with square operating nuts or approved equal.
.6 Hydrant buried components to be asphaltic coated.
.7 All hydrants shall be cathodically protected with a 5.5 kilogram zinc anode.
.8 All hydrants must have square operating nuts at top of hydrant.
.9 Hydrants shall be of compression type conforming to AWWA C502.

6. VALVES AND FITTINGS

6.1 Alignment and Placement

Main valves shall be located such that no more than 25 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 three valves at a tee and four 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. Where fittings are to be thrusted they shall be wrapped with plastic wherever they are to be encased in concrete.

6.3 Operation of Boundary Valves During Construction

The Consulting Engineer shall clearly identify boundary valves on the engineering design drawings. Arrangements for the operation of existing City of Cold Lake valves during construction shall be made through the Operations Manager of the City of Cold Lake's Public Works Department.

7. WATER MAIN FLUSHING AND DISINFECTION PROCEDURES

7.1 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 Cold Lake's Standard for Testing and Disinfecting Water Mains. This document is attached as Appendix A and is available on the web site www.coldlake.com.
Note: The Engineer must collect all water samples in the presence of a representative from Infrastructure Services.

.2 Consulting Engineer to submit proposed disinfection/flushing procedures complete with the appropriate calculations to the City for review with engineering design drawings.

.3 Should the water lines in any development remain idle for a period of 30 days or more then the water lines shall be flushed again prior to the issuance of building permits.

END OF SECTION

Table of Contents

1.0 INTRODUCTION

This standard sets the procedures for the testing and disinfection of water mains in the City of Cold Lake.

The objectives of the standard for the testing and disinfection of Water Mains are:

1) To provide clear standards to contractors and engineers regarding the testing and disinfection of Potable Water Distribution infrastructure in the City of Cold Lake.

2) To ensure that infrastructure built for the City of Cold Lake meets community quality of life expectations by being safe and functional.

3) To protect Public Health and Safety.

These standards are the basis on which all construction is to be undertaken in the City of Cold Lake.

2.0 REFERENCES

This standard references the following documents. In their latest editions, they form a part of this standard to the extent specified within the standard. In any case of conflict, the requirements of this standard shall prevail.

ANSI/AWWA C651-99 – Standard for Disinfecting Water Mains

ANSI/AWWA C605-94 – Standard for Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water

ANSI/AWWA B300 – Standard for Hypochlorites

ANSI/AWWA B031 – Standard for Liquid Chlorine

Simplified Procedures for Water Examination. AWWA Manual M12. AWWA, Denver (1997)

Standard Methods for the Examination of Water and Wastewater. APHA, AWWA and WEF Washington, D.C. (20th ed., 1998)

3.0 HYDROSTATIC TESTING

3.1 General

To prevent pipe movement, sufficient backfill shall be placed prior to filling pipe with water and field testing. When local conditions require that the trenches be filled immediately after the pipe has been laid, the testing may be carried out after backfilling has been completed but before placement of permanent surface. The constructor shall ensure that thrust blocking or other types of restraining systems will provide adequate restraint prior to pressurizing the pipeline.

This testing standard applies in principal to PVC pipe installations. Other testing criteria will be applied when other pipe materials are installed, or other factors govern.

3.2 Cross Connection Control

When existing water mains are used to supply test water, they should be protected from backflow contamination by temporarily installing a double check-valve assembly between the test and supply main or by other means approved by they City of Cold Lake. Prior to pressure and leakage testing, the temporary backflow protection should be removed and the main under test isolated from the supply main.

3.3 Procedure

The following procedure is based on the assumption that the pressure and leakage tests will be performed at the same time. Separate tests may be made if desired. If separate test are made, the pressure test shall be performed first. Tests shall be performed only after the pipeline has been properly filled, disinfected, flushed and purged of all air. The specified test pressure shall be applied by means of an approved pumping assembly connected to the pipe in a manner satisfactory to the City of Cold Lake. The test pressure shall be maintained by additional pumping for the specified time during which the system and all exposed pipe, fittings, valves and hydrants shall be carefully examined for leakage. All visible leaks shall be stopped. All defective elements shall be repaired or removed and replaced and the test repeated until the allowable leakage requirements have been met.

3.4 Test Method

The contractor may perform simultaneous pressure and leakage tests or perform separate pressure and leakage tests on the installed system at test durations and pressures specified in table 1. The project engineer, or their approved agent shall witness the entire duration of the tests, and the equipment used for the test shall be subject to the approval of the City of Cold Lake or approved agent.

3.5 Allowable Leakage

The constructor shall furnish the gauges and measuring device for the leakage test, pump, pipe, connections, and all other necessary apparatus, unless otherwise specified, and shall furnish the necessary assistance to conduct the test.

The duration of each leakage test shall be two (2) hours, unless otherwise specified. During the test, the pipeline shall be subjected to the pressure listed in Table 1. Leakage shall be defined as the quantity of water that must be supplied into the pipe section being tested to maintain a pressure within 5 psi (34 kPa) of the specified leakage-test pressure after the pipe has been filled with water and the air in the pipeline has been expelled. No installation will be accepted if the leakage is greater than that determined by the formula:

$$L_m = \frac{ND\ (\text{square root of } P)}{65{,}410}$$

Where:

L_m = allowable leakage, in litres per hour
N= number of joints in the length of pipeline tested (each gasket shall constitute a joint)
D = nominal diameter of the pipe, in millimeters
P= average test pressure during the leakage test, (kPa)
(1.0 psi= 6.9 kPa)

Table 1 – System Test Methods

Procedure	Pressure	Duration of Test
Simultaneous Pressure and Leakage Tests	150% of working pressure[1] at point of test, but not less than 125% of normal working pressure at highest elevation	2 hr
Separate Pressure Test	150% of working pressure[1] at point of test, but no less than 125% of normal working pressure at highest elevation.[2]	1 hr
Separate Leakage Test	150% of working pressure[1] of segment tested.	1 hr
Leakage Test for Water Main Renewals only	100% Existing Line Pressure at time of test for segment tested[2]	2 hr

1 Working pressure is defined as maximum anticipated sustained operating pressure
2 In no case shall the test pressure be allowed to exceed the design pressure for pipe, appurtenances, or thrust restraints.

These formulas are based on an allowable leakage of (0.978 L/day/km/mm) of nominal diameter at a pressure of 150 psi (1,030 kPa).

Leakage values determined by the above formulas are presented in Table 2.

When testing against closed metal-seated valves, an additional leakage per closed valve of (0.0012 L/hr/mm) of nominal valve size shall be allowed.

When hydrants are in the test section, the test shall be made against closed hydrants valves.

All visible leaks shall be repaired, regardless of the amount of leakage.

Alternative allowable-leakage criteria may by applied from time to time at the sole discretion of the City of Cold Lake with prior notification.

Table 2 – Allowable Leakage per 50 Joints of PVC Pipe (litres per hour)

Nominal Pipe Diameter, mm (in)													
Avg. Test Pressure		100	150	200	250	300	350	400	450	500	610	760	915
psi	*kPa*	(4)	(6)	(8)	(10)	(12)	(14)	(16)	(18)	(20)	(24)	(30)	(36)
300	*2070*	1.75	2.60	3.50	4.35	5.21	6.10	6.96	7.85	8.70	10.45	13.06	15.66
275	*1900*	1.67	2.49	3.35	4.17	4.98	5.84	6.66	7.51	8.33	10.01	12.50	14.99
250	*1720*	1.60	2.38	3.16	3.98	4.76	5.58	6.36	7.14	7.96	9.52	11.94	14.32
225	*1550*	1.53	2.27	3.01	3.76	4.54	5.28	6.03	6.77	7.55	9.04	11.31	13.58
200	*1380*	1.41	2.12	2.83	3.57	4.28	4.98	5.69	6.40	7.11	8.52	10.68	12.80
175	*1210*	1.34	2.01	2.68	3.31	3.98	4.65	5.32	5.99	6.66	8.00	9.97	11.98
150	***1030***	**1.23**	**1.86**	**2.46**	**3.09**	**3.68**	**4.32**	**4.91**	**5.54**	**6.18**	**7.40**	**9.23**	**11.09**
125	*860*	1.12	1.67	2.23	2.83	3.39	3.94	4.50	5.06	5.62	6.73	8.44	10.12
100	*690*	1.00	1.53	2.01	2.53	3.01	3.53	4.02	4.54	5.02	6.03	7.55	9.04
75	*520*	0.86	1.30	1.75	2.19	2.60	3.05	3.50	3.91	4.35	5.21	6.55	7.85
50	*340*	0.71	1.08	1.41	1.79	2.12	2.49	2.83	3.20	3.57	4.28	5.32	6.40

If the pipeline under test sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.
Note: Table is for guideline only (Typical test pressure is highlighted for convenience)

4.0 DISINFECTION

4.1 GENERAL

4.1.1 Scope

This standard presents mandatory procedures for the disinfection of new and repaired potable water mains. All new water mains shall be disinfected before they are placed in service. All water mains taken out of service for inspection, repair, or other activities that might lead to contamination of water shall be disinfected before they are returned to service.

4.1.2 Purpose

The purpose of this standard is to define the minimum requirements for the disinfection of water mains, including the preparation of water mains, application of chlorine, and sampling and testing for the presence of coliform bacteria.

4.1.3 Application

This standard shall be referenced in specifications for the disinfection of water mains and can be used as a guide for the preparation of water mains, application of chlorine, and sampling and testing for the presence of coliform bacteria. The stipulations of this standard apply when this document has been referenced and then only to the disinfection of water mains.

4.2 REQUIREMENTS

4.2.1 Forms of Chlorine for Disinfection

The forms of chlorine that may be used in disinfection operations are sodium hypochlorite solution and calcium hypochlorite.

Sodium hypochlorite:

Sodium hypochlorite conforming to ANSI/AWWA B300 is available in liquid form in glass, rubber-lined, or plastic containers typically ranging in size from 1 qt (0.95 L) to 5 gal (18.92 L). Containers of 30 gal (113.5 L) or larger may be available in some areas. Sodium hypochlorite contains approximately 5% to 15% available chlorine, and the storage conditions and time must be controlled to minimize its deterioration. (Available chlorine is expressed as a percent of weight when the concentration is 5% or less, and usually as a percent of volume for higher concentrations. Percent x 10 = grams of available chlorine per litre of hypochlorite.)

Calcium Hypochlorite

Calcium Hypochlorite conforming to ANSI/AWWA B300 is available as a dry material, of approximately 65 per cent as available chlorine and comes in powder, granular, or tablet form. Calcium hypochlorite is relatively soluble in water and therefore, adaptable to solution feeding. Storage conditions must be controlled to prevent deterioration or reaction with combustible chemicals or materials as identified on the applicable MSDS label.

4.2.2 Basic Disinfection Procedure

The basic disinfection procedure consists of:

1. Inspecting all materials to be used to ensure the integrity of the materials.
2. Preventing contamination materials from entering the water main during storage, construction, or repair and noting potential contamination at the construction site.
3. Removing, by flushing or other means, those materials that may have entered the water main.
4. Chlorinating any residual contamination that may remain, and flushing the chlorinated water from the main.
5. Protecting the existing distribution system for backflow caused by hydrostatic pressure test and disinfection procedures.
6. Documenting that an adequate level of chlorine contacted each pipe to provide disinfection.
7. Determining the bacteriological quality by laboratory test after disinfection.
8. Final connection of the approved new water main to the active distribution system.

4.2.3 Preventive and Corrective Measures During Construction

General:

Heavy particulates generally contain bacteria and prevent even very high chlorine concentrations from contacting and killing these organisms. Therefore, the procedures of this section must be observed to assure that a water main and its appurtenances have been thoroughly cleaned for the final disinfection by chlorination. Also, any connection of a new water main to the active distribution system prior to the receipt of satisfactory bacteriological samples may constitute a cross-connection. Therefore, the new main must be isolated (by either a valve assembly or physical separation) until bacteriological tests described in Section 4.3 of this standard are satisfactorily completed.

Keeping pipe clean and dry:

The interiors of pipes, fittings, and valves shall be protected from contamination. Pipe delivered for construction shall be strung to minimize the entrance of foreign material. All openings in the pipeline shall be closed with watertight plugs when pipe laying is stopped at the close of the day's work or for other reasons, such as rest breaks or meal periods. Rodent-proof plugs may be used when watertight plugs are not practicable and when thorough cleaning will be performed by flushing or other means.

Delays:

Delay in placement of delivered pipe invites contamination. The more closely the rate of delivery correlated to the rate of pipe laying, the lower risk of contamination.

Joints:

Joints of all pipes in the trench shall be completed before work is stopped. If water accumulates in the trench, the plugs shall remain in place until the trench is free of water.

Packing materials:

Yarning or packing material shall consist of molded or tubular rubber rings, rope of treated paper, or other approved materials. Materials such as jute or hemp shall not be used. Packing material shall be handled in a manner that avoids contamination. If asbestos rope is used, asbestos shall be prevented from entering into the water-carrying portion of the pipe.

Sealing materials:

No contaminated material or any material capable of supporting prolific growth or microorganisms shall be used for sealing joints. Sealing material or gaskets shall be handled in a manner that avoids contamination. The lubricant used in the installation of sealing gaskets shall be suitable for use in potable water and shall not contribute odors. It shall be delivered to the job in closed containers and shall be kept clean and applied with dedicated, clean applicator brushes.

Cleaning and swabbing:

If dirt enters the pipe, it shall be removed and the interior pipe surface swabbed with a 1 to 5 % hypochlorite disinfecting solution. If, in the opinion of the City of Cold Lake, the dirt remaining in the pipe will not be removed using the flushing operation, then the interior of the pipe shall be cleaned using mechanical means, such as a hydraulically propelled foam pig (or other suitable device acceptable to the City of Cold Lake) in conjunction with the application of a 1% hypochlorite disinfecting solution. The cleaning method used shall not force mud or debris into the interior pipe-joint spaces and shall be acceptable to the City of Cold Lake.

Wet-trench construction:

If it is not possible to keep the pipe and fittings dry during installation, the water that may enter the pipe-joint spaces shall contain an available chlorine concentration of approximately 25 mg/L. This may be accomplished by adding calcium hypochlorite granules or tablets to each length of pipe before it is lowered into a wet trench or by treating the trench water with hypochlorite tables.

Flooding by storm or accident during construction:

If the main is flooded during construction, the City of Cold Lake may require the following procedure be followed. The decision will be based on site specific conditions.

The main shall be cleared of the floodwater by draining and flushing with potable water until the main is clean. The section exposed to the floodwater shall then be filled with a chlorinate potable water that, at the end of a 24-h holding period, will have a free chlorine residual of not less than 25 mg/L. The chlorinated water may then be drained or flushed from the main. After construction is completed, the main shall be disinfected using the continuous-feed or slug method.

Backflow protection:

When specified by the City of Cold Lake the new water main shall be kept isolated from the active distribution system using a physical separation until satisfactory bacteriological testing has been completed and the disinfectant water flushed out. Water required to fill the new main for hydrostatic pressure testing, disinfecting, and flushing shall be supplied through a temporary connection between the distribution system and the new main. The temporary connection shall include an appropriate cross-connection control device consistent with the degree of hazard (a double check valve assembly or a reduced pressure zone assembly).

In **most** cases a closed gate valve will be considered to be sufficient isolation.

It will be necessary to re-establish the temporary connection after completion of the hydrostatic pressure test to flush out the disinfectant water prior to final connection of the new main to the distribution system.

NOTE: Exposure to high levels of chlorine or high pH can cause sever irritation to customers. Also, the chlorinated water can be high in disinfection by-products.

4.2.4 Methods of Chlorination

General:

One method of chlorination is explained in this section: continuous feed, the continuous-feed method gives a 24-h chlorine residual of not less than 10 mg/L.

Pre-flushing of source water. The source water used for disinfection and pressure testing shall be flushed prior to its use to ensure that contaminants or debris are not introduced into the new pipe. Adequate drainage must be provided during flushing. Drainage should take place away from the construction area. During the contact period, it is recommended that the valve isolating the new main from this system (if applicable) be tagged to prevent unintentional release of the elevated chlorine residual water into the system.

Table 3 Required flow and openings to flush pipelines (40 psi residual pressure in water main)*

Pipe Diameter	Flow Required to produce 2.5 ft/s (approx) Velocity in Main	Size of Tap. (mm)			Number of 2 ½ in (64mm) Hydrant Outlets
(mm)	(l/s)	25	38	51	
	Number of Taps on Pipe				

100	6.3	1	-	-	1
150	12.6	-	1	-	1
200	25.2	-	2	1	1
250	37.9	-	3	2	1
300	56.8	-	-	2	2
400	100.9	-	-	4	2

With a 40 psi pressure in the main with the hydrant flowing to atmosphere, 2 ½ inch hydrant outlet will discharge approximately 63 l/s; and a 4 ½ inch hydrant outlet will discharge approximately 160 l/s.

Continuous –feed method:

The continuous-feed method consists of placing calcium hypochlorite granules in the main during construction (optional), completely filling the main to remove all air pockets, flushing the completed main to remove particulates, and filling the main with potable water. The potable water shall be chlorinated so that after a 24-h holding period in the main there will be a free chlorine residual of not less than 10 mg/L.

.1 Placing of calcium hypochlorite granules: At the option of the City of Cold Lake calcium hypochlorite granules shall be placed in pipe sections. The purpose of this procedure is to provide a strong chlorine concentration in the first flow of flushing water that flows down the main. In particular, this procedure is recommended when the type of pipe is such that this first flow of water will flow into annular spaces at pipe joints.

.2 Preliminary flushing: Before the main is chlorinated, it shall be filled to eliminate air pockets and flushed to remove particulates. The flushing velocity in the main shall not be less than 0.76 m/s (2.5 ft/s) unless the City of Cold Lake determines that conditions do not permit the required flow to be discharged to waste. Table 3 shows the rates of flow required to produce a velocity of 0.76 m/s (2.5 ft/s) in commonly used sizes of pipe. Note that flushing is no substitute for preventative measures during construction. Certain contaminates, such as caked deposits, resist flushing at any feasible velocity.

For (600-mm) or larger diameter mains, an acceptable alternative to flushing is to broom sweep the main, carefully removing all sweepings prior to chlorinating the main.

.3 Procedure for chlorinating the main.

Water supplied from a temporary, backflow-protected connection to the existing distribution system or other approved supply source shall flow at a constant, measured rate into the newly installed water main. In the absence of a meter, the rate may be approximated using a Pitot gauge in the discharge or measuring the time to fill a container of known volume.

i. At a point not more than 10 ft (3 m) downstream from the beginning of the new main, water entering the new main shall receive a dose of chlorine fed at a constant rate such that the water will have between 25 – 50 (mg/L) of free chlorine. To ensure that this concentration is provided, measure the chlorine concentration at regular intervals during filling of the main.

Table 4 gives the amount of chlorine required for each 30 m of pipe of various diameters. Solutions of 1% chlorine may be prepared with sodium hypochlorite or calcium hypochlorite.

ii. Water used to fill the new main during the application of chlorine shall be supplied through a temporary connection. This temporary connection shall be installed with an appropriate cross-connection control device, consistent with the degree of hazard for backflow protection of the active distribution system. Chlorine application shall not cease until the entire main is filled with heavily soiled chlorinated water. The chlorinated water shall be retained in the main for at least 24 h, during which time all valves and hydrants in the treated section shall be operated to ensure disinfection of the appurtenances. At the end of this 24-h period, the treated water in all portions of the main shall have a residual of not less than 10 mg/L of free chlorine.

Table 4 Chlorine required to produce 25 mg/l concentration in 30 m of pipe by diameter

Pipe Diameter (mm)	100% Chlorine (g)	1%Chlorine Solution (L)
150	13.6	1.4
200	24.5	2.5
250	38.6	3.9
300	54.4	5.4
400	98.4	9.8

4.2.5 Final Flushing

Clearing the main of heavily soiled chlorinated water:

After the applicable retention period, heavily chlorinated water should not remain in prolonged contact with pipe. In order to prevent damage to the pipe lining or to prevent corrosion damage to the pipe itself, the heavily chlorinated water shall be flushed from the main fittings, valves and branches until chlorine measurements show that the concentration in the water leaving the main is no higher than that generally prevailing in the distribution system or that is acceptable for domestic use.

Disposing of heavily chlorinated water:

Under no condition is heavily chlorinated water to be discharged to the Storm Sewer System. Heavily chlorinated water may be discharged to the Regional Utilities Services Commission Wastewater Lagoon with permission from the Wastewater Utility manager.

Where discharge to the Regional Utilities Services Commission Wastewater Lagoon is impractical chlorinated water shall be treated with an approved de-chlorinating agent and monitored to ensure that chlorine levels do not adversely effect the environment.

4.2.6 Procedures When Cutting Into or Repairing Existing Mains

The following procedures apply primarily when existing mains are wholly or partially dewatered. After the appropriate procedures have been completed, the existing main may be returned to service prior to the completion of bacteriological testing in order to minimize the time customers are without water.

Trench treatment:

When an existing main is opened, either by accident or by design, the excavation will likely be wet and may be badly contaminated from nearby sewers. Liberal quantities of hypochlorite applied to open trench areas will lessen the danger from this pollution. Tablets have the advantage in this situation, because they dissolve slowly and continue to release hypochlorite as water is pumped from the excavation.

Swabbing with hypochlorite solution:

The interior of all pipe and fittings (particularly couplings and sleeves) used in making the repair shall be swabbed or sprayed with a 1% hypochlorite solution before they are installed.

Flushing:

Thorough flushing is the most practical means of removing contamination introduced during repairs. If valve and hydrant location permit, flushing toward the work location from both directions is recommended. Flushing shall be started as soon as the repairs are completed and shall be continued until discolored water is eliminated.

Slug chlorination:

Where practical, in addition to the procedures previously described, the section of the main in which the break is located shall be isolated, all service connections shut off, and the section flushed and chlorinated. The dose may be increased to as much as 300 mg/L and the CT reduced to as little as 15 min. After chlorination, flushing shall be resumed and continued until discolored water is eliminated and the chlorine concentration in the water exiting the main is not higher than the prevailing water in the distribution system or that which is acceptable for domestic use.

Bacteriological samples:

Bacteriological samples shall be taken after repairs are completed to provide a record for determining the procedure's effectiveness. If the direction of flow is unknown, then samples shall be taken on each side of the main break. If positive bacteriological samples are recorded then the situation shall be evaluated by the City of Cold Lake who can determine corrective action.

4.2.7 Special Procedure for Caulked Tapping Sleeves

Before a tapping sleeve is installed, the exterior of the main to be tapped shall be thoroughly cleaned and the interior surface of the sleeve shall be lightly dusted with calcium hypochlorite powder.

Tapping sleeves are used to avoid shutting down the main. After the tap is made, it is impossible to disinfect the annulus without shutting down the main and removing the sleeve. The space between the tapping sleeve and the tapped pipe is approximately 13 mm, so that as little as 1000 mg/m^2 of calcium hypochlorite powder will provide a chlorine concentration of more than 50 mg/L.

4.3 Verification

4.3.1 Bacteriological Tests

Standard conditions:

After final flushing and before the new water main is connected to the distribution system, two consecutive sets of acceptable samples, taken at least 24 h apart, shall be collected from the new main. (NOTE: The pipe, the water loaded into the pipe, and any debris all exert a chlorine demand that can interfere with disinfection.)

At least one set of samples shall be collected from every 350 m of the new water main, plus one set from the end of the line and at least one set from each branch. All samples shall be tested for bacteriological quality in accordance with Standard Methods of the Examination of Water and Wastewater; and shall show the absence of coliform organisms. *This shall be accomplished through test identifying E.coli and Total Coliforms.*

Chlorine residual and turbidity shall also be tested for.

A standard heterotrophic plate count MAY be required at the option of the City of Cold Lake, because new material does not typically contain coliforms but does typically contain HPC bacteria.

Special conditions:

If trench water has entered the new main during construction or if, in the opinion of the City of Cold Lake, excessive quantities of dirt or debris have entered the new main, bacteriological samples shall be taken at intervals of approximately 60m and the location shall be identified. Samples shall be taken of water that has stood in the new main for at least 16 hours after final flushing has been completed.

Sampling procedure:

Samples for bacteriological analysis shall be collected in sterile bottles treated with sodium thiosulfate as required by Standard Methods for the Examination of Water and Wastewater. No hose or fire hydrant shall be used in the collection of samples. (NOTE: For pipe repairs, if no other sampling port is available, well flushed fire hydrants may be used with the understanding that they do not represent optimum sampling conditions.) The sampling pipe must be dedicated and clean, and disinfected and flushed prior to sampling. A corporation cock may be installed in the main with either a copper-tube gooseneck or Municipex pipe assembly.

Record or compliance:

The record of compliance shall be the bacteriological test results certifying that the water sampled from the new water main is free of coliform bacteria contamination as described in Section 4. – Reporting.

4.3.2 Re-disinfection

If the initial disinfection fails to produce satisfactory bacteriological results or if other water quality is affected the new main may be re-flushed and shall be re-sampled. If check samples also fail to produce acceptable results, the main shall be re-chlorinated by the continuous-feed or slug method until satisfactory results are obtained.

NOTE: high velocities in the existing system, resulting from flushing the new main, may disturb sediment that has accumulated in the existing mains. When check samples are taken, it is advisable to sample water entering the new main to determine the source of turbidity.

5.0 REPORTING

4.1 General

Prior to a new water main being placed into service the following forms must be submitted to the City of Cold Lake Director of Public Works and Infrastructure Services, or an approved designate, for approval.

These forms shall be accompanied by a signed and stamped letter from a Professional Engineer stating that the intent of this standard has been satisfied.

Form A – Hydrostatic Testing Results
Form B – Disinfection Report
Form C – Laboratory Results

FORM A – HYDROSTATIC TESTING RESULTS

LOCATION _____

_____

TEST DATE _____

START TIME: _____

END TIME: _____

DIAGRAM OF TEST SECTION (SHOULD INCLUDE FITTINGS, HYDRANTS, VALVES, PIPE SIZES AND LENGTHS

CALCULATED ALLOWABLE LEAKAGE _____

PASS YES NO

RETEST START TIME: _____

END TIME: _____

PASS YES NO

Signed: _____
Consulting Engineer

Witnessed _____
City of Cold Lake

FORM B – DISINFECTION REPORT

LOCATION _____

_____

CHLORINATION DATE _____

CHLORINATION START TIME: _____

CHLORINATION END TIME: _____

DIAGRAM OF CHLORINATED SECTION INCLUDING LABELED SAMPLE POINTS
(SHOULD INCLUDE FITTINGS, HYDRANTS, VALVES, PIPE SIZES AND LENGTHS)

NUMBER OF SAMPLE POINTS REQUIRED _____

SAMPLE POINT	INITIAL CHLORINE CONTENT	FINAL CHLORINE CONTENT	FLUSHED CHLORINE RESIDUAL

Signed: _____
Consulting Engineer

Witnessed _____
City of Cold Lake

FORM C –BACTERIOLOGICAL LABORATORY RESULTS

LOCATION _____

_____

TEST DATE _____

DIAGRAM OF TEST SECTION (SHOULD INCLUDE FITTINGS, HYDRANTS, VALVES, PIPE SIZES AND LENGTHS

LAB NAME _____

LABORATORY ADDRESS _____

_____

_____

NOTE: ALL LAB RESULTS ARE TO BE ATTACHED TO THIS FORM.

Signed: _____
Consulting Engineer

Witnessed _____
City of Cold Lake

1. GENERAL

The sanitary system must be designed with consideration for the service area boundaries established by the city for each trunk system. The sanitary sewer system shall be of sufficient capacity to carry peak flows plus infiltration. The factors outlined in the following sections shall be used in the design of sanitary sewerage systems.

The Developer and the Developers Consultant are responsible to ensure that the infrastructure is designed and constructed to achieve design life expectations consistent with good design and construction practices.

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 the cost of these mains are included in the current sanitary off site levy rate. The current trunk sanitary mains are identified in the most recent council approved off site levy reports.

2. DESIGN FLOWS

2.1 Residential (Population Generated)

In determining the residential flows, a minimum of 3.5 persons per household shall be used.
Residential dry weather flows are to be calculated as follows:
$Q_{PDW} = (G \times P \times Pf) / 86.4$
Q_{PDW} – the peak dry weather design flow rate (liters/sec)
G = 350 liters / day / person
P = the design contributing population in thousands (population per hectare c contributing area / 1000)
Peaking Factor shall be Pf = Harmon's Peaking Factor = $1 + 14 / (4 + P^{0.5})$ or a minimum of 3.0. The peaking factor must reflect the projected population of the subdivision being designed.
Minimum flow velocity = 0.60 m/s
Maximum flow velocity = 3.0 m/s
Pipe sizing shall be determined by utilizing the Manning's Formula using a minimum "n" value of 0.013.
The minimum grade of the fires upstream leg of the sanitary sewer shall not be less than 1.00%.
Weeping Tiles and similar appurtenances such as sump pumps (By-law 69-UT-99) shall not be permitted to discharge into sanitary sewers.
A minimum allowance of 25,000 liters/day per gross hectare must be incorporated into the design.

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 or 18.0 m^3 / Ha./day, whichever is greater.

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

Q_{AVE} = 0.20 litres / sec / ha

Peak dry weather flows are to be determined as follows:

Peaking Factor, PF = 10 ($Q_{AVE}^{-0.45}$), but not less than 2.5

Peak Dry Weather Flow Q_{PDW} = Pf X Q_{AVE}

2.3 Extraneous Flow Allowances – All Land Uses

For the City, a general allowance of 0.29 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.

3. SANITARY SEWER MAINS

3.1 General

Sanitary sewers shall be designed for gravity flow unless approved otherwise by the Engineer.

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 %

Class “B” pipe bedding shall be provided for all mains.

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 Curved Sewer

Although it is recommended that sanitary 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 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% grater than the minimum grades noted in Clause 3.2 of this Section.

3.4 Alignment

Sanitary mains shall be located on the standard alignment shown in Section 13. A minimum separation of 3.0 m from water mains shall be provided in all instances, unless approved otherwise by the City Engineer. Consistent alignments shall be used along the entire length of a street, lane or public utility lot.

3.5 Depth of Cover

All sewer shall be designed so that the top of the main is at the minimum depth required to meet the conditions of Section 9, Clause 4, but not shallower than 3.0 m, unless otherwise approved by the Engineer. Where existing conditions dictate that the depth of bury be less than 3.0 m, the main/service is to be insulated as per current Engineering Best Management Practices and approved by the City of Cold Lake prior to installation.

3.6 Compaction in trench

In all new subdivisions, it shall be the Developers responsibility to ensure that utility trenches are adequately compacted. Within the road right of way 98% Standard Proctor Density shall be required; 95% Standard Proctor Density in all other areas.

4. MANHOLES

Manhole sections shall be precast reinforced concrete sections conforming to ASTM C478, latest revision thereof.

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 120 m along the length of the sewer.

Inverts in manholes shall have a minimum 30 mm drop for straight run sewer manholes. Where a bend in pipe alignment occurs in a manhole, the invert elevation of the downstream pipe shall be at lease 50 mm below that of the lowest upstream pipe.

In cul de sacs service leads may be connected directly to the 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.

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 750 mm in diameter or less. Pre cast manhole vaults, or an oversized manhole barrel shall be used on mains 900 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 detail in contract specifications.

Manhole frames and covers shall be NF-80 cast iron conforming to Class20 ASTM A48, latest revision thereof.

All joints shall be sealed with rubber gaskets and grouted inside and outside.

Manhole steps shall be standard safety type, hot dipped galvanized iron or aluminum.

Backfill around manholes shall be compacted with mechanical tampers to a minimum of 98% Standard Proctor Density at a moisture content of -1% to +2% of optimum.

All drop manholes shall be internal drops.

5. OVERSIZE

Oversize may be applicable for sanitary mains. Oversize costs will be determined as outlined in the development agreement.

END OF SECTION

Table of Contents

3.0 INTRODUCTION

Extension of sanitary servicing by means other that gravity flow sewers shall be considered only in cases where insurmountable constraints cannot be resolved, dictating a requirement for a wastewater pumping station.

2.0 DESIGN REQUIREMENTS

2.1 General

It is the City of Cold Lake's interest to standardize the design and construction of wastewater pumping stations to promote economical construction and increased reliability of operation.

2.2 Pumping Station Configuration

The City of Cold Lake will consider both wet well or wet/dry well design concepts for wastewater pumping stations. The wet well concept is preferable for pumping stations with capacity's less than 75 kilowatts. Furthermore each pumping station shall be equipped with lifting amenities and automatic pump discharge connection.

A building will be required for all pumping stations to house the pumping equipment, electrical systems, and control equipment. All heating and ventilation equipment will also be expected to be housed in the building.

Pumping station structures should be designed to 50 year life expectancy.

2.3 Pumping Design Capacity

Pumping equipment shall be designed with capacities greater that the maximum expected wastewater flow rate produced by the development area. The pumping capacity of the facility shall meet the minimum design capacity flow rate and exceed the expected maximum flow rate ratio as determined by the maximum population density of the development area.

2.4 Mechanical Redundancy

A minimum of two (2) pumps are required for each pumping station, although provision for a third pumping unit is preferred. All pumps must be interchangeable. In situations where two (2) pumping units are provided they shall each be of the same pumping capacity and each unit capable of operating independently, either pump shall be capable of pumping at the Design Capacity Flow Rates.

In situations where three (3) or more pumping units are being designed, the pumping capacity shall be such that with the largest unit out of services, the remaining units operating in parallel shall by capable of pumping to the Design Capacity Flow Rates. It should be noted that head losses associated with parallel operations must be taken into consideration for the design of parallel operations.

2.5 Power Supply Provisions

Whenever feasible, electrical power supply to the pumping station shall be provided from two (2) independent distribution sources. Subject to site conditions, the City of Cold Lake must have mandatory permanent back up power generation equipment. All pumping stations shall be designed with provisions for such equipment to be incorporated. Sufficient site area must be provided, and electrical design, building layout, and structure components shall allow for standby power generation without unnecessary expense.

2.6 Alarm Telemetry

Automated remote sensing and telemetry equipment shall be provided at each wastewater pumping station. This equipment shall provide for the detection of the status and selected operating conditions and transmission of appropriate alarms to the Cold Lake Regional Utilities Services Commission Water Treatment Plant.

2.7 Backup Storage

A minimum 4-hour design capacity flow detention storage will be required for all pumping stations. The storage shall not be created by enlarging the volume of the pump stations wet well. The storage shall be at an elevation above the wet well active zone so that flow will not enter the storage area under normal operating conditions, and the storage will drain by gravity to the wet well once normal operating functions have been restored.

3.0 DETAILED DESIGN REQUIREMENTS

3.1 WASTEWATER SEWER INLET:

3.1.1 Single Sewer Entry to Wet Wells

Only one sewer connection shall be provided into a wet well to convey sewage form the contributing collection system.

3.1.2 Collection Manhole

If more than one sewer enters the site or is required to be connected to the pumping station, a collection manhole shall be provided as a junction point for all incoming sewers. Only a single connection is to be made from the collection manhole to the wet well of the pumping station.

3.1.3 Inflow Shutoff Valve

A watertight valve or slide gate shall be provided on the inlet to the wet well so that inflow to the wet well can be stopped. This valve may be installed in the first manhole upstream form the pumping station. Installation of this valve within the wet well is not permitted. The shutoff valve shall be of a type and material suitable for raw sewage service.

3.1.4 Inlet Sewer Elevation

Excessive entrainment of air into the flow stream entering the wet well should be avoided to prevent entrained air form reducing pump performance. Provisions necessary to address this may include drop tubes inside the wet wells, grade adjustments or a drop manhole upstream form the pump station to lower the elevation of the inlet. It should be noted the inlet shall not enter the wet well at an elevation lower than the normal high liquid level for the design capacity flow rate.

3.2 WET WELL SIZE AND DETAIL:

3.2.1 Size Considerations

Wet wells are to be of adequate size to suit equipment space and operator access requirements, and active volume considerations.

To minimize dead storage volume, the depth form the “pump off” level to the floor of the wet well should be kept to an acceptable minimum. The required depth will be dictated by the suction pipe inlet conditions, pump manufacturer’s requirements for submergence or cooling, net positive suction head, priming requirements, and vortex control.

Wet wells must by sized small enough to minimize the time duration that sewage is held in the wet well and any rising force main and yet large enough to control the frequency of pump starts. The maximum retention time in the wet well should not exceed 30 minutes for the design capacity minimum flow rate anticipated at full development of the contributing area. Total retention time in the wet well and force main should be kept to a minimum (generally less than 4 hours) to avoid anaerobic fermentation and the resultant production of odorous, hazardous, and corrosive gases. Otherwise, provisions must be made to control anaerobic conditions. It is desirable to have sufficient active volume in the wet well so that all sewage within the discharge force main will be replaced by one pumping cycle.

Wet wells should be sized large enough to maximize pump life by decreasing the frequency of pump starts. However, in the interest of limiting excessive detention time, wastewater pumping stations will inherently be subject to relatively high frequencies of switching cycles. The manufacturer’s recommendations with regard to the allowable frequency of pump starts for the specific size and type of motor are to be satisfied.

3.2.2 Wet Well Shape and Benching

Wet wells are to be arranged and benched to limit dead spaces where solids can accumulate, and to provide smooth, uniform and unobstructed flow to the pump suction influence zones. Wet well floors should have a minimum slope of 1:1 to a hopper type bottom. The horizontal area of the hopper bottom should be no larger than necessary for the proper installation of the pump or suction pipe.

The cross-sectional area and shape of the wet well above the benching are to be constant, and in any case the across section shall not decrease from the bottom towards the top.

3.2.3 Vortex Prevention

Suction elbows, baffle plates, vortex breakers, or drop tubes are to be provided as required.

3.2.4 Corrosion Consideration – Wet Well

All bolts, nuts, and other fasteners used in wet well areas are to be stainless steel and all supports, brackets, gratings, ladders, and other structures shall be of corrosion resistant metals or approved plastics. Aluminum doors or hatches are mandatory for access to wet wells.

3.3 PUMPS

3.3.1 Pump Selection Consideration

Submersible pumps are preferred for all situations (wet or dry mounted). Pumps are to be removable and replaceable without dewatering the wet well or requiring personnel to enter the wet well. All pumps in one pumping station should be identical and interchangeable.

Pump impellers shall be of a non-clog design and be capable of passing spherical solids of 75mm diameter.

Pumps are to be selected which provide optimum efficiencies at actual operating points. The power rating of a motor should not be exceeded by the pump at any operating condition on the characteristic curve of the pump.

Flush valves or recirculation pipes to the wet well are to be provided for aeration, and suspension of grit and solids in wet well.

3.3.2 Pump Electrical Requirements

Main pump motors shall operate on 600 volt, 3 phase power.

The City prefers the use of magnetic motor starters over variable frequency drive.

Pump and flush valve power cables shall be provided with twist lock plugs and receptacles to allow for convenient pump removal and replacement. These connections are to be installed so as to be accessible without entering the wet well.

3.4. PUMP, VALVE AND PIPING ARRANGEMENT

3.4.1 Pump and Discharge Header Arrangement

Two or more pumps shall be provided connected in a parallel arrangement in each pumping station. The pumps shall discharge to a common header, which must be located within a control building or dry well, such that all isolation and check valves are accessible for operation and maintenance.

3.4.2 Provision for Pump Removal

Pumps are to be connected such that when any pump is removed for servicing the remaining pump(s) will remain operational. Submersible pumps shall be removable and replaceable without the need for dewatering the wet well or for personnel to enter the wet well.

3.4.2 Pump Suction Arrangement

Each pump shall have its own individual intake and/or suction connection to the wet well.

1. Suction Crossover (Wet Well/Dry Well Pump Stations). In wet well/dry well station, a full sized valved crossover pipe shall be installed connecting the individual suction pipes, and shutoff valves shall be placed on the pump suction pipes between the crossover connections and the pumps. The piping and valve arrangement shall be suitable to permit isolation of any individual pump for maintenance or removal.

2. Provision for Back Flushing. Piping and valving shall be provided to back flush each pumping unit and its suction, using the discharge flow from another pump directed through the discharge of the unit being flushed.

3.4.3 Piping and Valve Requirements

1. Minimum Size of Piping: The minimum diameter for all pump suction and discharge piping shall be 100mm nominal. Piping shall be sized such that flow velocity will not exceed 1.8 m/s in suction piping, or 3.5 m/s in the discharge header within the pumping station. Flow velocities should not be less than 0.75 m/s, to maintain solids in suspension. Discharge piping should be as large as possible while maintaining this minimum velocity for scouring.

2. Piping Materials: All piping within wastewater pumping stations shall be corrosion resistant material. All flange bolting in wet well areas shall be stainless steel. Buried pipe under the facility and within the excavation shall be standard wall welded steel, with yellow jacket exterior and cement or epoxy interior; or galvanized pipe with polyken tape wrapped exterior.

3. Pressure Rating for Piping: The pressure rating for piping within the station shall suit the service requirement, however the minimum rating shall be 900 kPa.

4. Check Valve: A check valve shall be installed on the discharge line between each pump and a shutoff valve. Check valves shall be supplied with external levers and spring, and limit switches to indicate the prove valve opening. Check valves shall not be mounted in a vertical position.

5. Isolation Valves: Shutoff valves shall be included on the discharge lines from each pump between the pump check valve and the discharge header. This will permit isolation of each pumping unit and check valve for removal or repair. An additional shutoff valve shall be included on the main discharge pipe where it connects to the discharge forcemain leaving the facility, to isolate the forcemain from the pump station.

6. Bypass Provisions: A tee-connection with a shutoff valve on the branch is to be provided on the main discharge pipe within each pumping station, downstream from the valve isolating the forcemain from the discharge pipe. This is to allow for bypassing of the station using auxiliary pumping equipment. The unconnected end of the valve must be oriented to face toward an access hatch or entry way to facilitate the connection of the auxiliary pump discharge.

7. Provisions for Removal of Valves and Equipment: Provisions shall be made in the piping for removal of all valves and equipment. Appropriately located vent and drain valve shall be provided to permit drainage of all piping to facilitate valve and equipment removal.

8. Pressure Gauge Taps: Taps with shutoff valves suitable for portable quick-connect pressure gauges are to be provided on each suction and discharge pipe at suitable locations.

3.5 PUMP CONTROL AND INSTRUMENTATION REQUIREMENTS

3.5.1 Pump Controls.

.1 Control Panel Location/Flood Proofing: The control panel must be located so that it cannot be flooded under any foreseeable circumstances.

.2 Pump Control Requirements: Provision shall be made to automatically alternate between at least two pumps in normal service. Controls shall be provided such that if, with one pump operating, the sewage level in the wet well continues to rise, then the additional pump or pumps will automatically start once the sewage level reaches a higher set point or points.

.3 Control Panel Features: The control panel is to include pump auxiliary control relays, timers, level controls, and identified control wiring. The control equipment is to be mounted within a CEMA Type 12 dead front enclosure fabricated of steel. High Voltage wiring is not to be installed in the control panel enclosure. Sufficient excess space is to be provided for future installation of data logging equipment. Telemetering and autodialing equipment is to be located in a separate cabinet.

The control panel is to provide for the following control functions and requirements:

i. manual pump sequence selection
ii. stop and start levels infinitely adjustable for each pump.
iii. An adjustable timer and manual override for flush valve operation
iv. Run time meters, one for each individual pump, and one for each combination of pumps running together
v. Provisions to ensure submergence and priming of the pumping units
vi Provision for volume totalization of sewage flow from the facility, with provision for future data logging and/or remote telemetry of this data
vii Records of drawings for all control diagrams and schematics having wires individually numbered matching field wire labeling.

3.5.2 Level Control Transducers

.1 Transducer Types – Wet Well: An ultrasonic transducer shall be provided to sense the wet well sewage level for sewage pump and alarm operation.

A float switch (Flygt ENH-10 or equal) is to be provided in the wet well, set at the active elevation of any overflow, or at a suitable high-level elevation, for activation of an alarm.

.2 Transducer Installations – Wet Well: The ultrasonic level transducer shall be installed in a 100mm diameter PVC guide pipe extending to the exterior of the wet well.

All level sensor transducers and float switches shall be mounted so that they are removable and serviceable without entry into the wet well.

.3 Dry Well Flooding Detection: For wet well/dry well station, a float switch shall be provided in the dry well set at an appropriate elevation near the bottom of the well, to detect a flooding condition and activate an alarm.

3.5.3 Telemetry System

.1 General Requirements for Telemetry: Remote telemetry equipment is to be provided to communicate pumping station system status and alarms to the Regional Utilities Service Commission Water Treatment Plant.

General requirements are as follows:

- telemetering and auto dialing equipment is to be installed in its own cabinet separate from the control panel.
- dedicated telephone service will be required for telemetry purposes
- backup power supply must be provided for the alarm and telemetry systems
- Test circuits are to be provided to enable testing of the alarms and telemetry systems

2. Alarm Telemetry: Provide for eight alarm points for present and future telemetry as follows:

- pump failure * (incorporate a time delay prior to alarm initiation)
- power failure *
- high wet well alarm *
- ventilation failure
- temperature alarm
- door entry
- gas alarm

* Minimum alarm points presently required to be telemetered to the Water Treatment Plant.

3.5.4 Power Meters

.1 Main Power Supply Meters. Provisions are to be made for a 3-phase voltmeter and 3-phase ammeter on the main power supply line.

2. Pump Power Supply Meters: A voltmeter and ammeter are to be provided for each pump motor. These meters should be installed on the covers of the respective motors combination magnetic starters. When there is insufficient space on the covers to permit this, the meters are to be installed in a cabinet adjacent to the combination magnetic motor starters.

3.5.5 Location of Electrical Equipment

1. All electrical and control equipment shall be located such that it cannot be flooded under any foreseeable circumstances.

2. Local safety disconnect switches are to be located above potential flood level

3. Any disconnect switches located away from the pumps location are to be lockable

4. Switch gear and combination magnetic motor starters are to be located away from control and telemetry panels.

3.5.6 Electrical Protection Requirements

1. Electrical protection for phase imbalance, phase loss, phase reversal and low voltage is to be provided.

3.5.7 Switchgear and Combination Motor Starter

1. Switchgear and combination magnetic motor starters manufactured by Allen Bradley or Square D will be preferred. The designer will be required to provide justification for the selection of alternative equipment, and this selection shall be subject to the approval of the Engineer.

3.5.8 Receptacle Requirements

1. 120 – V ground fault protected outlet receptacles are to be provided as necessary for convenient power supply throughout the facility (except the wet well). Minimum receptacle requirements are as follows:
   - one at the control panel
   - one within the dry well (where applicable)
   - at least one outside of the building. External receptacles are to be under lockable weatherproof covers

3.6 MAINTENANCE AND OPERATIONAL PROVISIONS

3.6.1 Pump and Equipment Removal

Permanent hoist equipment and access hatches are to be provided to permit removal and replacement of any piece of station equipment requiring routine maintenance or replacement.

As an alternative in specific cases, appropriate vehicle access and adequate access hatches may be provided to allow the use of exterior mobile cranes.

For wet well pump installations, the provision and arrangement of lifting equipment is to be such that the necessity for personnel to enter the wet well for removal of equipment is minimized.

Lifting equipment should have sufficient capacity to handle the heaviest load anticipated, including an allowance for dynamic forces due to load shifting, etc. the capacity of all lifting equipment is to be clearly posted. Eyebolts in the walls and/or ceilings should be provided for rigging chain hoists or come alongs.

3.6.2 Access into Station Structures

Suitable and safe means of access shall be provided to all equipment requiring inspection or maintenance and to the wet well for inspection and cleaning.

Stairways and ladders shall comply with the requirement of Occupational Health and Safety. All stairs shall be of a non skid type and shall be constructed with corrosion resistant material.

Doors and access hatches shall have suitable locking devices.

3.6.3 Lighting

Adequate lighting shall be provided for the entire facility. The light fixtures shall be of the vapor proof fluorescent type. Emergency backup lighting shall be provided.

Exterior lights are to be provided to illuminate all building entrance areas, entrance hatches, and outside equipment access locations.

3.6.4 Ventilation

.1 General Requirements for Ventilation: Forced mechanical ventilation is required at all wastewater facilities. Suitable equipment shall be installed to provide for continuous ventilation at a rate of six (6) air changes per hour (at low water level) in each of the wet well and dry well areas. Completely separate systems are required for each well, and there must be no interconnection between the wet well and dry well ventilation systems.
Fresh air, heated and thermostatically controlled, shall be forced into each area at a point 150 mm above the floor in dry wells and 150 mm above the high water level in wet wells, and exhausted at higher levels. In pits over 4.5 m deep, multiple inlets and outlets are desirable.

.2 Increased Ventilation on Access. Consideration should be given to provision of an automatic control to increase ventilation rates to 20 to 30 air changes per hour, interlocked to turn on with light switches or door switches, in addition to the continuous ventilation requirements.

.3 Ventilation Failure Alarm Provisions. Provision shall be made to detect and actuate an alarm if the ventilation system should fail. A local alarm indicator, noticeable prior to station entry but not to be noticeable to the public is required (a volume controllable buzzer and red beacon on the inside of a building, visible as soon as the doors open, is acceptable).Provision shall be made for transmission of the alarm through the telemetry system to the Wastewater Treatment Plant.

3.6.5 Heating

Design heating system to minimize heating costs. Use high efficiency furnaces or boilers and provide heat recovery units to recover waste heat from exhausted air. Design the entire facility for energy conservation

3.6.6 Sump Pump

Dry wells must be equipped with a sump and sump pump to deal with leakage or seepage. The sump pump is to discharge to the wet well, at a point above the maximum high water level. A check

valve shall also be provided in the discharge pipe to preclude backflow of wastewater into the sump.

3.7 SITE REQUIREMENTS

3.7.1 Vehicle Access

A 4.5 m (minimum) wide paved road is to be provided into the site, with extensions as appropriate to provide maintenance vehicle access to electrical transformers and as required for removal or delivery of other station equipment. Access is to be provided for portable power generation equipment to the emergency generator receptacle. Space for parking of maintenance staff and service vehicles is to be provided.

3.7.2 Fencing

All above ground pumping stations shall be fenced. The fence shall have an opening gate for entry of vehicles and equipment. The gate shall be lockable to prevent unauthorized entry. Fences shall typically be zinc coated industrial grade steel chain link security type, of 1.83 m overall height complete with three strand barbed wire overhang. Architectural fences providing a similar level of security may be considered where dictated by aesthetic considerations. Fencing must be of a durable and maintenance free type.

3.7.3 Site Grading

The pumping station site shall be adequately graded so that it drains freely away from the facility and no ponding of water will occur adjacent to buildings, entrances or around electrical transformers. Site elevation shall be established such that the facility is not subject to flooding due to runoff flows or ponding under any conditions of rainfall or runoff from snowmelt.

3.74. Landscaping and Aesthetic Considerations

At the minimum, pumping station sites shall be landscaped with grass or provided with a low maintenance ground cover material. Where the proximity to residential areas or other public land uses dictates a need for additional landscaping measures to conceal the facility, to make it blend into the surroundings, or to enhance its appearance, such measures are to be taken as a part of the facility design and construction. These measures may include appropriate planting of trees and shrubbery or architectural treatments of structures.

3.8 MAINTENANCE AND SERVICE MANUAL

As part of the responsibility for design of a wastewater pumping station, the design engineer shall prepare and provide an Operation and Maintenance Manual for the facility.

Six complete copies of the manual are to be provided to Infrastructure Services prior to the transfer of facility operation to the governing body. This will be prior to the approval of a Construction Completion Certificate (CCC). When completion of a finalized manual prior to CCC is not feasible, then to facilitate the timely transfer of operational responsibility, the Engineer may accept an interim form of the Operation and Maintenance Manual at CCC with the completed final version of the

manual to be provided by the Developer prior to approval of a Final Acceptance Certificate for the improvement.

The manual shall include complete equipment manufacturers' operation, maintenance, service, and repair instructions and complete parts lists for all mechanical and electrical equipment including all control diagrams and schematics with wires individually numbered and identified. Each set shall be firmly bound in a hard covered binder and include complete test results from calibration of all equipment during commissioning and testing conducted by the professional engineers on behalf of the Developer.

1. STORM WATER 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 proceedings.

In general, storm mains 1200 mm or grater, as well as storm water storage facilities and associated outlet piping, will be designated “Trunk Storm Mains”, and the cost of these mains are included in the Storm Off Site Levy rate. The current Trunk Storm Mains are identified in the most recent council approved Off Site Levy Report.

This section provides a brief summary of the design standards and guidelines for storm drainage systems in the City of Cold Lake.

1.2 Storm Water Management

These guidelines have been established pursuant to the City’s Master Drainage Plan and are the basis for storm water management in all developable land, including land upstream of existing pipe systems.

.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, storm water 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, storm water storage facilities and outfall structures, shall convey run off from snowmelt and rainfall events to an adequate receiving stream or pond without sustaining any surface ponding or excessive surface flows for events up to a 1 in 5 year return period.

The major system comprises the street system, storm water 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 manner sufficient to determine that no flooding that may cause significant property damage (flooding of building) occurs during the 100 year storm event.

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 Cold Lake Regional Airport.

ATMOSPHERIC ENVIRONMENT SERVICE

RAINFALL INTENSITY – DURATION FEQUENCY VALUES
GUMBEL – METHOD OF MOMENTS – 1990

TABLE 1 - COLD LAKE REGIONAL AIRPORT

YEAR	5 MIN	10 MIN	15 MIN	30 MIN	1 HR	2 HR	6 HR	12 HR	24 HR
1966	11.4	18.5	22.9	25.9	34.0	34.0	34.0	34.0	34.0
1967	7.6	10.4	13.2	14.7	15.0	15.2	15.2	19.3	20.1
1968	4.3	1.8	5.8	7.1	7.9	11.7	21.1	31.7	47.2
1969	4.3	7.6	7.9	8.4	9.4	14.2	29.0	41.9	52.1
1970	9.4	11.4	12.2	13.0	13.0	18.0	22.9	30.5	54.1
1971	9.4	14.2	16.5	26.4	30.5	42.9	42.9	42.8	48.3
1972	5.1	8.6	9.4	10.7	13.2	17.8	24.6	24.6	25.4
1973	5.6	7.1	7.4	8.1	11.4	14.5	23.4	30.0	33.0
1974	11.4	15.5	19.6	21.1	23.4	23.4	25.1	33.0	36.3
1975	8.6	11.7	12.4	15.2	18.0	20.1	32.3	48.5	62.0
1976	4.8	9.1	11.7	12.2	12.2	12.2	18.8	24.4	31.5
1977	7.6	12.7	15.7	21.3	21.8	22.1	22.1	24.6	38.6
1978	2.7	4.4	5.1	7.2	11.2	11.4	17.5	25.9	37.2
1979	9.6	17.4	20.4	24.0	24.0	26.8	28.6	29.0	29.4
1980	4.6	5.8	6.2	7.4	11.2	13.6	23.5	32.3	43.3
1981	6.3	11.0	12.2	12.9	15.2	22.0	24.4	27.6	28.9
1982	2.9	3.8	4.0	5.4	9.2	13.9	15.5	23.7	23.7
1983	3.8	5.4	6.1	7.5	13.5	19.2	20.9	30.1	30.3
1984	3.1	5.4	7.1	8.3	9.4	9.6	23.9	37.4	48.8
1985	4.4	5.4	5.7	8.5	11.7	16.9	29.1	30.9	35.5
1986	2.4	3.6	5.3	10.3	15.8	22.5	30.6	30.8	38.0
1987	8.2	15.2	22.2	39.8	51.1	52.8	52.8	52.8	52.8
1988	7.3	12.5	17.5	23.7	26.4	28.5	51.2	81.2	103.6
1989	5.8	9.1	12.8	17.8	18.2	19.0	35.7	46.3	46.8
1990	10.9	17.2	21.5	21.5	22.4	22.4	29.1	36.6	46.8

NOTE: - 99.90 INDICATES MSG DATA

# YRS	25	25	25	25	25	25	25	25	25
MEAN	6.5	9.9	12.0	15.1	18.0	21.0	27.8	34.8	41.9
STD DEV	2.8	4.6	6.1	8.4	9.8	10.0	9.7	12.7	16.7
SKEW	0.33	0.34	0.44	1.16	1.87	1.79	1.29	2.22	2.14
KURTOSIS	2.24	2.26	2.21	4.55	7.49	6.77	4.77	9.68	10.17

WARNING: - YEAR 1987 HAD VALUE GREATER THAN 100 YEAR STORM

ATMOSPHERIC ENVIRONMENT SERVICE

RAINFALL INTENSITY – DURATION FREQUENCY VALUES
GUMBEL – METHOD OF MOMENTS - 1990

TABLE 2 – COLD LAKE AIRPORT

DURATION	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR	# YRS
5 MIN	6.0	8.5	10.1	12.2	13.8	15.3	25
10 MIN	9.2	13.2	15.9	19.3	21.9	24.4	25
15 MIN	11.0	16.4	19.9	24.4	27.7	31.0	25
30 MIN	13.8	21.2	26.2	32.4	37.0	41.6	25
1 HR	16.4	25.0	30.8	38.0	43.4	48.7	25
2 HR	19.3	28.2	34.1	41.5	47.0	52.5	25
6 HR	26.2	34.8	40.4	47.6	52.9	58.2	25
12 HR	32.7	43.9	51.4	60.8	67.8	74.7	25
24 HR	39.2	53.9	63.6	76.0	85.1	94.2	25

RETURN PERIOD RAINFALL RATES (MM/HR) – 95% CONFIDENCE LIMITS

DURATION	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR
5 MIN	72.0 +/- 12.2	101.9 +/- 20.5	121.7 +/- 27.7	146.7 +/- 37.4	165.3 +/- 44.7	183.7 +/- 52.1
10 MIN	54.9 +/- 10.0	79.4 +/- 16.8	95.6 +/- 22.6	116.0 +/- 30.5	131.1 +/- 36.5	146.2 +/- 42.5
15 MIN	44.2 +/- 8.7	65.5 +/- 14.7	79.7 +/- 19.8	97.6 +/- 26.7	110.9 +/- 32.0	124.1 +/- 37.3
30 MIN	27.5 +/- 6.1	42.4 +/- 10.2	52.3 +/- 13.8	64.8 +/- 18.6	74.1 +/- 22.3	83.3 +/- 26.0
1 HR	16.4 +/- 3.5	25.0 +/- 5.9	30.8 +/- 8.0	38.0 +/- 10.8	43.4 +/- 12.9	48.7 +/- 15.1
2 HR	9.7 +/- 1.8	14.1 +/- 3.0	17.0 +/- 4.1	20.8 +/- 5.5	23.5 +/- 6.6	26.2 +/- 7.7
6 HR	4.4 +/- .-6	5.8 +/- 1.0	6.7 +/- 1.3	7.9 +/- 1.8	8.8 +/- 2.1	9/7 +/- 2.5
12 HR	2.7 +/- 0.4	3.7 +/- 0.6	4.3 +/- 0.9	5.1 +/- 1.2	5.6 +/- 1.4	6.2 +/- 1.6
24 HR	1.6 +/- 0.2	2.2 +/- 0.4	2.7 +/- 0.6	3.2 +/- 0.8	3.5 +/- 0.9	3.9 +/- 1.1

ATMOSPHERIC ENVIRONMENT SERVICE

RAINFALL INTENSITY – DURATION FREQUENCY VALUES

GUMBEL – METHOD OF MOMENTS – 1990

TABLE 3 – COLD LAKE AIRPORT

INTERPOLATION EQUATIONS: R=A *T **B
R= RAINFALL RATE
T = TIME IN HOURS

STATS	2 YR	5 YR	10 YR	25 YR	50 YR	100 YR
MEAN OF R	25.9	37.7	45.6	55.5	62.9	70.2
STD DEV. R.	25.6	36.7	44.1	53.5	60.4	67.3
STD. ERROR	5.8	11.0	14.5	18.9	22.2	25.4
COEFF (A)	15.4	22.2	26.7	32.3	36.5	40.7
EXPONENT (B)	-0.693	-0.709	-0.715	-0.721	-0.724	-0.726
MEAN % ERROR	6.1	9.0	10.3	11.5	12.1	12.6

This IDF data 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:

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 modeling 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 (m3/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	5 Year Storm Frequency	10 year Storm Frequency
Residential	0.40	0.60
Apartments	0.70	0.80
Downtown Commercial	0.80	0.90
Neighborhood Commercial	0.65	0.80
Lawn, 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 a development area 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 Modeling

.1 Computer models shall be used to determine design flow conditions in sewer systems with drainage areas of 65 ha (160 ac) or larger. They may be used for smaller systems as an alternative to the rational method.

.2 Computer models shall be used to determine design flows and the sizing of systems that contain non pipe storm water management facilities (detention ponds) or systems that include a significant amount of undeveloped land.

.3 When large parcels of 65 ha (160 acres) or larger are being developed and will connect to the existing storm water facilities, the Consulting Engineer shall prepare a storm water model that simulates both major and minor systems. As a general rule, this

model will have sub basins no larger than 5 ha. The modeling 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 must be compatible with XP-SWMM, The City intends on maintaining their infrastructure modeling 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 modeling simulations will depend on the type of system being analyzed. Depending on basin characteristics and outlet rates, short duration storms (1 – 4 hour) 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 24 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 not be made to the storm sewer system. Roof drainage from residential housing units, apartments, commercial and industrial buildings shall discharge to grassed or pervious areas except where building density makes this impractical (central business district).

Weeping tile connections to the storm sewer shall be provided for in all new construction where the groundwater table is at or above the 2.0 meter level. The storm sewer system shall be designed to handle weeping tile flow and reviewed and accepted the City of Cold Lake. Other alternatives also may be submitted to the City of Cold Lake for review.
Where the storm sewer service will be higher than the footing elevation, the connection shall be made using a sump pump and approved by the City of Cold Lake Engineering Department.

.1 Site Drainage and Storm Sewer Service Restrictions
All developments are required to provide a detailed site grading drawing 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 Infrastructure Services Department.

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

.2 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 a new service is being connected to an existing main, the allowable capacity for the development will be based on the following formula:

$$\text{Allowable Capacity} = \frac{\text{Development area X Capacity of Main}}{\text{Upstream Catchments Area}}$$

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 Area

Where the new service is being connected to an existing main in a recently developed area of the City Service, the allowable capacity of 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 coefficient (C) and design methods to be used to determine the storm service size is included in the design guidelines.

1.8 Length of Run

Surface water should not be permitted to run a distance greater than 150 m in streets or 200 m in lanes and swales without interception by a catch basin.

1.9 Lot Drainage

The following will apply to back of lot drainage in a lane less subdivision:

.1 For back to back lots and lots that drain onto a park, a concrete swale is to be constructed along the rear property lines within an easement and to direct drainage to a Street.

.2 The flow from lot swales shall not be allowed to cross a sidewalk in order to prevent ice build-up and dirt accumulation on the sidewalk. A catch basin or other suitable means of conveyance approved by the City of Cold Lake is required at back of walk to intercept these flows.

.3 A minimum width of the right of ways or easement for a swale is 2.0m. Easements shall be in accordance with the Engineering Standards Drawing 3.06, unless approved by the Engineer

.4 The minimum longitudinal surface grade for concrete swales in new subdivisions is 0.8%. grades <0.80% are acceptable in older subdivisions where a grade ≥0.8% cannot be established due to adjacent development restrictions (e.g. existing concrete or paved driveways, garages etc.) grades <0.5% are not to be used unless approved by the Engineer.

.5 Swales shall be in accordance with the Engineering Standards Drawing 3.06 unless approved by the Engineer

.6 Side slopes of drainage swales in private property shall be extensions of the grading slope of the adjacent area being drained.

.7 Where a swale is required parallel to a fence, the preference is for the swale to be on the south or east side of the fence, to maximize sun exposure and ice melt.

2. STORM SEWER MAINS (MINOR SYSTEM)

2.1 General

Storm sewer mains shall be designed for gravity flow unless approved otherwise by the Engineer. Pipe for Storm sewer mains shall be concrete pipe (sulphate resistant cement) conforming to ASTM C76 reinforced concrete pipe, latest revision thereof or IPEX PVC Ultra Rib pipe. Pipe for catchbasin leads shall be PVC DR35 conforming to CAN B182.2 and ASTM D3034.

2.2 Flow Capacity and Velocities

Sewer hydraulics shall be calculated using Manning's equation. Manning's in value shall be 0.013 for concrete and P.V.C. For other pipes and open channels, the values suggested in modern sewer design shall be used but shall not be less than 0.013.

The minimum and maximum flow velocities in any sewer shall be 0.60 m/s and 3.0 m/s, respectively. Designs containing velocities in excess of 3.0 m/s shall require special provisions and the approval of the City of Cold Lake

2.3 Pipe Strength

The strength of 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 requirements.

2.4 Depth of Cover

All sewers shall be designed so that the top of the main shall be located not shallower than 1.5m to the obvert, unless otherwise approved by the Engineer. Where conditions dictate that the depth of bury be less than 2.5 m, the main/service is to be approved by the City of Cold Lake Infrastructure Services Department.

2.5 Minimum Sizes

The minimum size of a storm sewer main shall be 300 mm in diameter with a minimum grade of 0.40%.

2.6 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 3.0m/sec, special consideration shall be given to the design of junctions and bends in the system. See minimum design slopes for storm sewer in Alberta Environmental Protections publication titles standards and guidelines for municipal waterworks, wastewater and storm drainage systems in Alberta.

2.7 Curved Sewers

Although it is recommended that storm sewers be laid with straight alignments between manholes, curved sewer 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 center line.

.4 The minimum grade for sewers on curves shall be 50% greater than the minimum grade required for straight runs of sewer.

2.8 Alignment

Storm sewers shall be located on the standard alignment shown on drawing 021 for streets 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.

2.9 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.

Manhole sections shall be precast reinforced concrete sections conforming to ASTM C478, latest revision thereof.

Manhole frames and covers shall be cast iron conforming to Class 20 ASTM A48 latest revision thereof.

Manhole steps shall be standard safety type of hot dipped galvanized iron or aluminum.

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 storm sewer mains and shall be perched when the main size is 600mm to 1050mm inside diameter unless otherwise approved in writing by the City of Cold Lake. Precast manhole vaults or an oversized manhole barrel shall be used on mains of 900 mm in diameter or greater. A Tee-riser manhole shall be used on mains 1050 mm in diameter and larger, providing there is no deflection in alignment or grade.

2.10 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 street (swales) are not permitted unless approved by the City of Cold Lake Public Works and Infrastructure Services Department.

.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 240 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 1.0%.

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

Spacing and capacity of catch basins shall be such that ponding shall not occur during a 1:5 year storm. Road gutter flows shall not exceed 0.04 cubic meters per second per gutter between catch basins during a 1: 5 year storm. The maximum distance between catchbasins will be 150 meters. Catchbasins to be supplied with weepage holes at the sub grade level.

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

Norwood Model	Sump Condition *	Continuous Slope ** Capture	Continuous Slope ** 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 350 mm deep sump.

The type of inlet assembly as illustrated in the contract specifications to be used for catch basin 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.

.6 CRD trash grate may be used to drain ditches.

Manhole bases shall be precast slab, concrete poured bases, vaults or precast tees.

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 curb side should be less than 200 mm for all roadways. If downstream constraints require a gutter flow in excess of 200 mm, special modeling and design calculations shall be submitted to the City of Cold Lake for review. The City of Cold Lake shall determine the extent, if any, of a relaxation of the maximum 200 mm gutter flow standard on an individual.

.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. Overland flow capacities of typical local and collector street cross sections and a typical trap low storage area must be illustrated in the submitted engineering drawings.

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. STORM WATER MANAGEMENT (SWM) FACILITIES

4.1 Design Requirements Common to Storm water Management Storage Facilities

.1 General

The use of storm water 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 Outlining 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.
Storm water detention ponds, if required, shall be designed in accordance with the "Storm water Management Guidelines" as published by Alberta Environment and in accordance with good engineering practice.

Ponds shall be classified as either "wet" or "dry" depending on whether the installation is intended to permanently retain water or temporarily store peak flows, respectively.

Storm water detention ponds are to be sized for the volume of water produced by a 1:100 year storm for the ultimate development contributory area.

.2 Geotechnical Considerations

Soils investigation specific to the detention facility shall be undertaken to determine the soils permeability and salinity (or other potential contaminant) and the height of the groundwater table. Where the facility is sited above a shallow aquifer the potential for groundwater

.3 Minimum Storm water 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. Storm water 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 storm water treatment measures in the design of any storm water storage facility

.4 Erosion and Sediment Control

An Erosion and Sediment Control Plan as detailed in Section 6 is required as part of the Storm Water Management Study to define measures which must be undertaken for the control of sediment into the storm water storage facility and into the receiving water body.

.5 Storage Alternates

.1 General

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

.2 Dry Pond (Detention) Storage

Dry pond storage is the storm water 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 are has ended. Generally, low flows do not enter the pond.

.3 Wet Pond (Retention) Storage

Wet pond 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 storm water management storage system must incorporate appropriate means for the control of outflow and to limit the rate of discharge to the recommended flow rate of 2 liters per second per hectare.(2 l/s/ha). These release rates have been determined based the City of Cold Lake Master Drainage Plan August 2006 prepared by UMA Engineering. The proposed release rates are to be confirmed by

detailed modeling 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 Land Dedication for Storm Water Management Facilities

The requirements for dedication of land on which a storm water management facility is to be situated will be in accordance with City of Cold Lake Master Drainage Plan and determined as part of the Development Agreement process.

.9 Landscaping Requirements

Detention pond landscaping requirements are detailed in Section 12.

.10 Detention Pond Development Costs

Detention pond financing and construction responsibility is detailed in Section 12.

.11 Signage for Safety

The design of storm water 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 approved by the Planning and Development Department, they should be associated with municipal reserve areas to take advantage of the joint use ability of the facilities (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

Infrastructure Services Department should be consulted 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 sewer 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. 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 wing walls.

.3 Design Parameters

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

.1 Storage capacity for up to the 1 in 100 year storm event

.2 Detention time to be determined based on downstream capacity, recommended maximum detention time is 96 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 Planning and Development 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 2.0% and minimum longitudinal slope of 1.0%.

.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).

.13 The pond bottom and slopes shall be landscaped to the satisfaction of the City of Cold Lake. All improvements, such as playing fields, park furniture, planted areas, etc., shall be subject to approval by the City of Cold Lake.

4.3 Wet Detention Ponds (Residential Subdivision)

The current Transport Canada Regulation TP1247 does not recommend the construction of wet ponds within the 3.2 km radius from the reference point of the 4 Wing aerodrome. However, their use may be approved by Council and 4 Wing as an exception to the Policy. If approved, the Developer will be responsible for all construction. All communication to 4 Wing for any variance of the current policy must go through the City of Cold Lake's Infrastructure Services Department.

Design of a wet pond is to be in accordance with the Alberta Environmental Protection publication entitled "Storm Water Management Guidelines for the Province of Alberta" and the location of which must be approved by the City of Cold Lake . An overflow channel and overland drainage route must be provided to the satisfaction of the City of Cold Lake General design parameters and permitted water level fluctuations must ensure the following:

.1 The lowest basement weeping tile of any building on a lot adjacent to the lake shall be a minimum of 300 mm above the high water level.
.2 The lowest manhole invert shall be at or above the normal water level elevation.
.3 The pipe obverts at the lowest manhole upstream of the pond shall be above the high water level during a one in five year storm event.
.4 A minimum distance of six meters shall be maintained from any basement wall to the high water level.
.5 The inlet to the pond must be above the normal water level or below ice level.
.6 The minimum depth of the body of the pond, at normal water level,shall be 2 meters.
.7 The lake bottom and side slopes shall be composed of an impervious material
.8 No dead bay areas shall be permitted.

.9 Shoreline improvements shall be subject to review and approval by the City of Cold Lake.
.10 Easements, in favor of the City of Cold Lake, shall be granted over any private property situated between the normal and high water levels.
.11 The design shall incorporate a semi-annual turnover at average annual precipitation.
.12 Submerged inlets/outlets are preferred and shall be constructed such that the tops are a minimum of 0.6 m below normal water level.
.13 Inlets/outlets not submerged shall require fencing along adjacent shoreline for 5.0 m in each direction from the center line of pipe. In addition all exposed inlets/outlets shall be provided with a grate permanently fixed to the structure.
.14 Vegetative plantings shall be utilized to enhance water quality.
.15 Minimum width of the water surface at the normal water level shall be 25 meters.
.16 A silt trap shall be provided at the inlet of each pond. A defined path via publicly owned land or established drainage courses shall be identified and designed to carry flows when the design storage is exceeded.
.17 2.0 ha minimum water surface area
.18 Maximum interior side slopes of 7H:1V between the high water level and 1.0 m below normal permanent water level, 4H : 1V on inside slopes from high water level to top of bank, maximum outside slopes 4H : 1V.
.19 Maximum 1:100 year storage depth of 1.5m
.20 Sediment fore bays are required at each inlet
.21 Hard edge treatment required along lake perimeter
.22 Minimum freeboard depth of 0.6 m. House footings must be above freeboard elevation.
.23 Water recirculation and make up system required
.24 Provide access for maintenance and emergency equipment
.25 Design of outlet control structure to be capable of maintaining permanent pool depth and capable of draining the permanent pool for maintenance purposes.
.26 When possible, preserve existing wetlands by incorporating them into the storm water management plan.

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. Discharge rates shall be kept below pre-development flow rates or as approved by municipal and provincial authorities.

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.

5.4 Culverts and Bridges

Culvert and bridge design should consider backwater effects over a range of flows. The design of a hydraulic structure requires assessment of both its nominal design capacity and its performance during the 100 year storm event as well as the 100 year ice level and break up.

END OF SECTION

1. GENERAL

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

2. SERVICE SIZE AND LOCATIONS

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

Water	25 mm
Sanitary	100 mm
Storm	100 mm

The sanitary service and storm services shall have a plug installed at property/easement line. Service pipe shall be PVC DR 28 building service pipe conforming to CSA Specification B 182.1, latest revision thereof.

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 minimum size of a sanitary sewer service connection to a commercial dwelling shall be 150 mm inside diameter. Each lot shall have its own separate sanitary service connection. The minimum grade on the service line shall be 2.00%. The maximum length shall be limited to 15.0 m from the main to the property line.

Sewer services shall be extended beyond the property line and terminate 3.0 m inside the lot. Where a four party easement is used the sewer services shall extend 1.0m beyond the easement line and terminate inside the lot. All services shall be properly capped.

All sewer services shall be installed using Class “B” bedding.

Services shall be placed so that when facing the lot from the street the water service shall be on the right side of the sewer service.

Services shall be located in a position such that they do not conflict with driveway locations. Curb cocks and sanitary sewer are not to be placed in driveways or sidewalks.

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

Red painted stakes of size 50 mm x 100 mm shall be extended from the end of the service connection to a minimum of 0.50 m above ground level.

3. DUPLEX SERVICES

Duplex service connections (y sanitary connection) will not be permitted, each side of a Duplex shall have its own sanitary and water connections to the mains.

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 m below finished grade. Where sewer services are required to connect to mains in excess of 3.5 m deep, risers shall be installed. Where existing conditions dictate that the depth of bury be less than 2.7 m, the main/service is to be insulated and approved by the City of Cold Lake prior to installation.

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. These requirements are illustrated in Appendix II.

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 center of the service alignment, the sanitary service 0.3 m to the left of the water service, and the storm service 0.3 m to the right of the water service. The services shall intersect the property line at an angle as near to 90 as possible unless otherwise approved by the Engineer.

The curb stop and standpipe shall be located 0.15 m from the property / easement line.

To aid in locating the service, temporary markers shall be installed at the end of the service stub as shown on Engineering Standards Drawings in Section 13.

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 3 m past the curb stop/service box location. The spacing between the CC and the sanitary sewer shall be no more than 150mm.

Service pipe shall be of type K copper AWWA 800 or Kitec Q Line.

Curb stops shall be copper curb ball valve with stop and drain and curb boxes shall be epoxy coated and the rod shall be stainless steel.

7. RISERS

Where sewer services are required to connect to mains in excess of 4.50 m deep, risers shall be installed.

8. SERVICE CONNECTION RESTRICTIONS

Large sanitary and storm service connections may require the installation of a manhole at the main; refer to the following manhole requirement chart.

SIZE OF MAIN	SIZE OF SANITARY SERVICE						
	150 mm	200 mm	250 mm	300 mm	375 mm	450 mm	525 mm
200 mm	**MANHOLE NOT REQUIRED**						
250 mm					**SERVICE LARGER THAN MAIN NOT PERMITTED**		
300 mm							
375 mm							
450 mm							
525 mm							
600 mm							
675 mm							
750 mm							
825 mm				**MANHOLE REQUIRED**			
900 mm							
1050 mm							
1200 mm							
1350 mm							

SIZE OF MAIN	SIZE OF STORM SERVICE								
	100 mm	150 mm	200 mm	250 mm	300 mm	375 mm	450 mm	525 mm	600mm
200 mm									
250 mm							**SERVICE LARGER THAN MAIN NOT PERMITTED**		
300 mm									
375 mm									
450 mm									
525 mm									
600 mm									
675 mm		**MANHOLE NOT REQUIRED**					**MANHOLE REQUIRED**		
750 mm									
825 mm									
900 mm									
1050 mm									
1200 mm									
1350 mm									

Connections to a main sewer line shall be by means of a wye fitting. Saddles are allowed only for service connections to existing mains. T-fitting service connections for sanitary sewer will be allowed provided they discharge into the top half of 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

All service connections 200mm or larger shall have an inspection manhole installed on their sanitary sewer service connection. Where possible commercial, industrial or institutional services should connect to an existing or proposed manhole constructed on the sanitary sewer main alignment.

END OF SECTION

1. GENERAL

1.1 Area Structure Plan Servicing Study

The Developer should have prepared a preliminary Shallow Utilities Plan as part of the servicing study where the tentative alignments for each utility are schematically shown. Four-party trenching is The City of Cold Lake's preferred option, and is indicated on the standard road cross sections in Section 13. It is important that this plan be submitted to all shallow utility companies as early as possible in the design process so that the respective utilities can conduct their designs and schedule construction. Some utility companies schedule their work a year in advance and any change by the developer affects the shallow utility companies and can cause significant delays in the installation of the utilities.

1.2 Detailed Design Drawings

The Developer is required to prepare a detailed Shallow Utility Plan for each phase of development in relation to the standard utility alignment plans. Refer to section 13. The Developer shall make arrangements for the provisions of Shallow Utilities by contacting the appropriate area representatives for each Shallow Utility.

Shallow Utilities are to be installed in a common four party trench; however, each utility company should be contacted to review their alignments and prepare their design early in the planning stage. ATCO electric typically requires 4 to 5 months lead time for design and 4 to 5 months for the construction scheduling.

1.3 Review and Approval of Detailed Shallow Utilities Plan

The Developer shall prepare a servicing plan showing all shallow utilities on a site plan. The site plan shall also show the deep underground municipal improvements and surface improvements. This plan shall then be circulated to, and approved by the shallow utility companies.

Note: The developer is also responsible for any costs related to the provision of Shallow Utilities to service a subdivision, including the cost of installing ducts for road crossings.

1.4 Four-Party Common Trench

.1 Unless otherwise approved by the Engineering Department, all Shallow Utility distribution lines and service connections shall be installed as per the standard details in Section 13. All four party alignments shall have a 2.5m easement located on private property for the shallow utilities and a common Service box installed 1.0m past the edge of the URW just under the existing grade. The service trench begins at the service box. A minimum separation of 0.3m must be maintained between the gas line and all other shallow utilities.

.3 The face of the poles, pedestals and transformers shall be at least 1.0m clear of the face of the curb and 0.3m from sidewalk. Street furniture such as kiosks, transformers and cabinets shall have an anti-graffiti coating. No trees shall be permitted where shallow utilities reside.

.4 The Shallow Utilities shall be separated from the deeper municipal utilities (water and sewer) by not less than 3.0m laterally. A separation of 1.0m from gas utility to other utilities is required, except in a common (four-party) trench installation.

.5 Depth of cover shall be as required to meet the applicable codes, subject to consideration for future development, construction and grading works. Typically, standard cover below finished grade should be between 1.0m and 1.4m. Design depth of cover shall be indicated on the utility alignment drawings.

.6 Adequate ducts shall be installed under roadways prior to their construction to accommodate the installation of Shallow Utilites. Where the road crossings are installed after the construction of the road improvements, they shall be augered or drilled to avoid disruption of the surface improvements. Road crossing angle should be 90°.

.7 The developer must insure that all utility trenches are adequately compacted and within specified moisture contents. Within the road carriage way, 98% Standard Proctor Density shall be required, the moisture content shall be within 2% of optimum. 95% Standard Proctor Density within 2% of optimum moisture content in all other areas is required as noted in section 13.

2. ELECTRICAL SYSTEM

2.1 Design and Construction

As detailed in the Development Agreement, the Developer shall arrange for the installation of street, walkway lighting and power distribution with the local franchise holder, ATCO Electric.

2.2 General Design Guidelines

Before starting with the detailed design of the electrical system, the developer should review the shallow utilities plan prepared in conjunction with ATCO Electric to confirm the proposed alignments. Standard utility alignments are included in Section 13.

Street lighting standards currently adopted by the City of Cold Lake are IESNA with the appropriate pedestrian usage designation.

Street light cables shall be installed underground and an acceptable type of steel post with fixture shall be used.

The City of Cold Lake shall approve the street lighting layout and fixture type prior to installation.

Street lights shall be placed at locations not interfering with the proposed driveways and shall be located in line with the extension of the common property line between two lots.

The face of the posts shall be at least 1.0 meters clear of the face of the curb and 0.3 meters from the back of the sidewalk.

Street lights shall be provided for each internal park area that does not abut onto a lighted street. A street light shall be located at the point where each walkway opens onto the park area.

Distribution cables are normally installed in a common 500 mm wide trench at the required alignment. Associated apparatus shall be installed as detailed in the ATCO Electric specifications.

The following requirements are to aid the developer in the design of the distribution system:

.1 Trench Locations

Where cables are installed along a street, walkway or utility lot, they shall be located with standard clearances to other utilities. Where power, telephone or cable television cables cross the water main, they shall be at a minimum distance of 3 m from any valve or hydrant, unless approved otherwise.

.2 Easements

Where cables are installed along a rural road with a ditch system they are to be installed in an easement on private property to keep utilities out of wet areas. The required easement width will be dependent upon the four party trench system.

In all new subdivisions it shall be the Developer’s responsibility to ensure that utility trenches are adequately compacted and within specified moisture contents. Within the road carriage way, 98% Standard Proctor Density shall be required within 2% of optimum moisture; 95% Standard Proctor Density within 2% of optimum moisture in all other areas. In existing subdivisions, the utility trenches for any new installations or modification of existing lines.

The Developer is responsible to coordinate locations of shallow utility crossings of roadways with the respective utility company. All shallow utilities are to be contained in conduit of appropriate size and number for all roadway crossings.

END OF SECTION

1. ROAD AND STREET CLASIFICATION

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:

Urban Arterial Roadways
Frontage Roads and Auxiliary Lanes
Residential Collector Streets
Residential Local Streets
Industrial Roadways
Rural Roadways
Lanes

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:

TAC Geometric Design Guide for Canadian Roads
TAC Metric Curve Tables
A policy on Geometric Design of Highways and Streets, AASHTO
Turning Vehicle Templates, TAC
Manual of Uniform Traffic control Devices for Canada

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

3.1 Road Right of Way

The Right of Way shall be of adequate width to accommodate the road, sidewalks, boulevards, underground utilities, street lighting etc., in a manner acceptable to the City of Cold Lake.

Minimum Right of Way requirements are as follows:

Lanes	6.0 meters
Cul de sacs	20.0 meters
Residential Street	20.0 meters
Collector Streets	24.0 meters
Arterial Streets	30.0 meters

3.2 Road Widths

Road widths shall be designed to satisfy projected traffic requirements. The TAC Manual standards shall apply. .Minimum width requirements are as follows:

Lanes	5.0 meters
Cul de Sacs	10.0 meters (face of gutter to face of gutter)
Residential Streets	10.0 meters (face of gutter to face of gutter)
Collectors Streets	13.0 meters (face of gutter to face of gutter)
Arterial Streets	15.0 meters (face of gutter to face of gutter)

3.3 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.

3.4 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, center line grades should be increased to provide a minimum gutter grade of 0.50% along all gutters with 0.8% around curb returns. It is desirable to use 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 ≥0.8% cannot be established due to adjacent development restrictions (e.g. existing concrete or paved driveways, garages etc.) grades <0.5% are not to be used unless approved by the Engineer.

3.5 Vertical Curves

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

.1 Length of Vertical curve, L = KA

Where K is the vertical curve calculation factor and

"A" is the algebraic difference between grades

.2 Crest "K" factor based on L>SSD

.1 $SSD = 0.278tV + d$ (TAC formula 2.1.5)

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

Where perception and reaction time (t) = 2.5 sec and

F is as listed in table 13.1 and 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

.3 Sag "K" factor based on Comfort Control

$K_{(Sag)} = V^2 / 395$ (TAC formula 2.1.28)

Table 11.1
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
70	0.31	111	22	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
Expressway Street	L < 50 m

.2 Sag vertical curves are not required for any roadways if L is less than 15 m.

.3 M = A x L / 800

Where "M' is the mid ordinate difference in elevation between V.P.I elevation and pavement design elevation on the vertical curve.

"A" is the algebraic difference in grades and

"L" is the length of vertical curve

3.6 Horizontal Alignment, Super elevation/Transition

Super elevation is normally rotated about the center line of the median; however, other rotation points can be used if the Engineer feels it is necessary and the drivability of the end product would be better.

The length of tangent run out shall be as shown in AASHTO (1990) Table 111-14 and TAC Urban Supplement

Design speeds are 60 km/h except arterials which are 70 km/hr
Curves

.1 The minimum degree of curvature is dependent on the road classification and its design speed

.2 All horizontal curves shall be designed to meet the minimum design requirements as shown in Table B2

TABLE B2

CLASSIFICATION	MINIMUM RADIUS OF CURVES	MAXIMUM TANGENT LENGTH (M)	MAXIMUM GRADIENT (%)	INTERSECTION SPACING (M)
CUL-DE-SAC	90	30	6	60
RESIDENTIAL	90	60	6	60
COLLECTOR	130	60	6	60
ARTERIAL	450	60	5	400

3.7 Design and Posted Speed

.1 Design Speed

The design speeds for the various roadway classification are summarized in appendix A.

.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.

3.8 Intersections

.1 The minimum angle of intersection for two roadways shall be 75 degrees.

.2 Acceptance of intersection design, driveway locations and fencing shall be subject to review of available sight distances and other safety considerations. Tapering of berms at intersections may be required to provide for the necessary sight distances. Acceptance shall be granted on a case by case basis.

.3 The Developer shall provide confirmation that sight distances and horizontal and vertical visibility constraints at the access to arterial roadways meet the applicable stopping sight distances.

.4 Minimum center line to center line spacing of intersections shall be 60 m along local and collector roadways.

.5 All intersections shall make provisions for storm water drainage.

3.9 Cul-de-Sacs

.1 The normal maximum length of a cul-de-sac is one hundred and twenty (120) meters from the street curb line to the start of the bulb. Cul-de-sacs in excess of 120 meters and less than 170 meters will require an additional hydrant and water main looping. Where cul-de-sacs in excess of 170 meters are proposed, provision must be made for a 6 m wide Public Utility Lot (PUL) for emergency vehicle access and water service looping. Emergency vehicle access PUL's shall be developed to a standard acceptable to the City.

.2 Cul-de-sacs with steep grades are to be avoided. If cul-de-sacs cannot be graded to drain towards the intersection then an outlet for the overland flow must be provided by way of a PUL.

.3 The minimum radius of cul de sac bulbs is 12 meters to face of curb.

3.10 Driveways

.1 Residential subdivision lot layouts shall be such that driveways shall not access directly onto arterial roadways.

.2 All driveways shall be constructed to provide a minimum clearance of 1.5 m from any structure including hydrants, light standards, service pedestals, curb cocks and transformers.

.3 No driveways or any portion thereof shall be permitted to access an abutting road through a curb return area. The minimum setback from the nearest face of curb in the intersection to the nearest edge of driveway shall be 3m.

.4 For corner lots, the driveway zone must be indicated for the street of lesser traffic only.

.5 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.

.6 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.

4. CURB, GUTTER AND SIDEWALKS

4.1 General

Curb and gutter will be required on all roadways with the exception of roadways that may be constructed to a rural cross section. A 0.5 m wide concrete gutter shall be provided on expressways and arterial roadways. A 0.25 m gutter width shall be provided on all other road classification. Curb returns on residential street intersections shall be constructed with a minimum radius of 8 m. Curb returns in industrial/commercial areas shall be constructed with a minimum radius of 15 m to accommodate truck turning movements.

All concrete curbs and monolithic curbs and walks shall be constructed with the same sub grade structure as the adjacent road. The structure is to extend 300 mm beyond the back of curb or walk.

In addition to gutters, a shoulder may be required on expressways and arterial roadways.

All sidewalks shall be imprinted with the Contractor’s stamp showing company name and year of construction. Frequency of stamps shall be one per residential block or every 200 m whichever is less.

Sidewalks shall be imprinted with a “CC” to identify all CC locations.

All concrete structures are to be adequately reinforced. All concrete structures require a minimum compressive strength of concrete at 28 days of 30 MPa. In all, concrete air entrainment by volume shall be a minimum of 5.5% and a maximum of 8%. The sub grade and base gravel under concrete structures must be compacted to 100% Standard Proctor Density.

The Consultant is required to provide written recommendations and/or confirmation of the cross section for all expressways and arterial roadways within their project limits.

Reverse gutter may be used where the road cross slopes away from the curb such as on super elevation 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 sidewalks along the various road classifications are generally as follows. Specific requirements are subject to review by the Engineering Department. The design of the subdivision should consider pedestrian needs and allow for walkways through cul-de-sacs and other appropriate locations.

4.2 Arterial Roadways

A 2.5 m wide, or greater separate sidewalk or asphalt pathway shall be constructed on one side of the roadway to form part of the bicycle path system.

4.3 Residential Collector Roadways

A 1.5 m monolithic or 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 2.5 m (monolithic or separate) on one side of collector roadways if designated as part of the bicycle path system

4.4 Residential Local Roadways

A 1.5 m monolithic or separate sidewalk with rolled curb, and 0.25 m gutter is normally required along both sides of residential local roadways. The requirement for sidewalk may be waived by the City of Cold Lake under certain circumstances where pedestrian traffic is expected to be low.

4.5 Industrial, Commercial and Institutional Roadways

Sidewalks are generally not requited 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. WHEEL CHAIR / BIKE RAMPS

Wheel Chair / Bike Ramps shall be placed at the midpoint of the curb return at all intersections involving existing, new or future sidewalk crossings and shall be constructed monolithically or securely dowelled.

6. ROADWAY DRAINAGE

Requirements for storm water management, major drainage design standards, minor storm sewer design criteria, catch basin locations, length of drainage run are included in Section 8.

It is suggested that weeping tile drains be installed at sag points in the roadway to drain the sub grade during construction.

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 and or sandy soils are very common in Cold Lake. These 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 ground water table as possible. Where roadways are necessary in areas with sensitive soil conditions or at sag intersections it is recommended that the consultant consider the implementation of wick drains or alternative means addressing subsurface moisture to preserve the longevity of the roadway and its structure.

7.2 Pavement Design

The Geotechnical report for the proposed project shall be submitted to the City of Cold Lake for review as part of the overall submission.

The Geotechnical report must include specific recommendations for pavement structure construction based on insitu conditions and projected traffic volume. The stronger of the structure recommended by the Geotechnical Consultant and the structure shown in Table 11.3 shall be used.

The minimum pavement structure permitted for each road classification shall be as outlined in the following table:

Table 11.3
Pavement Structure

Road Classification	Asphaltic Concrete Depth (mm)	Granular Base Depth (mm)	Granular Subbase Depth (mm)	Subgrade Preparation Depth (mm)	Total Depth (mm)
Expressway and Arterial	125	200	300	150	775
Residential collector	60 1st yr, 40 next yr	300	150	150	700
Residential Local	50 1st yr, 40 next yr	250	-	150	500
Paved Lanes	75	250	-	150	475
Gravel Lanes	-	150	-	150	300
Recreational Trail	50	150	-	150	350

The pavement structures shown in Table 11.3 provide for the minimum allowable thickness for asphalt, granular base, granular sub base and sub base preparation for each street classification. Note that a minimum sub grade preparation of 150 mm is required in every case. The sub grade and base gravels must be compacted to 100% Standard Proctor Density with an optimum moisture content of +1% to -2% and pass a roll test prior to the placement of subsequent layers. The required compaction can generally best be achieved if the soil is dried or moistened to within +/- 3% of the optimum moisture content, Roll tests shall be conducted with a loaded tandem gravel truck or a single axle water truck loaded to maximum GVW. The consultant or their representative, the contractor and a representative from City of Cold Lake Infrastructure Services must be present to observe the roll test.

These pavement structures are founded on a prepared sub grade compacted to 98% Standard Proctor Density. The granular sub base must have a typical level of sub grade support for the site during spring thaw when the sub grade soils will exist in a weakened condition. Where soils of lower stability are used, an increase in the pavement structure will be required.

7.3 Sub grade Preparation and Improvement

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 6. Sub grade 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. 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 sub grades is to thicken the granular sub base layer of the pavement section. Placement of this thickened granular sub base is to 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. The geotechnical report submitted is to address these areas to determine acceptable depths of granular sub base and any other alternatives to provide the required support for both short and long term road life

Construction procedures should be designed to minimize disturbance to the sensitive sub grades and to protect the integrity of the granular working mats. If the sub grade has failed during construction, the weakened material may have to be sub cut and replaced with an approved fill material on top of a filter fabric and or geogrid. Should the sub grade fail as a result of mismanaged construction procedures or ineffective care of water, the costs associated with the remediation or reconstruction of the subgrade shall be the responsibility of the contractor / developer.

Required granular thickness, initial lift thickness and the need for any special construction procedures are best determined during the geotechnical investigation.

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. The minimum depth of successive lifts shall be 40 mm. Asphalt placement shall be in accordance to Table 11.3 Pavement Structure.

9. STAGED CONSTRUCITON 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.

10. STANDARD ROAD CROSS SECTION

Standard roadway cross section drawings are included in Section 13.

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
Expressways and Arterial Roadways.	
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
Collector Roadways	
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
Local Roadways	
1. Centre Lines	Paint
2. Stop Bars	Paint
3. Crosswalk Lines	Paint
Notes:	
1. Expressway and Arterial roadways include any portion of a collector or local roadway within 50 m of an intersecting expressway or arterial roadway.	
2. Type 1 permanent pavement marking material – Thermoplastic “hot in laid polymer epoxy surface material	
3. Type 2 permanent pavement marking material – spray applied hybridized polymer epoxy surface material.	
4. Type 3 permanent pavement marking material – surface applied cold plastic marking material.	
5. A painted center line marking shall be applied to all Collector Roadways unless otherwise authorized by the City of Cold Lake Infrastructure Services	
6. Center lines and crosswalk lines are not required on Local Roadways unless otherwise authorized by the City of Cold Lake Infrastructure Services	

Pavement marking and traffic control signs shall conform to the manual of uniform traffic control devices guidelines unless otherwise specified in the City of Cold Lake Engineering Standards.

11.2 Street Signs

High intensity reflective material is required for the lettering and background for all signage.

Street name signs at intersections shall consist of white lettering on a blue metal plate, except for provincial highways/ expressways which shall consist of white lettering on a green metal plate.

Lettering sizes shall be as follows:

- Provincial highways/ expressways-shall conform to the most recent edition of the Manual of Uniform Traffic Control Devices for Canada
- Arterial roadways- 200 mm
- Collector roadways- 150 mm
- Local roadways- 100mm

All street name signs shall be of theme design acceptable to the City of Cold Lake.

Traffic control signage at intersections shall be placed as follows:

Stop signs will be placed at intersections, unless signalized, where a local road or lower classification road is entering a thorough road classified as a:

i) provincial highways/ expressway
ii) arterial roads
iii) collector roads

Yield signs will be placed at intersections where a local road is entering a thorough road classified as a:

i) Local road up to 3000 vehicles per day

Roads of similar classification, such as local meeting a local or collector meeting a collector will be signed based on traffic counts, collision reports and best management practices

11.3 Pavement Marking and Signage Drawings

Pavement markings and traffic control signs shall conform to the most recent edition of the Manual Of Uniform Traffic Control Devices For Canada. The codes and locations shall be shown on a separate drawing sheet as part of the “For Construction” drawing set.

.1 Consultant are to arrange for the installation of traffic signs and pavement markings through the use of a private contractor.

12. EMERGENCY ACCESS DESIGN REQUIREMENTS

The clear unobstructed width of an emergency access right of way shall be a minimum width of 6 m with 3 m driving surface. The driving surface may be concrete, asphalt, paving stone, or turf stone with a base constructed to lane standards.

The emergency access shall be structurally and geometrically designed to safely carry firefighting 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 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.

Swing 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. See Section 13 for Bollard standards.

13. FENCING

.1 Post and cable fencing is required along all lanes adjacent to public utility lots municipal reserves, environmental reserves and public open space areas or as specified by the City of Cold Lake Infrastructure Services or the Director of Public Works .

.2 Consistent screen fencing shall be required on all arterial and collector roadways where the lots back onto the roadway. Berms and fences shall be required to separate residential developments from high volume arterial traffic.

.3 Fencing proposals are to be reviewed for acceptance by the City of Cold Lake prior to construction. Construction of fencing may not start until an acceptable plan has been provided and written acceptance granted. Fencing along arterial roads and utility lots shall be of a close boarded type and extend to ground level. Fencing along parks, schools and other public open space shall be 1.5 m high chain link or lower pipe rail variety at the discretion of the City. All fences shall be constructed on private property approximately 150 mm from the property line. After the specified maintenance period the fences shall be the responsibility of the property owner.

14. LANDSCAPING

14.1 Expressway and Arterial Roadways

Berms or elevated contoured embankments shall be utilized for sound abatement along highways as required by the City of Cold Lake. All berms shall have maximum side slopes of 4:1, a top width of 1 m and be top soiled and sodded/seeded. Berm tops shall be centered on

the property line. Where berm design provides for less than 5 m from toe to curb, additional land must be dedicated for the right of way.

Level one landscaping of medians and boulevards within expressway and 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 Planning and Development Department.

The boulevard from back of walk, streetlight alignment to the curb shall be graded to drain to the curb at 2.0%. a berm shall be constructed from the back of walk/streetlight alignments to the edge of the right of way. Berms shall have maximum side slopes of 4:1 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 sewer system.

14.2 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 or divided collector and local roadways. All tree and shrub planting shall be in accordance with Section 12.

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%.

14.3 Medians

In general, the surface treatment for medians shall be as follows:

.1 Expressways and Arterial roadways

.1 The median shall be capped with concrete, paving stone or stamped asphalt where the median width is 3 m or less. The surface finish must be approved by the City of Cold Lake prior to installation.

.2 The median shall be finished to level one landscaping standards where the median width is greater than 3m.

.3 No trees shall be planted in an expressway or arterial roadway median area where the median width is less than 6m.

.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, paving stone or stamped asphalt where the median width is 3 m or less. The surface finish must be approved by the City of Cold Lake during the design phase of the project.

.2 The median shall be capped with concrete, paving stone, stamped asphalt or finished to level one landscaping standards where the median width is greater than 3m. The surface finish must be approved by the City of Cold Lake during the design phase of the project.

.3 No trees shall be planted in collector and/or local roadway median areas where the median width is less than 5m.

.4 The median cross section shall conform to the cross section shown in the construction specifications.

END OF SECTION

ROADWAY GEOMETRIC DESIGN ELEMENTS

Roadway Designation	Design Elements								
	TAC Design Classification	Daily Service Volume (vpd)	Minimum Right of Way Width	Horizontal Alignment Minimum Radius of Curvature	Minimum Intersection Angle (Degrees)	Intersection Curb Return Radii (m)			
						Arterial	Collector	Local	Lanes
Urban Expressway	UED 90	>30,000	90m	380	75	Site specific	10 x 10	N/A	N/A
Divided Arterial	UAD 70	>20,000	60m	250m	75	30 x 30	10 x 10	N/A	N/A
Undivided Arterial	UAU 70	<20,000	30m	250m	75	30 x 30	10 x 10	N/A	N/A
Divided Residential Collector (see note)	UCD 60	<10,000	24m	185m NC 135m RC	75	10 x 10	5 x 5	5 x5	N/A
Undivided Residential Collector	UCU 60	<10,000	24m	185m NC 135m RC	75	10 x 10	5 x 5	5x5	N/A
Divided Residential Local	ULD 60	<3,000	20m	115m	75	N/A	5 x 5	5x5	N/A
11m Undivided Residential Local	ULU 50	<3,000	20m	115m	75	N/A	5 x 5	5x5	N/A
10m Undivided Residential Local	ULU 50	<3,000	20m	115m	75	N/A	5 x 5	5x5	N/A
Rural Industrial Collector	RCU60	<10,000	24m	185m	75	10 x 10	10 x 10	10x10	N/A
Urban Industrial Collector	UCU 60	<10,000	24m	185m	75	10 x 10	10 x 10	10x10	N/A
Rural Industrial Local	RLU 50	<3,000	20m	115m	75	N/A	10 x 10	10x10	N/A
Urban Industrial Local	ULU 50	<3,000	20m	115m	75	N/A	10 x 10	10x10	N/A
Frontage (service) Road	ULU 50	<3,000	20m	115m	75	N/A	10 x 10	10x10	N/A
Lanes	20	<500	7m	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 Super elevation (as per TAC)			Road Gradient (%)			Curb Return Radii (m)		
		Desirable Rate (m/m)	Max Rate (m/m)		Max Grade	Desired Grade	Min Grade	Arterial Road	Collector Road	Local Road
Urban Expressway	UED 90	0.04	0.06	<< See Section 11 – clause 3.5 and Table 11.1 >>	6.00	3.00	0.50	See TAC Manual		N/A
Divided Arterial	UAD 70	0.04	0.06		6.00	3.00	0.50	As Per TAC Manual	15	N/A
Undivided Arterial	UAU 70	0/04	0.06		6.00	5.00	0.50		15	N/A
Divided Residential collector	UCD 60	Normal Crown 0.20	Reverse Crown 0.20		9.00	6.00	0.50	15	8	8
Undivided Residential collector	UCU 60	Normal Crown 0.20	Reverse Crown 0.20		9.00	6.00	0.50	15	8	8
Divided Residential	ULD 60	Normal Crown 0.20	Normal Crown 0.20		9.00	6.00	0.50	N/A	8	8
10m Undivided Residential Local	ULU 50	Normal Crown 0.20	Normal Crown 0.20		9.00	6.00	0.5	N/A	8	8
11m Undivided Residential Local	ULU 50	Normal Crown 0.20	Normal Crown 0.20		9.00	6.00	0.50	N/A	8	8
Rural Industrial Collector	RCU 60	Normal Crown 0.20	Reverse Crown 0.20		6.00	6.00	0.50	15	15	15
Urban Industrial Collector	UCU 60	Normal Crown 0.20	Normal Crown 0.20		6.00	6.00	0.50	15	15	15
Rural Industrial Local	RLU 50	Normal Crown 0.20	Normal Crown 0.20		6.00	6.00	0.50	N/A	15	15
Urban Industrial Local	ULU 50	Normal Crown 0.20	Normal Crown 0.20		6.00	6.00	0.50	N/A	15	15
Rural Frontage (Service)Rd.	ULU 50	Normal Crown 0.20	Normal Crown 0.20		6.00	6.00	0.50	N/A	8	8
Urban Frontage (service) Rd.	ULU 50	Normal Crown 0.20	Normal Crown 0.20		6.00	6.00	0.50	N/A	8	8
Gravel Lanes	20	N/A	N/A		9.00	6.00	0.80	N/A	N/A	N/A
Paved Lanes	20	N/A	N/A		9.00	6.00	0.60	N/A	N/A	N/A

1. GENERAL

The Developer and the City shall jointly be responsible for the design and development of the School Sites and Detention Ponds (should the City be contributing flows). The Developer shall be solely responsible for the design and development of all remaining public open space (parkettes, linear parks, natural parks, boulevards, medians, utility lots, buffer areas, roadway berms) including all amenities falling within these open spaces (plantings, walkways, furniture, playgrounds, buildings, structures) as noted by the Planning and Development Department and as specified in the Development Agreement.

The areas to be landscaped shall be identified in the following documents:

.1 Neighborhood Area Structure Plan

.2 Landscape Plan submitted with or supplemental to the approved "For Construction Drawings"

.3 Development Agreement

Detailed landscape drawings shall be prepared by a Certified Landscape Architect for each phase of Development in accordance with the conceptual landscape plans prepared as part of the Neighborhood Area Structure Plan. The landscape plan must be submitted to the City of Cold Lake as part of the submission of engineering drawings. 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 all municipal reserves

.7 Detention Ponds

2. LEVEL ONE LANDSCAPING

.1 The Developer is required to provide level one landscaping for all public open space areas (parkettes, linear parks, natural parks, boulevards, medians, utility lots, buffer areas, roadway berms, walkways) as specified by the Planning and Development Department. The Developer is not responsible for providing level one landscaping for designated neighborhood school/park sites. Additional information developing the neighborhood park sites is included in Clause 7.

.2 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 one landscaping requirements and cost recoveries for detention pond facilities are included in Clause 8.

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 Planning and Development Department.

.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 (water, sanitary or storm) but must be set back at least 1.5 m from shallow utilities (gas, power, telephone or cable); measured horizontally from the center of the tree to the nearest utility alignment.

.3 Trees and shrubs shall be set back at least 5 m from hydrants, valves, service valves, manholes, catch basins, transformers, pedestals or other surface utility equipment.

.4 Trees and shrubs shall be set back at least 2.5 m from the edge of any collector road (boulevard or median) local road (boulevard or median) or lane.

.5 Trees and shrubs shall be set back at least 3.0 m from the edge of any arterial roadway (boulevard or median).

.6 Hedge plants shall be spaced 1.0 m apart.

.7 The offset shall be measured horizontally from the center of the tree to the face of curb for roads or to the edge of gravel/pavement for lanes.

.8 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 m wide x 2 m long x 1.5 m deep

.2 Shrubs: 1 m wide x 1 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 center 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 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 is located in hardiness zone 3a. Additional information for the specific trees and shrubs suitable for this area can be found at the Agriculture and Agri Food Canada Web Site:
http://sis.agr.gc.ca/cansis/nsdb/climate/hardiness/index.html

.1 Appendix A, Table A identifies trees that are suitable for arterial roadway, collector roadway boulevards, median tree planting, municipal reserves and parkettes.

.2 The Developer shall identify all proposed tree and shrub species on the landscape drawing.

.3 If the Developer proposes to plant species that are not highlighted in the tables, the Developer shall submit a list of the proposed species for approval by the Parks and Facilitates Department Manager.

.4 The Developer shall provide trees and shrubs to the minimum standards included in Section 02906 of the Contract Specifications. The minimum size of deciduous trees suitable for arterial roadway, collector roadway and median tree planting shall be 65 mm (2 ½ in) caliper.

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 Neighborhood Area Structure Plan. 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 and/or shale trails

.4 Site furnishings (garbage receptacles, benches)

.5 Tot lots and playschool play structures and

.6 Trail signage

4.2 Post and Cable

.1 Post and cable fences are to be provided at the following locations:

.1 Separating a public roadway from a land or public utility lot

.2 Separating a lane from a park or other open space

.3 At other locations specified by Infrastructure and Public Works and/or the Planning and Development Department Manager.

4.3 Bollards

.1 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 bollard should be located on the easement line unless approved otherwise.

4.4 Site Furnishings

.1 The Developer shall supply and install site furnishing at locations specified by the approved landscape plan.

4.5 Trails

.1 The minimum width for walkways shall be 1.5 m wide and constructed of 12 mm crushed gravel or other approved surface. Construction details shall conform to City of Cold Lake Municipal Engineering residential lane standards.

.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 Planning and Development Department.

4.6 Tot Lots

.1 In addition to the playground facilities to be provided in the Neighborhood Park Sites, 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:

.1 A CSA compliant play structure base complete with treated timber surround
.2 A CSA compliant composite play structure
.3 One pedestal park bench
.4 One pedestal picnic table
.5 Two garbage receptacles
.6 Loose aggregate (gravel or shale) trials 1.5 m wide

.4 All equipment facilities and amenities are to meet current Parks and Facilities Department Specifications.

5. LEVEL FOUR LANDSCAPING

Level Four Landscaping (supplying and installing optional/enhanced amenities [e.g. ornamental structures, gazeboes, sculptures, feature walls, water features, fountains, spray pools etc.]) will be at the discretion of the Parks and Facilities and/or Public Works Department. 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. MUNICIPAL RESERVE/PARK SITE(S)

.1 General

The Developer is to provide municipal reserve land that may be used for various purposes as well as land required for parks and or school / church sites and will be determined as outlined in the Development Agreement.

The cost of developing these lands is the responsibility of the Developer and the City as follows:

.1 Multi neighborhood (High School) Park sites

City

.2 Neighborhood School sites

City

.3 Neighborhood Park Sites

Developer

.4 Parkette Sites

Developer

.5 Linear Parks

Developer

.6 Miscellaneous Reserve Parcels

Developer

.2 Neighborhood Park Financing and Construction

Construction of the Neighborhood Park Sites will be the responsibility of the Developer as follows:

.1 The developer will be responsible for completing the following work at their cost:
- .1 Topsoil stripping
- .2 Site grading
- .3 Topsoil replacement to finished grades
- .4 Level one, two and three landscaping
- .3 Constructing playground facilities, playing fields, multi purpose pad, parking lots

.4 Construction of the activity shelter

.2 Site financing and construction responsibility for a detention pond located in the Neighborhood Park Site will be the responsibility of the Developer and/or the City as noted in Clause 7.

.3 Neighborhood School/Park and Neighborhood Park Design

The Developer shall be responsible for the preparation of detailed design drawings for the development of the Neighborhood School/Park Sites and Neighborhood Park Sites. The design shall conform to standards established by the Planning and Development Department.

The design shall include:
.1 Establishing site grades, including grades for a detention pond
.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

Drawings of similar facilities are available from the recreation parks and culture department.

.4 General Municipal Reserve/Park Development Standards

Table A, included in Appendix B at the end of this section, provides a summary of the various park facility and amenity requirements to be provided in neighborhood school/park sites, neighborhood park sites, parkette site 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 included in the noted tables, included in Appendix B at the end of this Section.

.1 Multi neighborhood (high school) park sites – Table B

.2 Neighborhood school/park sites –Table C

.3 Neighborhood park sites – Table D

.4 Parkette sites – Table D

.5 Linear parks – Table F

As noted in Clause 7.1, the City is responsible for providing the amenities in the multi Neighborhood (high school) Park Sites and Neighborhood School/Park Sites. The Developer is responsible to provide these amenities for the parkettes and linear parks to the satisfaction of the City Planning and Development Department.

If the Developer wishes to develop parks exceeding the maximum standards, they must apply to the Planning and Development Department for approval and enter into a Maintenance Agreement prior to commencing construction. Also see Clause 5 – level four landscaping.

7. 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 neighborhood park sites; however, every effort should be made to exclude detention ponds from neighborhood park sites containing school sites.

.1 Detention Pond Financing Responsibility

.1 Financing responsibility options for construction of a detention pond are as follows:

Option 1:

If the proposed detention pond has been designated a trunk storm off site levy facility, the off site fund, subject to council approval, will be used to finance the construction of the detention pond. Responsibility for construction of the detention pond and recovery of the developers cost will be included in the development agreement.

Option 2:

If the proposed detention pond has not been designated a trunk storm facility, the Developer will be required to finance the construction of the detention pond. Recovery of the developers costs will not be applicable.

Responsibility for detention pond costs should be identified in the neighborhood area structure plan servicing study.

.2 Detention Pond Construction Responsibility

Construction of a detention pond will be the responsibility of the developer and the city as follows:

.1 The Developer will be responsible for completing the following work:

.1 Topsoil stripping

.2 Site grading

.3 Topsoil replacement to rough finished grades

.4 Grading topsoil to final grades

.5 Level One landscaping (except in the case of playing fields being constructed in the bottom of detention ponds, in which case the city will be responsible for the cost of constructing the playing fields).

.2 In the case of playing fields being constructed in the bottom of detention ponds, the City will be responsible for the construction of the playing fields including Level One Landscaping.

8. LANDSCAPING DRAWING REQUIREMENTS

.1 General

General landscaping drawing requirements are listed in Section 2.

.2 Detailed General Landscape Drawing

Detailed drawing at a scale of 1:500 shall be submitted showing the following:

.1 Specific type and site location for all proposed plantings, geotextiles and or furniture.

.2 Size (height and caliper) botanical name, and specie names of all plant material, 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. (included in Section 15 is a drawing showing a typical landscape and utility plan).

.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.

.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 areas / tennis courts.

.8 Detailed design and specifications for all trails.

.9 Detailed design and specifications for the community shelter.

.10 Tree and shrub planting details.

.4 Detailed Detention Pond Construction Drawings

Detailed plans shall be prepared for construction as a scale of 1:500 indicating the following:

.1 Detailed grading plan showing side slope grades, drainage swale grades, the tie in to grading on adjacent land uses, and existing / proposed site elevations.

.2 Detailed design of structures and piping.

.3 1:100 year flood plain.

.4 Detailed design of any baseball diamond or soccer pitch/football field, if applicable.

.5 Existing and proposed utilities and easements, including storm sewer mains, weeping tile drains and catch basins for site drainage.

.6 Detailed design and specifications for any trails.

.7 Tree, shrub and planting details.

.5 Drawing Review

The Developer shall submit landscape drawings as detailed in Section 2 of this document for review and approval.

.6 Design Revisions

The Infrastructure Services and Public Works department must approve all revisions to the approved design drawings.

END OF SECTION

TREES LISTED IN APPENDIX A SUITABLE FOR ROADWAY PLANTING

COMMON NAME		
American Elm	Laurel Willow	Schubert Chokecherry
American Lilac	Lodgepole Pine	Scots Pine
Brandon Elm	Manchurian Ash	Siberian Larch
Bur Oak	Mayday	Siberian Elm
Colorado Spruces	Mountain Ash	Silver Leaf Willow
Fallgold Black Ash	Patmore Green Ash	Spruce
Hawthorn	Ponderosa Pine	Swedish Columnar Aspen
Larch	Preston Lilac	Tower Poplar

TREES LISTED IN APPENDIX A SUITABLE FOR PARK PLANTING

COMMON NAME		
American Lilac	Laurel Willow	River Alder
Amur Maple	Linden	Saskatoons
Amur Cherry (Gold Rush)	Manchurian Ash	Schubert Chokecherry
Brandon Elm	Mayday	Silver Leaf Willow
Bur Oak	Mountain Ash	Spruce
Canada Buffalo Berry	Ohio Buckeye	Swedish columnar Aspen
Fallgold Black Ash	Ornamental Crab (Spring Snow)	Tatarian Maple
Hawthorn	Patmore Green Ash	Tower Poplar
Larch	Pincherry	Unity Sugar Maple
	Pine	Western Choke Cherry
	Preston Lilac	Wolf Willow

SUBDIVISION PARK DEVELOPMENT STANDARDS

ITEM	MINIMUM QUANTITY	MAXIMUM QUANTITY	DETAILS
Site preparation	Developer	Developer	Approved by department
Final grading/seeding	Entire site	Entire site	As per contract specs
Tree planting	10 trees / acre	15 trees / acre	Approved species
Shrub planting	50 m^2/ha(5shrubs/10m^2)	100 m^2 / ha	Approved species
Pre school play structure	1 per neighborhood	1 per neighborhood	Department approved
Elementary play structure	1 per neighborhood	1 per neighborhood	Department approved
Tot lot	1 per neighborhood	2 per neighborhood	Department approved
Class A soccer field	1 per neighborhood	1 per neighborhood	Department approved
Class B ball diamond	1 per neighborhood	1 per neighborhood	Department approved
Multi use pad	1 per 2 neighborhoods	1 per neighborhood	Department approved
Activity centre	1 per 2 neighborhoods	1 per neighborhood	Subject to school/city approval
Boarded rink/power/lights	1 per neighborhood	1 per neighborhood	Department approved
Sliding hill	1 per neighborhood	1 per neighborhood	Department approved
Power to site	1 per neighborhood park site	1 per neighborhood park site	Department approved
On site asphalt parking pad	1 per neighborhood park site	1 per neighborhood park site	18 parking stalls/sports field
Trails	1.5 m Asphalt	2.5 m Asphalt	As per 2.5m asphalt contract specs
Picnic tables	5 per neighborhood	8 per neighborhood	Department approved
Pedestal park benches	10 per neighborhood	14 per neighborhood	Department approved
Pedestal garbage receptacles	15 per neighborhood	22 per neighborhood	Department approved
Park signage	1 per neighborhood park site	1 per neighborhood park site	Department approved

MULTI NEIGHBORHOOD PARK STANDARDS

ITEM	MINIMUM QUANTITY	MAXIMUM QUANTITY	DETAILS
Site preparation	Entire site	Entire site	As per contract specs
Final grading/seeding	Entire site	Entire site	As per contract specs
Tree planting	10 trees / acre	15 trees / acre	Approved species
Shrub planting	50 m²/ha	100 m²/ha	Approved species
Pre school play structure	RP&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	Department approved
Class B ball diamonds	2 per site	2 per site	Department approved
Multi use pad	1 per site	1 per site	Department approved
Activity centre	As required	1 per site	Subject to school/city approval
Boarded rink/power/light	1 per site	1 per site	Department approved
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 contract specs
Picnic tables	4 per site	6 per site	Department approved
Pedestal park benches	6 per site	10 per site	Department approved
Pedestal garbage receptacles	10 per site	16 per site	Department approved
Park signage	2 per site	2 per site	Department approved

NEIGHBORHOOD/SCHOOL PARK STANDARDS

ITEM	MINIMUM QUANTITY	MAXIMUM QUANTITY	DETAILS
Site preparation	Entire site	Entire site	As per contract specs
Final grading/seeding	Entire site	Entire site	As per contract specs
Tree planting	10 trees / acre	15 trees / acre	Approved species
Shrub planting	50 m^2/ha	100 m^2/ha	Approved species
Pre school play structure	As required/school type	1 per site	Department approval
Elementary play structure	1 per site	1 per site	Department approval
Class A sports field	1 per site	1 per site	Department approved
Multi use pad	1 per site	1 per site	Department approved
Activity centre	As required	1 per site	Subject to school/city approval
Boarded rink/power/light	1 per site	2 per site	Department approved
On site asphalt parking pad	1 per site	1 per site	Lot shared with school
Trails	1.5m asphalt	2.5m asphalt	As per contract specs
Picnic tables	2 per site	3 per site	Department approved
Pedestal park benches	3 per site	5 per site	Department approved
Pedestal garbage receptacles	5 per site	8 per site	Department approved
Park signage	1 per site	1 per site	Department approved

NEIGHBORHOOD PARK STANDARDS

ITEM	MINIMUM QUANTITY	MAXIMUM QUANTITY	DETAILS
Site preparation	Entire site	Entire site	As per contract specs
Final grading/seeding	Entire site	Entire site	As per contract specs
Tree planting	10 trees / acre	15 trees / acre	Approved species
Shrub planting	50 m^2/ha	100 m^2/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	Department approved
Boarded rink/power/light	1 per site	1 per site	Department approved
On site asphalt parking pad	1 per site	1 per site	18 parking stalls/sports field
Picnic tables	1 per site	2 per site	Department approved
Pedestal park benches	2 per site	4 per site	Department approved
Pedestal garbage receptacles	3 per site	6 per site	Department approved
Park signage	1 per site	1 per site	Department approved
Trails	1.5m aggregate	2.5m asphalt	As per contract specs
Pedestal park benches	1 / acre	1 / acre	Department approved
Pedestal garbage receptacles	1 / acre	1 / acre	Department approved
Bollards	1 set/trail opening	1 set/trail opening	Department approved
Park signage	1 per site	1 per site	Department approved

PARKETTE STANDARDS

ITEM	MINIMUM QUANTITY	MAXIMUM QUANTITY	DETAILS
Site preparation	Entire site	Entire site	As per contract specs
Final grading/seeding	Entire site	Entire site	As per contract specs
Tree planting	10 trees / acre	15 trees / acre	Approved species
Shrub planting	50 m^2/ha	100 m^2/ha	Approved species
Pre school play structure	1 per site	1 per site	Department approved
Elementary play structure	RP&C discretion	RP&C discretion	Department approved
Trails	1.5m aggregate	1.5m aggregate	As per contract specs
Picnic tables	1 per site	1 per site	Department approved
Pedestal park benches	1 per site	2 per site	Department approved
Pedestal garbage receptacles	2 per site	3 per site	Department approved
Park signage	1 per site	1 per site	Department approved

LINEAR PARK STANDARDS

ITEM	MINIMUM QUANTITY	MAXIMUM QUANTITY	DETAILS
Site preparation	Entire site	Entire site	As per contract specs
Final grading/seeding	Entire site	Entire site	As per contract specs
Tree planting	10 trees / acre	15 trees / acre	Approved species
Shrub planting	30 m^2/ha	70 m^2/h	Approved species
Trails	1.5m aggregate	2.5m asphalt	As per contract specs
Pedestal park benches	1 / acre	1 / acre	Department approved
Pedestal garbage receptacles	1 / acre	1 / acre	Department approved
Bollards	1 set / trail opening	1 set / trail opening	As per RP&C specs
Park signage	1 per site	1 per site	Department approved

STANDARD DRAWING DETAILS

Water Design

Sanitary Design

Storm Design

Service Connections

Roadway Design

Signage

Landscape

END OF SECTION